JEFFERSON COUNTY ENVIRONMENTAL SERVICES DEPARTMENT

SANITARY SEWER SYSTEM – ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019 AMP01 WYLAM PS SERVICE AREA COMPREHENSIVE REHABILITATION

DECEMBER 2019

CONFORMED DOCUMENTS JANUARY 2020

VOLUME 1 of 1 BIDDING AND CONTRACT REQUIREMENTS, TECHNICAL SPECIFICATIONS – DIVISION 1 THRU DIVISION 15, AND APPENDICIES
These documents provided herein are a Conformed set of Contract Documents. The General and Special Conditions, General Requirements and Attachments are provided as a courtesy to the Contractor. In the event of a discrepancy between the Conformed Contract Documents and the Bid Contract Documents, the Bid Contract Documents shall govern.

Addenda items for replacement of existing text or addition are shown in bold and italics (example).

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NOTICE TO BIDDERS

Sealed Bid Proposals will be received by the Environmental Services Department, Jefferson County, Alabama, in Room 270, Commission Chambers, Courthouse, Birmingham, Alabama, until 2:00 P.M. local time on Wednesday, JANUARY 22, 2020 and then publicly opened and read for the SANITARY SEWER SYSTEM – ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019 AMP01 – WYLAM PS SERVICE AREA COMPREHENSIVE REHABILITATION.

The scope of work includes the rehabilitation of approximately 194 sanitary sewer service laterals with cured-in-place liner, replacement of 24 laterals with excavation, 20 cleanout installations, 11,789 linear feet of 8-inch mainline cured-in-place liner, 548 vertical feet of manhole rehabilitation, asphalt paving and restoration work.

Bidding Documents are on file for inspection in the following locations:

Environmental Services Department
716 Richard Arrington Jr. Boulevard North, Suite A-300
Birmingham, Alabama 35203
Contact for Appointment: John Willett at (205) 325-3060

Complete digital project Bidding Documents (Specifications and Drawings) are available at www.jeffcoes.org. Navigate to “Business” to “Notice To Bidders” and then “Asset Management Program – Project Bid Information” for a complete listing. You may download the digital plan documents for $15.00 by setting up an account. Hardcopy sets of Bidding Documents are the responsibility of the bidder.

Bids will only be accepted from pre-qualified contractors who are listed on the Plan Holders List, signifying that they have purchased a set of documents from the Engineer, and who attend the MANDATORY Pre-Bid Conference.

NO BID PROPOSAL SHALL BE ACCEPTED AFTER THE TIME STATED FOR RECEIVING BID PROPOSALS IN THIS NOTICE. ENVELOPES CONTAINING CONTRACTOR'S BID PROPOSALS MUST PROMINENTLY DISPLAY THE NAME AND ADDRESS OF THE FIRM AND THE CONTRACTOR'S ALABAMA LICENSE NUMBER WITH THE DATE OF EXPIRATION ON THE FRONT OF THE ENVELOPE. THESE REQUIREMENTS SHALL NOT BE WAIVED.

The Contractor is hereby advised that TIME IS OF THE ESSENCE on this project. The Contract Time for this project is two hundred seventy (270) consecutive calendar days from the effective date of the written Notice to Proceed to achieve Final Acceptance. Liquidated damages will be assessed if this time limit is exceeded. The Contractor may apply for an extension of time in accordance with the provisions of the Contract; however, such an extension must be approved prior to the Contract Completion Date to avoid the imposition of liquidated damages.
The Contractor is hereby advised that a Pre-Bid Conference will be held at the Shades Valley Training Facility, 1331 Oak Grove Road, Birmingham, Alabama on Tuesday, January 8, 2020 at 2:00 p.m. This Pre-Bid Conference is MANDATORY for all contractors planning to submit a Bid Proposal on this project.

Questions concerning meaning or intent of Bidding Documents shall be submitted to Tad Powell, PE, Associate, Hazen and Sawyer, at email tpowell@hazenandsawyer.com no later than 5:00 p.m. local time on January 10, 2020. All questions must be in writing on Bidder’s company’s letterhead.

THE ATTENTION OF ALL BIDDERS IS CALLED TO THE PROVISIONS OF THE STATE LAW GOVERNING GENERAL CONTRACTORS, AS SET FORTH IN ALABAMA CODE SECTIONS 34-8-1 THROUGH SECTION 34-8-28 (1975), AS AMENDED, CHAPTER 4, SECTION 65 TO 82 (INCLUSIVE) OF TITLE 46 OF THE CODE OF ALABAMA OF 1940, AS AMENDED; AND BIDDERS SHALL BE GOVERNED BY SAID LAW IN SO FAR AS IT IS APPLICABLE. THE ABOVE MENTIONED PROVISIONS OF THE CODE MAKE IT ILLEGAL FOR THE OWNER TO CONSIDER A BID PROPOSAL FROM ANYONE WHO IS NOT PROPERLY LICENSED UNDER SUCH CODE PROVISIONS.

THE ATTENTION OF BIDDERS IS CALLED TO THE PROVISIONS OF ALABAMA CODE SECTION 39-2-14 (1975) AS AMENDED, REQUIRING A NONRESIDENT CONTRACTOR TO REGISTER WITH THE DEPARTMENT OF REVENUE PRIOR TO ENGAGING IN THE PERFORMANCE OF A CONTRACT IN THE STATE OF ALABAMA.

THE ATTENTION OF BIDDERS IS CALLED TO THE PROVISIONS OF ALABAMA CODE SECTION 39-3-5 (1975) AS AMENDED, REGARDING PREFERENCE TO RESIDENT CONTRACTORS.

THE ATTENTION OF BIDDERS IS CALLED TO THE PROVISIONS OF ALABAMA ACT 2016-312 AS AMENDED, REGARDING NOT ENGAGING IN THE BOYCOTT OF A PERSON OR ENTITY BASED IN OR DOING BUSINESS WITH A JURISDICTION WITH WHICH THIS STATE ENJOYS OPEN TRADE.

THE EXCAVATION PORTION OF THIS PROJECT IS CLASSIFIED AS A CLASS “A” SEWER LINE PROJECT. ALL PROSPECTIVE BIDDERS MUST BE PRE-QUALIFIED WITH THE JEFFERSON COUNTY ENVIRONMENTAL SERVICES DEPARTMENT TO EITHER BID CLASS “A” SEWER LINE PROJECTS OR CURED-IN-PLACE PROJECTS IN ORDER TO BID ON THIS PROJECT. TO PRE-QUALIFY WITH THE DEPARTMENT AND TO CONSTRUCT CLASS “A” SEWER LINE PROJECTS, EACH PROSPECTIVE BIDDER MUST FURNISH WRITTEN EVIDENCE OF COMPETENCY AND EVIDENCE OF FINANCIAL RESPONSIBILITY TO THE COUNTY.

ACCORDINGLY, THE COUNTY WILL NOT ACCEPT PRE-QUALIFICATIONS AFTER JANUARY 3, 2020 BID PROPOSAL FORMS WILL NOT BE ISSUED TO PROSPECTIVE BIDDERS WHO DO NOT PRE-QUALIFY.
CONTRACTORS ARE ENCOURAGED TO CONTACT THE JEFFERSON COUNTY ENVIRONMENTAL SERVICES DEPARTMENT, 716 RICHARD ARRINGTON JR. BOULEVARD NORTH, SUITE A300, BIRMINGHAM, ALABAMA, IN ADVANCE OF THE DEADLINE TO DETERMINE IF THE CONTRACTOR IS PRE-QUALIFIED TO CONSTRUCT CLASS “A” SEWER LINE PROJECTS, OR FOR OTHER INFORMATION REGARDING THE REQUIREMENTS FOR PRE-QUALIFICATION.

BY: ______________________________

David Denard
Director of Environmental Services
Jefferson County, Alabama
SECTION 00101

INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Prequalification of Bidders
B. Bid Proposal Form
C. Issuance of Bid Proposal Forms
D. Interpretation of Estimated Bid Proposal Quantities
E. Examination of Contract Documents and Site of the Work
F. Preparation of Bid Proposal
G. Rejection of Bid Proposals
H. Bid Proposal Guaranty
I. Delivery of Bid Proposal
J. Withdrawal or Revision of Bid Proposals
K. Public Opening of Bid Proposals
L. Disqualification of Bidders
M. Consideration of Bid Proposals
N. Award of Contract
O. Cancellation of Award
P. Return of Bid Proposal Guaranty (Certified Checks)
Q. Requirements of Contract Bonds
R. Execution of Contract
S. Approval of Contract
T.  Failure to Execute Contract

U.  Nondiscrimination in Employment

1.02 PREQUALIFICATION OF BIDDERS

A.  The excavation portion of this project is classified as a Class “A” sewer line project. Only those contractors pre-qualified to bid work for the Jefferson County Environmental Services Department in this classification or Cured-In-Place projects will be allowed to submit Bids for this project. To obtain Pre-qualification status, each Bidder shall furnish the Owner satisfactory evidence of his competency to perform the proposed Work. Such evidence of competency, unless specified otherwise, shall consist of statements covering the Bidder's past experience on similar work, a list of equipment that would be available for the Work, and a list of key personnel that would be available. In addition, each Bidder shall furnish the Owner satisfactory evidence of his financial responsibility. Such evidence of financial responsibility, unless specified otherwise, shall consist of a confidential statement or report of the Bidder's financial resources and liabilities as of the last calendar year or the Contractor's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the Bidder shall further certify whether his financial responsibility is approximately the same as stated or reported by the public accountant. If the Bidder's financial responsibility has changed, the Bidder shall qualify the public accountant's statement or report to reflect his (Bidder's) true financial condition at the time such qualified statement or report is submitted to the Owner.

B.  Along with a signed Pre-qualification Application, each Pre-qualification applicant shall submit "evidence of competence" and "evidence of financial responsibility" to the Jefferson County Environmental Services Department, 716 Richard Arrington Jr. Boulevard North, Suite A300, Birmingham, Alabama 35203, no later than the deadline date for receipt of Pre-Qualification Applications as specified in Section 00100 – Notice to Bidders.

C.  Once a Bidder has pre-qualified to submit a Bid Proposal on County work, said Bidder will not be required to resubmit the Pre-qualification documents previously specified herein in order to bid subsequent work of a similar nature unless specifically requested to do so by the Jefferson County Environmental Services Department. Pre-qualification shall be applicable only to the particular individual, partnership, firm, corporation, or joint venture named in the documents submitted as evidence of competence and financial responsibility.

D.  All Bidders must be licensed contractors in the State of Alabama at the time Bid Proposals are submitted, and each Bidder must furnish certain information
pertaining to the State License on the outside of the Bid Proposal envelope in accordance with requirements of this Section, or said Bid Proposals will not be opened.

1.03 BID PROPOSAL FORM

A. The Owner has furnished Bidders with a Bid Proposal Form which contains a list of materials to be furnished and/or items of work to be done. The Bid Proposal Form is presented in Section 00300 – Bid Proposal. The complete Specifications ARE NOT to be returned with the completed Bid Proposal Form and associated documentation. As part of the Bidding Documents, the Engineer will electronically provide each bidder with an Adobe Acrobat® Portable Document Format (.pdf) file that includes the Bid Proposal Form and all of the associated documentation that each bidder will be required to complete and submit as their complete Bid Proposal as follows:

1. Section 00300 – Bid Proposal
2. Section 00350 – Non-Collusion Affidavit
3. Section 00360 – MBE/DBE Documentation Statement Jefferson County Commission Environmental Services Department
4. Section 00410 – Bid Bond
5. Section 00430 – List of Subcontractors
6. Appendix C – Jefferson County Environmental Services Department MBE/DBE Forms
7. Appendix D – State of Alabama Resident Status Form

B. The Drawings, Specifications, and other documents designated in the Bid Proposal shall be considered a part of the Bid Proposal, whether attached or not.

C. Clarifications, corrections, and minor changes to the Bid Proposal Form, Specifications, or Drawings may be put into effect through a numbered addendum issued by facsimile, by certified letter, or by hand delivery from the Owner or Engineer, notifying all prospective Bidders to whom Bid Proposal Forms have been previously issued.

1. Questions concerning meaning or intent of Bidding Documents shall be
submitted to Tad Powell, PE, Associate, Hazen and Sawyer, at email 
tpowell@hazenandsawyer.com. All questions must be in writing on 
Bidder’s company’s letterhead. Questions submitted may or may not be 
answered via Addenda. Any and all replies to questions will be issued by 
Addenda faxed, mailed, or delivered to parties recorded by the Engineer as 
having received the Bid Proposal Form. If Addenda are mailed, each 
Bidder must provide a UPS account number to pay for mailing of the 
Addenda. Questions received after 5:00 p.m. local time on January 10, 
2020 will not be answered. Only questions answered by formal written 
Addenda will be binding. Oral and other interpretations or clarifications 
will be without legal effect.

2. Addenda may be issued to modify any part of the Contract Documents as 
deemed necessary by the Engineer or Owner.

1.04 ISSUANCE OF BID PROPOSAL FORMS

A. The Owner reserves the right to refuse to issue a Bid Proposal Form to a 
prospective Bidder, should such Bidder be in default for any of the following 
reasons:

1. Failure to comply with any prequalification regulations of the Owner, if 
such regulations are cited, or otherwise included, in the Specifications as a 
requirement for bidding.

2. Failure to pay or satisfactorily settle all valid bills due for labor and 
materials on former Contracts in force (with the Owner) at the time the 
Owner issues the Bid Proposal Form to a prospective Bidder.

3. Contractor default under previous Contracts with the Owner.

4. Unsatisfactory work, at the sole discretion of the Owner, on previous 
Contracts with the Owner.

5. Failure to prequalify as required in this section.

1.05 INTERPRETATION OF ESTIMATED BID PROPOSAL QUANTITIES

A. The quantities of the Work and materials shown on the Bid Proposal Form or on the 
Drawings are believed to represent the approximate volume of Work to be performed 
and materials to be furnished and are to be used for comparison of Bid Proposals. 
Payment to the Contractor will be made only for the actual quantities of work 
performed or materials furnished and in accordance with the procedures set out in the 
Drawings and Specifications and it is understood that the quantities may be increased 
or decreased as hereinafter provided without invalidating the bid prices in any way.
1.06 EXAMINATION OF CONTRACT DOCUMENTS AND SITE OF THE WORK

A. Bidders are advised that the Drawings, Specifications, and Addenda, if any, constitute all the information which the Owner will furnish for Bidding. Except those items listed in the preceding sentence, no information given by the Owner, or any representative thereof, prior to the execution of the Contract shall become a part of or change the Contract Drawings or Specifications or be binding upon the Owner. Bidders are required, prior to submitting a Bid Proposal, to read carefully the Specifications, the Bid Proposal, Contract and Bond forms; to examine the Drawings; to visit the site of the Work; to carefully examine local conditions; to inform themselves by their independent research of the difficulties to be encountered; and judge for themselves of the accessibility of the Work and all attending circumstances affecting the cost of doing the Work or the time required for its completion and obtain all information required to make an informed Bid Proposal. Bidders shall rely exclusively upon their own estimates, investigation, and other data which are necessary for full and complete information upon which the Bid Proposal may be based. It is mutually agreed that submission of the Bid Proposal will be prima facie evidence that the Bidder has made the examination and investigations required herein.

1.07 PREPARATION OF BID PROPOSAL

A. The Bidder shall submit his Bid Proposal on the Bid Proposal Form furnished by the Owner. Each item for which a quantity of Work is shown shall show a unit price, and each item shall be correctly extended and summarized. Should there develop a discrepancy between the unit price and the extended amount shown, the unit price shall govern and the extended amount shall be corrected.

B. The Bid Proposal must be signed in black ink by the individual, by one or more members of the partnership, by one or more members or officers of each firm representing a joint venture, by one or more officers of a corporation, or by an agent of the Contractor legally qualified and acceptable to the Owner.

C. If the Bid Proposal is made by an individual, his name and post office address must be shown; by a partnership, the name and post office address of each partnership member must be shown; as a joint venture, the name and post office address of each member or officer of the firms represented by the joint venture must be shown; by a corporation, the name of the corporation and the business address of its corporate officials must be shown.

D. Anyone signing a Bid Proposal as an agent shall file evidence of his authority to do so and that his signature is binding upon the firm or corporation.

E. The Bidder certifies with his Bid Proposal that prices bid shall be firm for a
period of 75 days from date of the Bid Proposal or for a longer time if mutually agreeable by the Owner and the Contractor.

F. Bid shall contain acknowledgment Bidder has received Addenda (Addenda numbers shall be filled in on Bid Proposal).

1.08 REJECTION OF BID PROPOSALS

A. Bid Proposals may be considered irregular and rejected for the following reasons:

1. If the Bid Proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered.

2. If there are unauthorized additions, conditional, or alternate pay items, or irregularities of any kind which make the Bid Proposal incomplete, indefinite, or otherwise ambiguous as may be determined by the Owner.

3. If it is determined that the Bidder did not prequalify as previously required herein.

4. If the Bid Proposal does not contain a unit price for each pay item listed in the Bid Proposal.

5. If the Bid Proposal contains unit prices that are obviously unbalanced.

6. If the Bid Proposal is not accompanied by the Bid Proposal Guaranty specified by the Owner.

7. If the Bid Proposal does not prominently display the name of the project, the contractor’s name and address, and the contractor’s Alabama license number with date of expiration on the front of the envelope.

B. The Owner reserves the right to reject any and all Bid Proposals and the right to waive technicalities and/or informalities, if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

1.09 BID PROPOSAL GUARANTY

A. Each Bidder must submit with his Bid Proposal a certified check made payable to the Owner, or a Bid Bond made by a company qualified and authorized to transact business in the State of Alabama in an amount not less than five percent (5%) of the total amount of his Bid Proposal, not to exceed $10,000.00, as a guaranty that if awarded a Contract, the Bidder will execute the required Contract and furnish
the required construction bonds (surety bonds) within ten (10) days after date of notice of such award.

1.10 DELIVERY OF BID PROPOSAL

A. Each Bid Proposal, which shall only consist of the Bid Proposal Form and the associated documentation as listed in Article 1.03 herein, must be filed in a sealed envelope, together with the Bid Proposal Guaranty, and received by the Owner in hand at the Commission Chambers, Room 270, Courthouse, Birmingham, Alabama, within the time limit for receiving Bid Proposals as stated in Section 00100 – Notice to Bidders, and shall be made on the Bid Proposal Form provided with the Bidding Documents. Written on the outside of the envelope containing the Bid Proposal shall be the name of the project, the name and address of the Bidder, the Bidder's Alabama Contractor's license number, and the expiration date of the current license; otherwise, the bid will not be opened. Any Bid Proposal mailed must have the Bid Proposal Form and associated documentation as listed in Article 1.03 herein enclosed in the bid envelope and further placed in an additional mailing envelope clearly marked on the outside, "Bid Proposal Enclosed". Bidder may mail Bid Proposal at his own risk to Environmental Services Department, Suite A-300, 716 Richard Arrington Jr. Blvd. North, Birmingham, Alabama, 35203. The Owner will not be responsible for Bid Proposals mailed. Bid Proposals filed after the scheduled date and time of receiving Bid Proposals will not be considered and will be returned to the sender unopened.

1.11 WITHDRAWAL OR REVISION OF BID PROPOSALS

A. A Bidder may withdraw or revise a Bid Proposal, provided that the Bidder's request for withdrawal or revision is received by the Owner before the time specified for opening bids. Revised Bid Proposals must be received at the place specified in the advertisement before the deadline specified for receiving all bids.

1.12 PUBLIC OPENING OF BID PROPOSALS

A. Bid Proposals shall be opened and read aloud publicly at the place, time, and date specified in Section 00100 – Notice to Bidders. Bidders, their authorized agents, and other interested persons are invited to attend.

B. Bid Proposals that have been withdrawn or received after the time specified for receiving bids shall be returned to the Bidder unopened.

C. For Bid Proposals to be received at the County Commission Audience Chambers in the Jefferson County in Birmingham and Bessemer, the clock inside the respective Chambers shall be used to determine the time if the clock appears to be set within five minutes of the correct time. If not, the time shall be as determined
by the County official or employee who is responsible for receipt and opening of bids.

1.13 DISQUALIFICATION OF BIDDERS

A. A Bidder shall be considered disqualified for any of the following reasons:

1. Submitting more than one Bid Proposal from the same individual, partnership, firm, or corporation under the same or different name.

2. Evidence of collusion among Bidders. Bidders participating in such collusion shall be disqualified as Bidders for any future work of the Owner until any such participating Bidder has been reinstated by the Owner as a qualified Bidder.

3. If the Bidder is considered to be in "default" for any reason specified in this section.

1.14 CONSIDERATION OF BID PROPOSALS

A. After the Bid Proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the quantities shown in the Bid Proposal by the unit bid prices. If a Bid Proposal contains a discrepancy between unit bid prices and the extension, the unit price shall govern.

B. Until the award of the Contract is made, the Owner reserves the right to reject a Bid Proposal for any of the following reasons:

1. If the Bid Proposal is irregular as specified in this section.

2. If the Bidder is disqualified for any of the reasons specified in this section.

C. Until the award of the Contract is made, the Owner reserves the right to reject any or all Bid Proposals; waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new Bid Proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.
1.15 AWARD OF CONTRACT
A. The award of the Contract, if made, shall be to the lowest responsive, qualified Bidder whose Bid Proposal complies with the requirements of the Owner. The Owner shall have 75 days to award the contract.

B. Before an award is made, the Owner reserves the right to investigate the previous experience, financial status, and general reputation of all Bidders.

1.16 CANCELLATION OF AWARD
A. The Owner reserves the right to cancel the award of the Contract without liability to the Bidder, except return of Bid Proposal Guaranty, at anytime before a Contract has been fully executed by all parties and is approved by the Owner in accordance with the requirements of this section.

1.17 RETURN OF BID PROPOSAL GUARANTY (CERTIFIED CHECKS)
A. All Bid Proposal Guaranties submitted in the form of certified checks, except those of the three (3) lowest bonafide Bidders, will, upon request, be returned without undue delay after Bid Proposals have been checked, tabulated, and the relation to the Bid Proposals established.

B. The Bid Proposal Guaranty of the three (3) lowest bonafide Bidders will be returned, at the discretion of the Owner and upon specific request of the Bidder, as soon as the Contract bonds and the Contract with the successful Bidder have been properly executed and approved.

C. Should no award be made, all guaranties will be returned.

D. Should the successful Bidder agree in writing to a stipulated extension in the time limit for award, the Owner may, at his discretion, permit the successful Bidder to substitute a satisfactory Bidder's Bond, if a certified check was submitted with his Bid Proposal, as a Bid Proposal Guaranty.

E. The Owner reserves the right to return all Bid Proposal Guaranties with a letter of transmittal by mail and his responsibility shall end upon the mailing thereof.

1.18 REQUIREMENTS OF CONTRACT BONDS
A. With the execution and delivery of the Contract, the Contractor shall furnish to the Owner a Performance Bond for the full amount of the Contract and a Payment Bond for an amount not less than one hundred percent (100%) of the total amount of the Contract and for the payment of all persons performing labor and furnishing materials under the Contract. Maintenance provisions of the bonds
shall remain in effect for twelve (12) months after completion and acceptance of the Work. The Contract completion date shall be designated as the date of execution of the final estimate by the Owner. The bonds shall be in a form satisfactory to the Owner. The surety shall be a reputable bonding company authorized to transact business in the State of Alabama and shall be acceptable to the Owner.

1.19 EXECUTION OF CONTRACT

A. The Contract shall be executed by the successful Bidder and returned to the Owner with acceptable Contract bonds together with Insurance documents required under Section 00822 – Insurance Requirements within ten (10) days after the date of Notice of Award by the Owner. The Contract, bonds, and other documents, shall be approved by the Owner's attorney, if required, before acceptance and execution by the Owner.

1.20 APPROVAL OF CONTRACT

A. Upon receipt of the Contract, the Contract bonds, and the complete insurance documents, the Owner shall review and complete the execution of the Contract in accordance with local laws and ordinances, and return the fully executed Contract to the Contractor. Delivery of the fully executed Contract to the Contractor shall constitute the Owner's approval to be bound by the successful Bidder's Bid Proposal and the terms of the Contract.

1.21 FAILURE TO EXECUTE CONTRACT

A. Should the successful Bidder to whom the Contract has been awarded fail to execute the Contract and furnish satisfactory Contract Bonds and Insurance Requirements within ten (10) days after date of Notice of Award, it shall be considered that he has abandoned his Bid Proposal. The tender of Contract may be withdrawn by the Owner, and the amount of the Bid Proposal Guaranty shall be forfeited to the Owner. The filing of a Bid Proposal by any Bidder shall be considered as an acceptance by him of this provision.

B. In the event of the death of the successful Bidder (if an individual and not a partnership or corporation) between the date of the opening of the Bid Proposals and the 10 days following the date of award of the Contract as required by these Specifications for furnishing Contract bonds and insurance documents and executing the Contract, the Bid Proposal Guaranty will be returned intact to the estate of the deceased successful Bidder and the project either rebid or awarded to the second low Bidder, at the discretion of the Owner.
1.22 NONDISCRIMINATION IN EMPLOYMENT

A. Contracts for Work under this Bid Proposal will obligate the contractors and subcontractors not to discriminate in employment practices.

B. Bidders must comply with the President's Executive Order No. 11246; one requirement of which is that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, disability, or national origin.

C. Bidder must also comply with Jefferson County’s anti-discrimination policy contained in administrative order AO 2008-04 by executing the form attached hereto as Appendix E.

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SECTION 00300

BID PROPOSAL

DATE: 01 / 22 / 20

TO: The Commission of
Jefferson County
Birmingham, Alabama

Gentlemen:

In response to your request the undersigned Bidder submits this Bid Proposal for the SANITARY SEWER SYSTEM – ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019 AMP01 – WYLAM PS SERVICE AREA COMPREHENSIVE REHABILITATION, as described and specified in the Drawings and Specifications:

1. Bidder proposes and agrees, in the event this Bid Proposal be accepted, to enter into a Contract with the above named Commission (herein designated and referred to as the Owner), in the form herein specified, to furnish all materials, equipment, machinery, tools, means of transportation, power and fuel, and to perform all labor necessary for or incidental to the construction of the aforementioned improvements, all in complete accordance with the requirements of the Contract Documents, to the entire satisfaction of the Owner, at the unit and lump sum prices we have inserted opposite each item of work listed in the accompanying Bid Proposal Form, which is an integral part of this Bid Proposal.

2. In submitting this Bid Proposal, the Bidder understands and agrees that a Contract may be awarded for the Work as may appear to the interest of the Owner; that the quantities as stated are approximate only; that no claim shall be made against the Owner on account of any excess or deficiency, either absolute or relative, therein; that the estimated quantities will be used as a basis for canvassing and evaluating Bid Proposals and for determining the estimated amount of the Contract; and that, within the limits of available funds, the Owner reserves the right to increase or decrease the estimated quantities by such amounts as may be necessary to complete the Work, provided, however, that the stated unit prices shall remain firm and unchanged.

3. Bidder hereby declares that the only person or persons interested in this Bid Proposal as principal or principals is, or are, named herein and that no other person than herein mentioned has any interest in this Bid Proposal or in the Contract to be entered into, that this Bid Proposal is made without connection with any other person, company, or parties making Bid Proposal, and that this Bid Proposal is in all respects fair and made in good faith without collusion or fraud.
4. Bidder further declares that he has examined the site of the Work and the building and labor conditions and has informed himself fully in regard to all conditions pertaining to the place where the Work is to be done; that he has examined the Drawings and these Specifications for the Work and other Contract Documents relating thereto and has read all Special Conditions furnished prior to the opening of bids; and that he has satisfied himself relative to the Work to be performed.

5. Bidder further proposes and agrees that, if awarded a Contract for this project, he will commence Work immediately on or before the date stated in a written notice from the Owner to commence Work; that he will furnish all materials, and perform all labor for the completion of the Contract and will complete same, including all accepted alternates thereto, within the time stated in the Special Conditions; and that on his failure to complete the Work within such time he will pay to the Owner for each calendar day that the Work, or any part thereof remains uncompleted beyond such specified time, the amount specified in the Special Conditions; this payment shall be made as liquidated damages.

6. The Bidder further declares that accompanying this Bid Proposal is a certified check or satisfactory Bid Bond in the sum of five percent (5%) of this Bid Proposal, not to exceed $10,000.00 and it is hereby agreed that in case of the withdrawal of this Bid Proposal without the consent of the Owner within one seventy five (75) days after the Bid opening, or that in case of failure on the part of the undersigned to execute the Contract as aforesaid and to deliver same and the required security for the faithful performance of the Contract (executed in the form annexed hereto), to said Owner within ten days from the date a notice of acceptance of this Bid Proposal is given to the undersigned personally, or by mail to the address as herein stated, then the undersigned Bidder will be deemed to have abandoned the Contract, and thereupon the amount of such check or bond shall be absolutely due and payable thereunder to the Owner.

7. The Bidder further declares his understanding that the Bid Proposal may contain quantities for Bid Items that exceed the quantities identified in the Contract Documents. If applicable, the quantities that are not shown in the Contract Documents may be identified by the Owner and/or Engineer and, if so identified, will be completed in this Contract.
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Bidder's Address: 2424 TYLER STREET

Bidder's Telephone Number (include area code): (504) 466-1344

Bidder's Email Address: jacob@bldlc.net

Bidder's State of Alabama License Number: 44521

Licensed to be awarded Contracts not exceeding: UNLIMITED

Note: If the Bidder is a corporation, give the following information:

State in which incorporated: LOUISIANA

Address of Principal Office: 2424 TYLER STREET, KENNER, LA 70062

The Contractor is advised that TIME IS OF THE ESSENCE on this project and that the Contract time of 270 consecutive calendar days from the effective date of the written Notice to Proceed to achieve Final Acceptance shall be strictly observed. LIQUIDATED DAMAGES WILL BE ASSESSED IF THE CONTRACT TIME IS EXCEEDED. The Contractor may apply for an extension of time in accordance with provisions of the Contract and these Specifications; however, such an extension of time must be approved PRIOR to the Contract completion date to avoid the imposition of liquidated damages. The Contractor is referred to Section 01015 – Prosecution and Progress and to the Special Conditions.

Bidder has examined the following addenda, and receipt of them is acknowledged:

No. Name Dated Name No. ______ Dated ______
No. ______ Dated ______
No. ______ Dated ______
No. ______ Dated ______

Signature of Bidder:

JACOB TRAPANI / VICE PRESIDENT

31242-000/00300/01-10-17 00300-3

SSSR – AMP 2019 AMP01 WYLAM PS AREA REHAB
BID PROPOSAL FORM

SANITARY SEWER SYSTEM –
ASSET MANAGEMENT PROGRAM –
CONTRACT NO. 2019 AMP01 – WYLAM PS SERVICE AREA COMPREHENSIVE
REHABILITATION

All Bid Items shall include costs for furnishing to Owner all materials, equipment, and supplies and for all costs incurred in completing the Work, including installation of all materials, equipment, and supplies furnished, complete in-place and ready for continuous service, and all other labor, permit fees, taxes, insurance, miscellaneous costs, overhead, and profit.

<table>
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<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>ESTIMATED QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL AMOUNT</th>
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<td>MOBILIZATION AND DEMOBILIZATION (NOT TO EXCEED 5% OF THE GRAND TOTAL OF BID)</td>
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<td>ITEM NO.</td>
<td>ITEM DESCRIPTION</td>
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<td>ESTIMATED QUANTITY</td>
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<td>TOTAL AMOUNT</td>
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Grand Total of Bid (Items 1 through 16) $1,396,437.50

In the event of a discrepancy between the unit price bid and the extended total amount, the unit price will be deemed intended by the bidder and the extended total amount shall be adjusted. In the event of a discrepancy between the sum of the extended amounts and the Grand Total of Bid, the sum of the extended amounts shall govern.

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SECTION 00350

NON-COLLUSION AFFIDAVIT

STATE OF LOUISIANA
JEFFERSON PARISH

BID PROPOSAL DATE: 01/22/20

I hereby certify that BLD SERVICES, LLC (Name of Contracting Firm) has not either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this Contract.

Signed: BLD SERVICES, LLC
(Name of Contracting Firm)

By: JACOB TRAPANI / VICE PRESIDENT

Sworn to and subscribed before me this 21ST day of JANUARY, 20 20

ELIZABETH PREST PIEDISCALZO
Notary Public  ID # 128654
State of Louisiana
My commission is for life.

FAILURE TO EXECUTE THIS AFFIDAVIT SHALL BE CAUSE FOR REJECTION OF THIS BID PROPOSAL.

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SECTION 00360

MBE/DBE DOCUMENTATION STATEMENT JEFFERSON COUNTY COMMISSION
ENVIRONMENTAL SERVICES DEPARTMENT

PROJECT NAME: SANITARY SEWER SYSTEM –
ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019
AMP01 WYLAM PS SERVICE AREA COMPREHENSIVE
REHABILITATION.

The Jefferson County Commission, Environmental Services Department has initiated a
program to encourage the participation of Minority Business Enterprises/Disadvantaged
Business Enterprises (MBE/DBE) on its construction projects. This signed statement serves
as a commitment by the undersigned company to comply with this program as outlined in
Specification Section 00630, JEFFERSON COUNTY ENVIRONMENTAL SERVICES
DEPARTMENT MBE/DBE PROGRAM.

Signature

Date

01/21/20

JACOB TRAPANI / VICE PRESIDENT
Principal and Title (Print or Type)

BLD SERVICES, LLC
Company Name

44521
Alabama Contractor License Number

2424 TYLER STREET
Mailing Address

504-466-1344
Telephone Number

KENNER, LA 70062
City, State Zip

504-461-5971
Fax Number

INSTRUCTIONS:

1. FAILURE TO EXECUTE THIS STATEMENT MAY BE CAUSE FOR REJECTION OF THIS BID.
2. SUBMIT WITH BID DOCUMENTS.

END OF SECTION
SECTION 00410
BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, as Principal, and a Surety, are hereby held and firmly bound unto Jefferson County, Alabama, as OWNER in the penal sum of Five Percent of the Bid Amount (not to exceed $10,000.00) (5%) for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

Signed, this 22nd day of January, 2020.

The condition of the above obligation is such that whereas the Principal has submitted to Jefferson County, Alabama, a certain Bid Proposal, attached hereto and hereby made a part hereof to enter into a Contract in writing, for the SANITARY SEWER SYSTEM – ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019 AMP01 – WYLAM PS SERVICE AREA COMPREHENSIVE REHABILITATION.

NOW, THEREFORE,

(a) If said Bid Proposal shall be rejected, or in the alternate,

(b) If said Bid Proposal shall be accepted and the Principal shall execute and deliver a Contract in the form of Contract attached hereto ( Properly completed in accordance with said Bid Proposal) and shall furnish a bond for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid Proposal, then this obligation shall be void, otherwise the same remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid Proposal; and said Surety does hereby waive notice of any such extension. IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers the day and year first set forth above.

BLD Services, LLC

Principal
Jacob Trapani, Vice President
(L.S.)

Surety
Harford Accident and Indemnity Company

By
Cathy P. Grice, Attorney-in-Fact & LA Resident Agent

SEAL

END OF SECTION

31242-000/00410/01-10-17
00410-1
SSSR – AMP
2019 AMP01 WYLAM PS AREA REHAB
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POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS THAT:

Hartford Fire Insurance Company, a corporation duly organized under the laws of the State of Connecticut
Hartford Casualty Insurance Company, a corporation duly organized under the laws of the State of Indiana
Hartford Accident and Indemnity Company, a corporation duly organized under the laws of the State of Indiana
Hartford Underwriters Insurance Company, a corporation duly organized under the laws of the State of Connecticut
Twin City Fire Insurance Company, a corporation duly organized under the laws of the State of Connecticut
Hartford Insurance Company of Illinois, a corporation duly organized under the laws of the State of Illinois
Hartford Insurance Company of the Midwest, a corporation duly organized under the laws of the State of Indiana
Hartford Insurance Company of the Southeast, a corporation duly organized under the laws of the State of Florida

having their home office in Hartford, Connecticut, (hereinafter collectively referred to as the "Companies") do hereby make, constitute and appoint, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety(ies) only as delineated above by ☑, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof, on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

In Witness Whereof, and as authorized by a Resolution of the Board of Directors of the Companies on May 6, 2015 the Companies have caused these presents to be signed by its Senior Vice President and its corporate seals to be hereunto affixed, duly attested by its Assistant Secretary. Further, pursuant to Resolution of the Board of Directors of the Companies, the Companies hereby unambiguously affirm that they are and will be bound by any mechanically applied signatures applied to this Power of Attorney.

John Gray, Assistant Secretary
M. Ross Fisher, Senior Vice President

STATE OF CONNECTICUT
COUNTY OF HARTFORD

On this 5th day of January, 2018, before me personally came M. Ross Fisher, to me known, who being by me duly sworn, did depose and say: that he resides in the County of Hartford, State of Connecticut; that he is the Senior Vice President of the Companies, the corporations described in and which executed the above instrument; that he knows the seals of the said corporations; that the seals affixed to the said instrument are such corporate seals; that they were so affixed by authority of the Boards of Directors of said corporations and that he signed his name thereto by like authority.

Kathleen T. Maynard
Kathleen T. Maynard
Notary Public
My Commission Expires July 31, 2021

I, the undersigned, Assistant Vice President of the Companies, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is still in full force effective as of January 22, 2020.

Signed and sealed at the City of Hartford.

Kevin Heckman, Assistant Vice President
Producer Compensation Notice

You can review and obtain information on The Hartford's producer compensation practices at www.thehartford.com or at 1-800-592-5717.
SECTION 00430

LIST OF SUBCONTRACTORS

In compliance with the Instructions to Bidders and other Contract Documents, the undersigned submits the following names of subcontractors to be used in performing the Work for the SANITARY SEWER SYSTEM – ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019 AMP01 – WYLAM PS SERVICE AREA COMPREHENSIVE REHABILITATION.

Bidder certifies that all subcontractors listed are eligible to perform the Work.

<table>
<thead>
<tr>
<th>Subcontractor’s Work</th>
<th>Subcontractor’s Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation</td>
<td>TREN-TAY INC.</td>
</tr>
<tr>
<td>Manhole Rehabilitation</td>
<td>ADVANTAGE MANHOLE COMPANY</td>
</tr>
<tr>
<td>Service Lateral CIP Rehabilitation</td>
<td>SELF-PERFORM</td>
</tr>
<tr>
<td>CIP MAINLINE REHABILITATION</td>
<td>S &amp; P LINER, LLC</td>
</tr>
</tbody>
</table>

NOTE: This form must be submitted with the Bid in accordance with the Instructions to Bidders.

Bidder’s Signature
JACOB TRAPANI, VICE PRESIDENT
SECTION 00500

CONTRACT

THIS CONTRACT, made and entered into this the _______ day of ______________ 20__, by and between Jefferson County, Alabama hereinafter referred to as the Owner and BLD Services, LLC hereinafter referred to as the Contractor.

WITNESSETH:

That the parties hereto do mutually agree as follows:

1. The Contractor will furnish all materials, equipment, supplies, tools, power, fuel, and services and perform all labor necessary for the SANITARY SEWER SYSTEM – ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019 AMP01 – WYLAM PS SERVICE AREA COMPREHENSIVE REHABILITATION, and will perform same in strict conformity with the terms and conditions set forth in the following named documents which are hereto attached and made a part of this contract:

Project No. ___________________________ : Notice to Contractors, Special Conditions, Bid Proposal, Wage Rates, Performance Bond, Payment Bond, and Contract Drawings as enumerated and identified in these Specifications.

2. The Owner will pay to the Contractor, on faithful performance of his undertakings hereunder, in lawful money of the United States, the respective unit prices set forth in the aforementioned Bid Proposal for each unit of work performed or installed by the Contractor, the estimated sum total of all payments hereunder being One million Three hundred ninety six thousand, Four hundred thirty-seven dollars and fifty cents ($1,396,437.50).

3. The Owner will make payments to the Contractor as specified in these Specifications.

4. Within a period of 30 days after completion and acceptance of the Work the Owner will make a final and complete payment in full to the Contractor on account of this Contract; provided that, during said 30 day period, the Contractor has submitted to the Owner satisfactory written evidence that all payrolls and other costs incurred by the Contractor in connection with the Work have been paid in full; otherwise final payment will be made only after such evidence has been submitted.
5. The Contractor will commence the Work on or as of the date set in a notice from the Owner to proceed with the Work, will prosecute same diligently and continuously with the stated requirements within **two hundred seventy (270)** consecutive calendar days from the effective date of the written Notice to Proceed to achieve Final Acceptance. Should the Work or any separate part thereof be not completed by such time or date, then the Contractor will pay to the Owner as fixed, agreed and liquidated damages the sum stipulated in the Special Conditions.

IN WITNESS WHEREOF, the parties have executed this Contract on the day and date first above written in 5 original counterparts.

JEFFERSON COUNTY, ALABAMA

ATTEST OF RESOLUTION:

By: ______________________________

President – County Commission of Jefferson County

WITNESS:

By: ______________________________

Title______________________________

CONTRACTOR
CERTIFICATE OF SECRETARY OF CORPORATION

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

______________________________
SECRETARY

(Corporate Seal)

END OF SECTION
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SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN BY THE PRESENTS, THAT WE __________________________

hereinafter called the Principal, and __________________________

hereinafter called the Surety, and held and firmly bound unto Jefferson County, Alabama in the
penal sum of One million Three hundred ninety six thousand Four hundred thirty-seven dollars
and fifty cents ($ 1,396,437.50)

for payment of which we bind ourselves, our heirs, executors, administrators, successors, and
assigns for the faithful performance of a certain written Contract, dated the ______ day of ___

20____, entered into between the Principal and the Owner for the
SANITARY SEWER SYSTEM – ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019
AMP01 – WYLM PS SERVICE AREA COMPREHENSIVE REHABILITATION. A copy of
which Contract is incorporated herein by reference and is made a part hereof as if fully copied
herein.

NOW THEREFORE, the condition of this obligation is such that if the Principal shall faithfully
perform the terms and conditions of the Contract in all respects on his or their part, and shall
fully pay all obligations incurred in connection with the performance of such Contract on
account of labor and materials used in connection therewith, and all such other obligations of
every form, nature, and character, and shall save harmless the Owner from all and any liability of
every nature, kind, and character which may be incurred in connection with the performance or
fulfillment of such Contract or other such liability resulting from negligence or otherwise on the
part of such Principal, and further shall save harmless the Owner from all cost and damage which
may be suffered by reason of the failure to fully and completely perform said Contract and shall
fully reimburse and repay the Owner for all expenditures of every kind, character, and
description which may be incurred by the Owner in making good any and every default which
may exist on the part of the Principal in connection with the performance of said Contract; and
further that the Principal shall pay all lawful claims of all persons, firms, partnerships, or
corporations for all labor performed and materials furnished in connection with the performance
of the Contract, and that failure to do so with such persons, firms, partnerships, or corporations
shall give them a direct right of action against the Principal and Surety under this obligation, and
provided, however, that no suit, action or proceeding by reason of any default whatever shall be
brought on this bond after one (1) year from the date on which the final payment on the Contract
falls due; and provided further that if any alterations or additions which may be made under the
Contract, or in the Work to be done under it, or the giving by the Owner of any extension of time
for the performance of the Contract or any other forbearance on the part of either the Owner or
the Principal shall not in anyway release the Principal and Surety, or either of them, their heirs,
executors, administrators, successors, or assigns from their liability hereunder; notice to the
Surety of any such alterations, extensions, or forbearance being expressly waived.
This obligation shall remain in full force and effect until the performance of all covenants, terms, and conditions herein stipulated and after performance it shall be null and void. Executed in 5 original counterparts.

IN TESTIMONY WHEREOF witness the hands and seals of the parties hereto on the _________
day of ______________________, 20 ___.

__________________________________________
(Signature of Principal)

WITNESS:

______________________________
By______________________________

Title __________________________

__________________________________________
(Signature of Surety)

WITNESS:

______________________________
By______________________________

Title __________________________

COUNTERSIGNED:

By______________________________

Title __________________________

- END OF SECTION -
SECTION 00611

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, THAT WE __________________________

hereinafter called the Principal, and __________________________ hereinafter
called the Surety, are held and firmly bound unto Jefferson County, Alabama hereinafter called
the Obligee, in the penal sum of One million Three hundred ninety six thousand, Four hundred
thirty-seven dollars and fifty cents, ($1,396,437.50) lawful money of the United States, for the
payment of which sum well and truly to be made, we bind ourselves, our heirs, personal
representatives, successors and assigns, jointly and severally, firmly by these presents:

WHEREAS, said Principal has entered into a certain Contract with said Obligee dated the
______ day of ___________, 20__, for the SANITARY SEWER SYSTEM –
ASSET MANAGEMENT PROGRAM – CONTRACT NO. 2019 AMP01 – WYLAM PS
SERVICE AREA COMPREHENSIVE REHABILITATION, which Contract and the
Drawings and Specifications for said Work shall be deemed a part thereof as fully as if set out
herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if said
Principal and all subcontractors to whom any portion of the Work provided for in said Contract
is sublet and all assignees of said Principal and of such subcontractors shall promptly make
payments to all persons supplying him or them with labor, materials, feed-stuffs, or supplies for
or in the prosecution provided for in such Contract, or in any amendment or extension of or
addition to said Contract, and for the payment of reasonable attorneys' fees, incurred by the
claimant or claimants in suits of said bonds, then the above obligation shall be void; otherwise to
remain in full force and effect. PROVIDED, however that this bond is subject to the following
conditions and limitations:

(a) Any person, firm, or corporation that has furnished labor, materials, feed-stuffs, or
supplies for or in the prosecution of the Work provided for in said Contract shall
have a direct right of action against the Principal and Surety on this bond, which
right of action shall be asserted in a proceeding, instituted in the County in which
said Principal or Surety does business. Such right of action shall be asserted in a
proceeding instituted in the name of the claimant or claimants for his or their use
and benefit against said Principal and Surety or either of them (but not later than
one year after the final settlement of said Contract) in which action such claims or
claim shall be adjudicated and judgment rendered thereon.
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(b) The Principal and Surety hereby designate and appoint JEFFERSON COUNTY, ALABAMA as the Agent of each of them to receive and accept services, processes or other pleading issued or filed in any proceeding instituted on this bond and hereby consent that such services shall be the same as personal service on the Principal and/or Surety.

(c) The Surety shall not be liable hereunder for any damages or compensation recoverable under workman's compensation or employer's liability statute.

(d) In no event shall Surety be liable for a greater sum than the penalty of this bond or subject to any suit, action, or proceeding thereof that is instituted later than one year after the final settlement of said Contract.

SIGNED, SEALED, AND DELIVERED THIS _______ day of ________________________ 20____, in 5 original counterparts.

WITNESS: ____________________________ (Signature of Principal)

__________________________________
By ________________________________

Title ______________________________

WITNESS: ____________________________ (Signature of Surety)

__________________________________
By ________________________________

Title ______________________________

COUNTERSIGNED: ____________________________

By ________________________________ (Resident Agent)

END OF SECTION
SECTION 00630

JEFFERSON COUNTY ENVIRONMENTAL SERVICES DEPARTMENT MINORITY BUSINESS ENTERPRISE/DISADVANTAGED BUSINESS ENTERPRISE (MBE/DBE) PROGRAM

A. The Jefferson County Commission Environmental Services Department has adopted a program designed to encourage the participation of MBE/DBEs in construction projects. THE MBE/DBE FORMS CAN BE FOUND IN APPENDIX C.

B. All General Contractors are required to submit the following:

1. All Contractors are required to read and sign a statement that they fully understand and will participate in and follow the guidelines and instructions included in this section, JEFFERSON COUNTY ENVIRONMENTAL SERVICES DEPARTMENT MBE/DBE PROGRAM. This statement shall be submitted with the bid documents. Additionally, all Contractors shall submit with the bid documents a list of all MBE/DBE firms submitting proposals. Form “A” (attached) shall be utilized to satisfy this requirement.

2. Prior to award of the Contract, the successful General Contractor is required to submit a list of all MBE/DBE firms the Contractor proposes to utilize during the execution of the Contract (Form “B”). Include with Form “B” any MBE/DBE firms that the major subcontractors propose to utilize. This list must be received by the Environmental Services Department (ESD) prior to contract award by the Commission. The Contract will not be awarded without submission of Forms “A” and “B” (attached).

3. With each monthly pay estimate submitted to the Environmental Services Department, Contractors are required to submit updated monthly MBE/DBE reports which identify any changes in the MBE/DBE firms’ utilization, either adds or deducts. Monthly pay estimates will not be processed without the updated list of MBE/DBEs. The Contractor shall use Form “C” (attached) to meet the requirements of this paragraph.

4. Upon completion of the Contract and prior to release of retainage, the General Contractor is required to submit a Project Close-Out Report that includes final accounting of all MBE/DBE firms utilized on the project. The Project Close-Out Report with documented MBE/DBE utilization is a prerequisite for the release of the retainage. The Contractor shall use Form “D” (attached) to meet the requirements of this paragraph.
C. In addition to the requirements of Item B, pre-qualified General Contractors bidding on construction projects for the Environmental Services Department are required to comply with the following:

1. After deciding to bid a project, a prospective bidder must notify the Birmingham Construction Industry Authority (BCIA) of his/her intentions as soon as possible but no less than 5 days before the time set for receiving bids. The Contractor shall complete Form “E” (attached) and submit the completed form to the ESD no later than the scheduled date of the Pre-Bid Conference. This form may be submitted in person at the Pre-Bid Conference. The submission of Form “E” to ESD shall fulfill the notification requirement to the BCIA.

2. The potential prime bidder should obtain the BCIA listing of certified MBE/DBEs to assist in soliciting MBE/DBE participation for the project. The BCIA has advised the County that this listing will be continually monitored and updated by the BCIA. After once receiving the BCIA listing, it will be necessary to only obtain revisions thereafter.

3. In cases of dispute between a MBE/DBE and a General Contractor with respect to whether the MBE/DBE has a low bid, the BCIA Executive Director, with the concurrence of the General Contractor, shall be allowed to view the General Contractor’s sub bids, sub analysis sheets, and summary sheets for that specific area of the project. The General Contractor shall not, however, be requested to use a MBE/DBE subcontractor who cannot display reasonable technical and financial qualifications to perform the work in question.

4. Monthly, or as requested by the BCIA, the General Contractor shall furnish data similar to the data being forwarded to ESD under Item B. This information will be accumulated by the BCIA for all participating firms to determine the annual level of business activity in the area. The BCIA is concerned about confidentiality of Contractor reports. This information is intended for use by the BCIA to measure overall minority participation in the Birmingham Metropolitan Area and specifically, in Jefferson County. Every effort will be made to protect the identity of any specific Contractor.

5. After closeout of a specific project, the General Contractor shall submit to the BCIA, a final accounting of the MBE/DBE participation for the project.

END OF SECTION
SECTION 00700

GENERAL CONDITIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Award
B. Contractor’s Pre-Start Presentation
C. Starting the Project
D. Qualifications of Subcontractors, Materialmen, and Suppliers
E. Correlation, Interpretation, and Intent of Contract Documents
F. Availability of Lands
G. Subsurface Conditions
H. Differing Site Conditions
I. Supervision and Superintendence
J. Labor, Materials, and Equipment
K. Subcontractors
L. Patent Fees and Royalties
M. Permits
N. Laws and Regulations
O. Safety and Protection
P. Public Convenience and Safety
Q. Sanitary Provisions
R. Indemnifications
S. Work During Inclement Weather
T. Contract Time

U. Liquidated Damages

V. Restoration of Services disturbed by others.

1.2 AWARD

A. The award of the Contract, if it is awarded, will be to the lowest responsible, responsive Bidder. No Notice of Award will be given until the Owner has concluded such investigations as he deems necessary to establish the responsibility, qualifications, and financial ability of the Bidder to do the Work in accordance with the Contract Documents to the satisfaction of the Owner within the time prescribed. The Owner reserves the right to reject the Bid Proposal of any Bidder who does not pass such investigation to the Owner’s satisfaction. In analyzing Bid Proposals, the Owner may take into consideration alternates and unit prices, if itemized in the Bid Proposal Form. If the Contract is awarded, the Owner will issue the Notice of Award and give the successful Bidder a contract for execution.

1.3 CONTRACTOR’S PRE-START PRESENTATIONS

A. The Contractor represents that he has familiarized himself with, and assumes full responsibility for having familiarized himself with, the nature and extent of the Contract Documents, Work, locality; and has familiarized himself with all local conditions and federal, state, and local laws, ordinances, rules, and regulations that may in any manner affect performance of the Work; and represents that he has correlated his study and observations with the requirements of the Contract Documents. The Contractor also represents that he has studied all surveys and investigation reports of subsurface and latent physical conditions referred to in the Specifications, and has made such additional surveys and investigations as he deems necessary for the performance of the Work at the Contract Price in accordance with the requirements of the Contract Documents, and has correlated the results of all such data with the requirements of the Contract Documents.

B. Before undertaking each part of the Work, the Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures and drawings shown thereon and all applicable field measurements. He shall at once report in writing to the Engineer any conflict, error, or discrepancy which he may discover.
1.4 STARTING THE PROJECT

A. The Contractor shall start to perform his obligations under the Contract Documents on the date when the Contract Time commences. No Work shall be done at the site prior to the date on which the Contract Time commences, except with the written consent of the Owner.

1.5 QUALIFICATIONS OF SUBCONTRACTORS, MATERIALMEN, AND SUPPLIERS

A. In accordance with Section 00430 – List of Subcontractors, the Contractor shall submit to the Owner for acceptance as part of the Bid Proposal, a list of the names of the subcontractors and such other persons and organizations (including those who are to furnish principal items of materials or equipment) proposed for those portions of the Work as to which the identity of the subcontractors and other persons and organizations must be submitted. Within ten (10) working days after opening of Bid Proposals, the Owner will notify the Contractor in writing if either the Owner or Engineer, after due investigation, have reasonable objection to any subcontractor, person, or organization on the List of Subcontractors. The failure of the Owner or Engineer to make objection to any subcontractor, person, or organization on the List of Subcontractors within ten (10) days of receipt shall constitute an acceptance of such subcontractor, person, or organization. Acceptance of any such subcontractor, person, or organization shall not constitute a waiver of any right of the Owner or Engineer to reject defective Work, material, or equipment, not in conformance with the requirements of the Contract Documents.

B. The Contractor shall certify that subcontracts have not and will not be awarded to any firm that is currently on the USEPA Master List of Debarred, Suspended, and Voluntarily Excluded Persons.

1.6 CORRELATION, INTERPRETATION, AND INTENT OF CONTRACT DOCUMENTS

A. It is the intent of the Drawings and Specifications to describe completely the project to be constructed in accordance with the Contract Documents. The Contract Documents comprise the entire Agreement between the Owner and the Contractor.

B. The Contract Documents are complementary, what is called for by one is as binding as if called for by all. If the Contractor finds a conflict, error, or discrepancy in the Contract Documents, he shall call it to the Engineer’s attention in writing at once and before proceeding with the Work affected thereby. The various Contract Documents shall be given precedence, in case of conflict, error, or discrepancy, as follows: Supplemental General Conditions, Agreement Modifications, Addenda, Special
Conditions, Instructions to Bidders, General Conditions, Specifications, and Drawings. If the requirements of other Contract Documents are more stringent than the General Conditions, the more stringent requirements shall apply.

C. The words “furnish”, “furnish and install”, “install”, and “provide” or words with similar meaning shall be interpreted, unless otherwise specifically stated, to mean “furnish and install complete in place and ready for service.”

D. Miscellaneous items and accessories which are not specifically mentioned, but which are essential to produce a complete and properly operating installation, or usable structure or plant, providing the indicated function, shall be furnished and installed without change in the Contract Price. Such miscellaneous items and accessories shall be of the same quality standards, including material, style, finish, strength, class, weight, and other applicable characteristics, as specified for the major component of which the miscellaneous item or accessory is an essential part, and shall be approved by the Engineer before installation. The previously specified requirement is not intended to include major components not covered by or inferable from the Drawings and Specifications.

E. The Work of all trades under this Contract shall be coordinated by the Contractor in such a manner as to obtain the best workmanship possible for the entire project, and all components of the Work shall be installed or erected in accordance with the best practices of the particular trade.

1.7 AVAILABILITY OF LANDS

A. The Owner will furnish, as indicated in the Contract Documents, the lands upon which the Work is to be done, rights-of-way for access thereto, and such other lands which are designated for the use of the Contractor. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the Owner, unless otherwise specified in the Contract Documents. Other access to such lands or rights-of-way for the Contractor's convenience shall be the responsibility of the Contractor. The Contractor will provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

B. The Owner will, upon request, furnish to the Contractor copies of all available record drawings and subsurface tests.

1.8 SUBSURFACE CONDITIONS

A. The Contractor acknowledges that he has investigated prior to bidding and satisfied himself 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, and roads; uncertainties of
weather, river stages, tides, water tables, or similar physical conditions at the site; 
the conformation and conditions of the ground; and the character of equipment 
and facilities needed preliminary to and during prosecution of the Work. The 
Contractor further acknowledges that he has satisfied himself 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 on behalf of the Owner 
on the site or any contiguous site, as well as from information presented in the 
Drawings and Specifications made a part of this Contract, or any other 
information made available to him prior to receipt of the Bid Proposals. Any 
failure by the Contractor to acquaint himself with available information will not 
relieve him from responsibility for estimating properly the difficulty or cost of 
successfully performing the Work. The Owner assumes no responsibility for any 
conclusions or interpretations made by the Contractor on the basis of the 
information made available by or through the Owner.

1.9 DIFFERING SITE CONDITIONS

A. The Contractor shall promptly, and before such conditions are disturbed, notify 
the Owner in writing of:

1. Subsurface or latent physical conditions at the site differing materially 
from those indicated in this Contract.

2. Unknown physical conditions at the site, of an unusual nature, differing 
materially from those ordinarily encountered and generally recognized as 
inherent in work of the character provided for in this Contract. The Owner 
shall promptly investigate the conditions, and if he finds that such 
conditions do materially so differ and cause an increase or decrease in the 
Contractor's cost of, or the time required for, performance of any part of 
the Work under this Contract, whether or not changed as a result of such 
conditions, an equitable adjustment shall be made and a change order 
issued in accordance with Section 01028 – Change Order Procedures.

1.10 SUPERVISION AND SUPERINTENDENCE

A. The Contractor shall supervise and direct the Work. The Contractor shall be 
solely responsible for the means, methods, the techniques, sequences, and 
procedures of construction. The Contractor shall employ and maintain on the 
Work a qualified superintendent who shall have been designated in writing by the 
Contractor as the Contractor's representative at the site. The superintendent shall 
have full authority to act on behalf of the Contractor and all communications 
given to the superintendent shall be as binding as if given to the Contractor. The 
superintendent shall be present on the site at all times as required to perform 
adequate supervision and coordination of the Work. Copies of written
communications given to the superintendent shall be mailed to the Contractor's home office.

B. All Contractor work groups or crews crossing private property to work in sewer easements shall have at least one individual who can speak English and who is specifically designated to deal with any questions from the property owners located adjacent to the Work or other members of the public. This person shall be knowledgeable of the Work and capable of answering questions. The designated individual will remain with the crew at all times while work in backyards or on private property is in progress. Questions that cannot be answered shall be forwarded to the Engineer and/or Owner.

1.11 LABOR, MATERIALS, AND EQUIPMENT

A. The Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. The Contractor shall at all times maintain good discipline and order at the site.

B. The Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, local telephone, water and sanitary facilities, and all other facilities and incidentals necessary for the execution, testing, initial operation, and completion of the Work.

C. All materials and equipment shall be new, except as otherwise provided in the Contract Documents. When special makes or grades of material which are normally packaged by the supplier or manufacturer are specified or approved, such materials shall be delivered to the site in their original packages or container with seals unbroken and labels intact.

D. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, or processors except as otherwise provided in the Contract Documents.

1.12 SUBCONTRACTORS

A. The Contractor shall perform, with his own forces, the minimum percentage of work for this Project as specified in Section 00820 – Special Conditions.

B. The Contractor shall be fully responsible for all acts and omissions of his subcontractors and of persons and organizations directly or indirectly employed by them, and of persons and organizations for whose acts any of them may be liable to the same extent that he is responsible for the acts and omissions of
persons directly employed by him. Nothing in the Contract Documents shall create any contractual relationship between the Owner and any subcontractor or other person or organization having a direct or indirect relationship or contract with the Contractor, nor shall it create any obligation on the part of the Owner to pay or to see the payment of any monies due any subcontractor or other person or organization, except as may otherwise be required by law.

C. The Contractor agrees to bind specifically every subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of the Owner.

D. All Work performed for the Contractor by a subcontractor shall be pursuant to an appropriate agreement between the Contractor and the subcontractor.

E. The Contractor shall be responsible for the coordination of the trades, subcontractors, and materialmen engaged upon his Work.

1. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to the Contractor by the terms of these General Conditions and other Contract Documents insofar as applicable to the Work of subcontractors, and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise of the Contractor under any provisions of the Contract Documents.

2. The Owner or Engineer will not undertake to settle any differences between the Contractor and his subcontractors or between subcontractors.

3. If in the opinion of the Engineer, any subcontractor on the project proves to be incompetent or otherwise unsatisfactory, he shall be replaced by the Contractor if and when directed in writing by the Engineer.

1.13 PATENT FEES AND ROYALTIES

A. The Contractor will pay all license fees and royalties and assume all costs incident to the use of any invention, design, process, or device which is the subject of patent rights or copyrights held by others. He will indemnify and hold harmless the Owner and the Engineer and anyone directly or indirectly employed by either of them from and against all claims, damages, losses, and expenses (including attorneys' fees) arising out of any infringement of such rights during or after completion of the Work, and shall defend all such claims in connection with any alleged infringement of such rights.

B. The Contractor shall be responsible for determining the application of patent rights and royalties on materials, appliances, articles, or systems prior to bidding.
1.14 PERMITS

A. The Contractor will secure and pay for all construction permits and licenses and will pay all governmental charges and inspection fees necessary for the prosecution of the Work. When such charges are normally made by the Owner and when so stated in the Special Conditions, there will be no charges to the Contractor. The Contractor will also pay all public utility charges.

1.15 LAWS AND REGULATIONS

A. The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations applicable to the Work. If the Contractor observes that the Specifications or Drawings are at variance therewith, he will give the Engineer prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate modification. If the Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules, and regulations, and without such notice to the Engineer, he will bear all cost arising there from.

B. The Contractor shall comply with all laws, ordinances, rules, and regulations of the Alabama Plumbers and Gas Fitters Board.

1.16 SAFETY AND PROTECTION

A. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury, or loss to:

1. All employees on the Work and other persons who may be affected thereby.

2. All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site.

3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

B. The Contractor will designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor’s superintendent unless otherwise designated in writing by the Engineer.
1.17 **PUBLIC CONVENIENCE AND SAFETY**

A. The Contractor shall, at all times, conduct the Work in such a manner to ensure the least practical obstruction to public travel. The convenience of the general public and of the residents along and adjacent to the area of the Work shall be provided for in a satisfactory manner, consistent with the operation and local condition. “Street Closed” signs shall be placed immediately adjacent to the Work, in a conspicuous position, at such locations as traffic demands. At anytime that streets are required to be closed, the Contractor shall notify law enforcement agencies, fire departments, and parties operating emergency vehicles before the street is closed and again as soon as it is opened. Access to fire hydrants and other fire extinguishing equipment shall be provided and maintained at all times.

B. All chemicals used during construction or furnished for project operation, including but not limited to herbicides, pesticides, disinfectants, polymers, and reactants, must be labeled to show approval of either USEPA or USDA. Use of all such chemicals and disposal of residues shall be in conformance with the instructions of the applicable state or federal agency.

1.18 **SANITARY PROVISIONS**

A. The Contractor shall furnish necessary toilet conveniences, secluded from public observation, for use of all personnel on the Work, whether or not in his employ. They shall be kept in a clean and sanitary condition and shall comply with the requirements and regulations of the public authorities having jurisdiction. Sanitary provisions shall commit no public nuisance. Temporary sanitary facilities shall be removed upon completion of the Work and the premises shall be left clean.

1.19 **INDEMNIFICATIONS**

A. The Contractor will indemnify and hold harmless the Owner and the Engineer and their agents and employees from and against all claims, damages, losses, and expenses including attorneys’ fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss, or expense is:

1. Attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting there from.

2. Caused in whole or in part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable,
regardless of whether or not it is caused in part by a party indemnified hereunder.

B. In any and all claims against the Owner or the Engineer or any of their agents or employees, by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable. The indemnification obligation shall not be limited in anyway by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any subcontractor under workmen’s compensation acts, disability benefit acts, or other employee benefit acts.

1.20 WORK DURING INCLEMENT WEATHER

A. Liability for work performed by the Contractor during inclement weather shall be borne exclusively by the Contractor. The Owner or the Engineer shall maintain the ability to suspend the Contractor’s work during inclement weather should the Engineer consider suspension to be in the best interest of the Owner. Inferior work performed during inclement weather or work damaged during periods of suspension due to inclement weather shall be repaired and/or replaced by the Contractor. Any time extensions or compensation for repairs or replacement shall be subject to approval by the Engineer.

1.21 CONTRACT TIME

A. The number of days in which the Contractor shall fully perform the proposed Work have been specified in Section 00100 – Notice to Bidders and Section 00820 – Special Conditions. The date of the beginning and the time for completion of the Work are essential conditions of the Contract.

B. In arriving at any credit due the Contractor for extension of time on the Contract, the Owner, upon the recommendation of the Engineer, may allow such credit as, in his judgement, is deemed equitable and just for all delays occasioned by a Change Order, any act, or failure to act, on the part of the Contractor or caused by forces beyond the Contractor’s control. Additional time will also be allowed the Contractor to cover approved overruns or additions to the Contract in the same proportion that the said overruns or additions in monetary value bears to the original Contract amount. Delays caused by normal and ordinary weather conditions will not be the basis for an extension of Contract Time.

C. If the Contractor claims that any instructions by the Engineer involve an extension of time, he shall give the Engineer written notice of said claim within ten (10) days after the receipt of such instructions, and in any event before proceeding to execute the Work, stating clearly and in detail the basis of his claim or claims. No such claim shall be valid unless so made.
D. The Contractor shall make no claim for extra compensation due to delays of the project beyond his control. Such delays may include those caused by any act of neglect on the part of the Owner or Engineer, or by any employee of either, or by any separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delays in transportation, adverse weather conditions not reasonably anticipatable, unavoidable casualties, or by delay authorized by the Engineer pending arbitration, or by any other cause which the Engineer determines may justify the delay.

E. Time extensions may be granted upon proper justification by the Contractor. Any claim for time extensions under these provisions shall be submitted in writing to the Engineer not more than ten (10) days following commencement of the delay; otherwise, claim will be waived. With submission of claim, the Contractor shall provide an estimate of the probable effect of such delay on the progress of the Work.

F. Additional costs incurred in accelerating the Work to compensate for such delays (as previously defined herein) shall also not form the basis for extra compensation claims.

1.22 LIQUIDATED DAMAGES

A. If the Contractor shall fail to complete the Work within the Contract Time, the Contractor will pay to the Owner the amount for liquidated damages as specified in the Special Conditions for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents.

1.23 RESTORATION OF SERVICES DISTURBED BY OTHERS

A. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, at anytime during the progress of the Work.

B. Except as previously listed herein, the Contractor shall not permit any individual, firm, partnership, or corporation to excavate or otherwise disturb such utility services located within the limits of the Work without the written approval of the Engineer.

C. Should the owner of a public or private utility service be authorized to construct, reconstruct, or maintain such utility service during the progress of the Work, the Contractor shall cooperate with such owner by arranging and performing the work in this Contract so as to facilitate such construction, reconstruction, or maintenance by others whether or not such work by others is part of this contract. When ordered as extra work by the Engineer, the Contractor shall make all
necessary repairs to the Work which are due to such authorized work by others, unless otherwise provided for in the Contract, Drawings, or Specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the Work resulting from such authorized work.

1.24 AGREEMENTS WITH PROPERTY OWNERS

A. Any agreement entered into by the Contractor with any property owner, in connection with construction of this project, must be made in writing and a copy supplied to the Engineer. A written release must also be supplied to the Engineer upon termination of any agreement.

END OF SECTION
SECTIN 00802

NPDES GENERAL PERMIT

PART 1 - GENERAL

1.01 PERMIT APPLICATION

It shall be the responsibility of the Contractor to determine if a State NPDES General Permit ALR100000 for construction site runoff is required as part of this project. When required by the Alabama Department of Environmental Management (ADEM):

A. Contractor shall submit a Notice of Intent (NOI) to be covered under the ADEM National Pollutant Discharge Elimination System (NPDES) General Permit.

1. Application forms and instructions are to be obtained from ADEM.

2. The NOI must be submitted at least 30 days before construction activities begin.

B. Public notice of submittal of the NOI must be published in a local newspaper for one (1) day immediately before submission of the NOI.

C. With the NOI submit a Construction Best Management Practices Plan (CBMPP) and Spill Prevention, Control and Countermeasure (SPCC) Plan.

D. Submit the NOI to:

Director
Alabama Department of Environmental Management
Attn: Water Division
1400 Coliseum Boulevard
Montgomery, Alabama 36110
(Mailing Address)
P.O. Box 301463
Montgomery, Alabama 36130-1463
Telephone (334) 271-7700

PART 2 - PRODUCTS

Not Used
PART 3 - EXECUTION

3.01 IMPLEMENTATION

A. Submit three (3) copies (or the number directed by the Engineer) of the NOI to the Engineer for records.

B. Do not begin construction before receiving ADEM acknowledgement of the submitted NOI and approval of coverage of the discharge.

C. Show NOI submittal and ADEM review as an activity on the Project Schedule specified in Section 01310 – Progress Schedules.

D. Comply with all Permit-required inspections, monitoring, documentation, and testing requirements. Submit copies of all Tests, Inspection, Non-Compliance, or other related Reports to the Engineer for records.

END OF SECTION
PART 1 -- GENERAL

1.01 QUALIFICATIONS OF THE CONTRACTOR

A. The Contractor shall have previous experience in the replacement of sanitary sewers and manholes (or, in the construction, repair, and rehabilitation of sanitary sewers and manholes or pump stations; or in the construction, repair rehabilitation and CCTV condition assessment of sanitary sewers – whichever is applicable) and shall employ workmen and foremen with sufficient knowledge, skill, and experience to perform the work assigned to them.

1.02 CONTRACT TIME

A. The Contract Time for this project is two hundred seventy (270) consecutive calendar days from the effective date of the written Notice to Proceed to achieve Final Acceptance. The Contractor may apply for an extension of time in accordance with provisions of the Contract; however, such an extension of time must be approved by the Owner prior to the Contract completion date and in accordance with Section 00700 – General Conditions to avoid the imposition of liquidated damages.

B. Extension of the Contract Time may be granted by the Engineer, with approval of the Owner, if the work is on the project’s critical path. No extension of time shall be granted to the Contractor for delays occurring to parts of the work that have no specific impact on the critical path as determined by the Owner and Engineer.

C. No extension for Contract Time will be considered for normal weather conditions reasonably anticipated for the area in which the work is being performed. Normal weather conditions shall be defined as the average number of days with precipitation greater than or equal to a trace amount (0.01-inch) for a particular month over a recent 30-year period and shall be based on the 1981-2010 Climate Normals released by the National Oceanic and Atmospheric Administration’s National Climactic Data Center for the station located closest to the project site. If the actual number of precipitation days received during any month exceeds the normal precipitation days and more than 50% of the Contractor’s work force was affected, the Contractor may be entitled to a Contract extension. If a Contract extension is granted due to weather conditions, the Contract Time shall be extended by the number of days in which actual precipitation exceeded the anticipated precipitation. If the Contractor requests any rain day delays for a particular time period, they must be submitted with the pay request for that time period. No requests for additional days will be granted if not requested at that time.

D. All other requested Contract extensions shall be evaluated by the Owner and Engineer, with their determination deemed final.
1.03 LIQUIDATED DAMAGES

A. The Contractor is advised that TIME IS OF THE ESSENCE on this project. Liquidated damages will be assessed if either the Contract Time to achieve Substantial Completion or the Contract Time to achieve Final Acceptance is exceeded. By executing the Contract, the Contractor agrees to pay as liquidated damages the amount of $1,500.00 per day for each consecutive calendar day after either the Contract Time for Substantial Completion or the Contract Time for Final Acceptance is expired.

1.04 RECORD OF EMPLOYEES

A. The Contractor shall keep an accurate record showing the name, place of residence, citizenship, and per diem pay for each person engaged in the execution of the Contract and shall cause every subcontractor under him, who shall undertake the performance of any part of the Contract, to also keep a similar record of each person engaged in the execution of said subcontract. All such records shall be available at any time to the Owner or his duly authorized representative.

1.05 ARCHEOLOGICAL FINDS

A. Notwithstanding anything to the contrary herein, in the event any archaeological artifacts within the project are discovered during the course of the Work, the Owner shall have and retain all right, title, and interest to such artifacts and shall have the further right, during the course of the Contract, to examine, or cause to have examined, the site of the Work for any such artifacts and to perform, or have performed, archeological excavations and all other related work to explore for, discover, recover, and remove such artifacts from the site of the Work. In the event the archeological examination and related work delays the Contractor's work, he shall be entitled to request an extension of time to complete the Work equal to the number of days he is thus delayed.

1.06 NOTIFICATION TO PROPERTY OWNERS

A. It shall be the responsibility of the Contractor to notify, in writing, any property owner whose service could be affected by the work being performed in the area. Property owner shall be notified a minimum of 48 hours prior to performing any work. The notification shall be on the Contractor’s company letterhead and shall contain the following information:

1. Date
2. Name of Project
3. Description of the type of work
4. Time of construction, including start date and end date
5. Contractor’s Project Manager’s name and phone number
6. Contractor’s Superintendent’s name and phone number
7. Contractor’s Foreman’s name and phone number
8. 24-hour emergency number

B. The Contractor shall be solely responsible for any damage to private service lines or sewer backups caused by the sanitary sewer and manhole replacement work. The Contractor shall provide hotel accommodations for any residents either whose wastewater backs up into their home as a result of the Contractor’s work or if use of their sewer service line is limited or prohibited due to the Contractor's operations. Hotel accommodations shall be provided for as long as required to return the resident's home to its original or better condition.

1.07 SAFETY

A. All activities shall be performed in accordance with the manufacturer's recommendations and regulations established by OSHA. Particular attention shall be directed to those safety requirements and regulations involving excavations and entering confined spaces. The Contractor shall provide OSHA-approved access to manholes and other work areas for the Owner and Engineer. The Contractor shall be solely responsible for the safety of this project.

B. If the Owner, Engineer or Resident Project Representative becomes aware of any perceived safety violation, he has the right to inform the Contractor. The provision of, or failure to provide, any such notice to the Contractor shall not be construed as the Owner, Engineer or Resident Project Representative assuming any duty, responsibility or liability for safety precautions and/or programs. The Contractor remains solely responsible for the safety of the project.

1.08 DRUG DETECTION AND DETERRENCE

A. It is the policy of the Owner to achieve a drug-free work force and to provide a workplace that is free from the use of illegal drugs and alcohol. It is also the policy of the Owner that the manufacture, distribution, dispensation, possession, sale, or use of illegal drugs or alcohol by Contractor while on the Owner's premises is prohibited.

1.09 CONTRACT DRAWINGS

A. The Work shall be performed in accordance with the set of Drawings entitled “Sanitary Sewer System – Asset Management Program – Contract No. 2019 AMP01 - Wylam PS Service Area Comprehensive Rehabilitation”, which are incorporated herein as part of the Contract Documents and are identified by the following numbers and descriptions:
### SHEET NO.
#### DESCRIPTION
#### NO. OF SHEETS
<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>DESCRIPTION</th>
<th>NO. OF SHEETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>G01 thru G08</td>
<td>General Drawings</td>
<td>8</td>
</tr>
<tr>
<td>C01 thru C11</td>
<td>Civil Drawings</td>
<td>11</td>
</tr>
<tr>
<td>D01 thru D04</td>
<td>Standard Details Drawings</td>
<td>4</td>
</tr>
</tbody>
</table>

1.10 STANDARD DRAWINGS

A. Appendix A of the Specifications and Drawings D01, D02, D03, and D04 present standard drawings prepared by the Engineer to assist the Contractor in the execution of this Contract.

1.11 STORED MATERIALS

A. No payment will be made for stored materials for this Project, unless otherwise approved by the Owner or Engineer.

1.12 SUBCONTRACTORS

A. All subcontractors performing sewer and manhole replacement work included in this Project shall be pre-qualified by the Jefferson County Environmental Services Department to perform their specific work as classified in Section 00101 – Instructions to Bidders.

B. A list of all subcontractors and the work they will perform must be submitted to the Engineer for approval as part of the Bid Proposal in accordance with Section 00700 – General Conditions. Subcontractors who do not meet pre-qualification requirements to perform their specific work may not perform any Work on the project.

C. No subcontractors will be allowed to perform work on this project without the Contractor’s Superintendent on site.

1.13 MANHOLE ENTRY

A. The Contractor shall exercise extreme caution during any manhole entry operations on live sewer lines. Particular attention shall be paid while working on larger diameter sewers. The Contractor shall implement all necessary safety precautions, in accordance with OSHA regulations, to give maximum protection at all times to persons or property at or near the work area.

1.14 CONSTRUCTION RUNOFF PERMITTING

A. The Contractor shall obtain a National Pollutant Discharge Elimination System (NPDES) permit for Storm Water Discharge Associated With Construction Site Runoff if the Contractor determines a NPDES permit is required as part of this project. This permit shall be obtained in accordance with Section 02270 – Slope Protection and Erosion Control. The
Contractor shall forward one (1) copy of the permit to the Engineer prior to commencement of work activities.

1.15 UNPERMITTED DISCHARGE PENALTIES

A. In no case shall the discharge of raw sewage be allowed from the sanitary sewer collection system. Any bypassing of raw sewage shall be from one manhole to a downstream manhole in accordance with Section 02600 – Wastewater Flow Control.

B. Any overflows that occur shall be reported to the Engineer. The Owner will file all necessary documents and reports required by the ADEM and USEPA.

C. The unpermitted discharge penalty to the Contractor shall be one thousand dollars ($1,000.00) per day per unpermitted discharge event for days 1-30, five thousand dollars ($5,000.00) per day for days 31-60, and eight thousand dollars ($8,000.00) per day for all days over 60.

D. The Contractor shall owe the unpermitted discharge penalty to the Owner when the Owner reports any unpermitted discharge caused by the actions of the Contractor as an unpermitted discharge to USEPA.

E. The Contractor shall add a line item to the monthly pay estimate for the unpermitted discharge penalty. The line item shall be added to the monthly pay estimate after the first occurrence and shall be maintained on each monthly pay estimate thereafter.

F. The Contractor shall add the penalty to the monthly pay estimate each time an unpermitted discharge report is filed. The penalty shall be added, as would any liquidated damages, as a negative line item to be subtracted from the total amount due to the Contractor that month.

G. The Contractor shall receive final payment in accordance with these documents less any unpermitted discharge penalties incurred.

H. The determination if an unpermitted discharge is caused by the Contractor’s actions shall be the sole authority of the Owner.

1.16 ABANDONMENT OF SEWER LINES

A. Where indicated in the Plans or directed by the Engineer, the Contractor shall perform CCTV assessment and/or dyed - water testing to determine whether there are active service connections. The Contractor shall not abandon sewers with an active service connection.

B. The Contractor shall abandon sewers by grouting using a free flowing grout with a 28 - day compressive strength of 1000 psi.
C. Measurement and payment for CCTV assessment performed to determine the presence or absence of active service connections on sewer lines to be abandoned will be on a linear foot basis. Payment shall be made under:

1. CCTV Assessment, per linear foot (size).

D. No separate measurement or payment will be made for dyed-water testing performed to determine the presence or absence of active service connections on sewer lines to be abandoned.

D. Measurement and payment for abandoning sewer lines by grouting will be per linear foot.

1.17 ALABAMA DEPARTMENT OF TRANSPORTATION

A. Appendix B of the Jefferson County Standard Specifications contains the blanket Utility Permit No. 3-1-3982.

B. Any work within the Alabama Department of Transportation right-of-way shall be performed in accordance with the requirements of the Permit. The Alabama Department of Transportation must be notified of and must approve of all work within their right-of-way.

1.18 EXISTING FLOW MONITORS

A. When work is required on manholes that contain existing flow monitors, the flow monitor must be left in-place and shall not be disturbed whatsoever during performance of the Work.

B. If a specific flow monitor must be temporarily removed to perform the work at that existing manhole, Contractor shall be responsible for contacting Cedric Hayden with Jefferson County Environmental Services Department at (205) 214-8611 a minimum of seventy-two (72) hours in advance to coordinate monitor removal.

C. The removal, storage, and reinstallation of any existing flow monitors that require temporary removal must be conducted by ADS, LLC. ADS, LLC will invoice the Owner for the full removal, storage, and reinstallation fees.

1.19 QUANTITIES

A. The Bid Proposal Form may contain quantities for Bid Items that exceed the quantities identified on the Contract Drawings. These quantities may be used to accommodate unforeseen circumstances that may arise during construction.

B. The Bid Proposal Form may contain quantities for Bid Items that underrun the quantities listed on the Bid Proposal Form. Contractor shall make no claim for lost profits due to underrun of Bid Quantities listed on the Bid Form.
C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor’s overhead and profit for each separately identified item.

1.20 ALLOWANCES

A. If applicable, any amount listed in the Bid Proposal Form for designated Allowance Items are considered to be part of the Contract Price; however, the use of these funds will follow the procedures set forth in Section 01028 – Change Order Procedures. If the item involves Owner-initiated work, a request for proposal will be issued to the Contractor and, following receipt and review of the proposal and negotiation of the scope of work and cost, a form for modifying the allowance, as provided by the Owner, will be executed and the Owner will formally notify the Contractor in writing to proceed with the Owner-initiated work. If the work involves the response to eligible unforeseen conditions, the scope of the work and method of payment will be determined by the Engineer following notification by the Contractor and an assessment of the situation.

1.21 PROJECT COMMUNICATION

A. The Contractor shall provide each crew which performs work on this Project with a cell phone at no additional cost to the Owner. A list of contacts and phone numbers for each crew shall be supplied by the Contractor to the Owner and Engineer before beginning any work.

1.22 EXISTING CONDITIONS AND EXISTING UTILITIES

A. The Engineer has attempted to show on the Plans all pertinent surface features and utilities as existed at the time of the survey. The Contractor is urged to view the construction route and to identify any new or overlooked features. Claims for extra work may not be allowed for any feature not shown on the Plans.

B. Only approximate utility locations are shown on the Plans. The Contractor shall be responsible for notifying the appropriate utility company for determining the precise location and having the utility company mark the utility location in the field, and for coordinating his work with the utility company. The Contractor shall notify the utility company a minimum of seventy-two (72) hours in advance of performing any work in the area of the utility. No extra payment shall be made for any deviation from the proposed alignment as shown on the Plans (or increased depth) to avoid existing utilities.

1.23 SERVICE LATERAL RE-ROUTE

A. Service Lateral Re-Route shall consist of required modifications of the service lateral to accommodate connection to a separate sewer main than originally connected. Service lateral installation shall be in accordance with the Jefferson County Environmental Services Department Standard Specifications for Sanitary Sewer Service Lines and Connections.
B. Measurement and Payment for Service Lateral Re-Route shall be made on a linear foot basis. Payment will be full compensation for furnishing all labor, materials, tools, and equipment necessary to perform all work.

1.24 SERVICE LATERAL CONNECTION AND REPAIR PERMIT

A. Contractor is required to obtain a permit for each service line connection from the Jefferson County Environmental Services Department. The permit must be obtained by a licensed Master Plumber from a company that is licensed by the State of Alabama and has a current Bond with Jefferson County. No fee will be charged to obtain the permit for Jefferson County construction projects. No additional inspections/tests (hydrostatic/wooden ball) will be required other than what is required by the on-site inspector provided to inspect the Jefferson County construction project.

1.25 OBSTRUCTIONS WITHIN THE SANITARY SEWER LINE

A. Damage or an obstruction in the sanitary sewer line caused by the Contractor during work within this Contract shall be repaired or removed within 24 hours. If the repair or removal is not performed within the allotted time, the Owner will perform the necessary work at the expense of the Contractor.

1.26 SUBSTANTIAL COMPLETION

A. When the Contractor considers the entire Work to be ready for its intended use, Contractor shall notify Owner and Engineer in writing that he believes Substantial Completion has been achieved, except for items specifically listed by Contractor as incomplete, and request that the Engineer issue a certificate of Substantial Completion. For Substantial Completion to have been achieved, the entire Project must be fully capable of providing its intended use to the satisfaction of the Engineer. “Substantial Completion” means that all portions of the Project shall be installed and operational. All field testing shall be completed; all final paving, grading, and other finish items shall have been completed; and all warranties shall have been submitted and approved. The Contractor’s notification shall include an itemized list of remaining incomplete work.

B. Promptly after the Contractor’s notification, Owner, Contractor, and Engineer shall perform an inspection of the Work to determine the status of completion. If the Engineer does not consider Substantial Completion of the Work to be achieved, Engineer will notify the Owner and Contractor in writing identifying the particulars in which this determination revealed the Work to be incomplete or defective. If the Engineer does consider Substantial Completion of the Work to be achieved, Engineer will meet with the Contractor to:

1. Prepare a Punch List of incomplete or incorrect items of the Work and establish a date for their completion;
2. Define the division of responsibilities between Owner and Contractor with respect to security, operation, safety, and protection of the Work; maintenance; insurance; and warranties and guarantees; and

3. Describe any other outstanding issues related to Substantial Completion of the Work.

C. Upon reaching agreement with the Contractor, the Engineer will submit a tentative certificate of Substantial Completion to the Owner that states in writing that the Work has achieved Substantial Completion, includes a list of the items to be completed or corrected before final payment, establishes the date for completion of the incomplete or incorrect work, describes the division of responsibility between the Owner and Contractor, and sets forth any other items related to acceptance. Owner shall have seven days after receipt of the tentative certificate to issue a written objection to Engineer regarding any provisions of the certificate or attached list. If, after considering such objections, if any, Engineer concludes that the Work has not achieved Substantial Completion, Engineer will, within fourteen days after submission of the tentative certificate to the Owner, notify Contractor in writing, stating the reasons why. If, after consideration of Owner’s objections, if any, Engineer considers the Work to have achieved Substantial Completion, Engineer will, within said fourteen days, execute and deliver to the Owner a definitive certificate of Substantial Completion, including a revised tentative list of items to be completed or corrected, that has been revised to reflect changes from the tentative certificate that the Engineer believes are justified after consideration of the Owner’s objections, if any.

D. The Owner, who has sole discretion for final determination of definitive Substantial Completion, will review the Engineer’s definitive certificate that Substantial Completion has been achieved, and if the Owner concurs with that certification, the Owner will notify the Contractor, in writing, that the Work has achieved Substantial Completion. Substantial Completion will not occur until the entire Project is ready for possession and use. The Owner’s acceptance notice will include a Punch List of remaining incomplete or incorrect work items, establish the date for their completion, confirm the division of responsibilities between the Owner and Contractor, and describe any other outstanding terms of acceptance. The Contractor will acknowledge receipt of the acceptance notice in writing, indicating acceptance of all of its terms and provisions.

E. Upon receipt of the Contractor’s acknowledgement letter, the Owner shall take possession of the Work and put it into its intended service. The date that the Work is put into service will become the date of Substantial Completion. Unless otherwise specified, warranties will begin on the date of Substantial Completion.

F. Upon attainment of Substantial Completion, the Contractor shall become eligible for payment of retainage, subject to a withholding of 200 percent of the value of the outstanding Work, including Punch List items, as determined by the Engineer.

1.27 FINAL ACCEPTANCE
A. Once the Contractor has achieved Substantial Completion as detailed in Article 1.22 herein and has completed the itemized Punch List of the remaining incomplete or incorrect items of the Work from the Owner’s notice to the Contractor of acceptance of Substantial Completion, Contractor shall notify Owner and Engineer in writing that he believes Final Acceptance has been achieved and request that the Engineer issue a certificate of Final Acceptance. To achieve Final Acceptance, Contractor shall have removed all of his equipment, materials, tools, trash, labor, etc. from the site of the Work, shall have cleaned the site of the Work to the Owner’s satisfaction, and shall have complied with any and all additional requirements for Final Acceptance as listed in the Contract Documents.

B. Promptly after the Contractor’s notification, Owner, Contractor, and Engineer shall perform an inspection of the Work to determine the status of acceptance. If the Engineer does not consider Final Acceptance to be achieved, Engineer will notify the Owner and Contractor in writing identifying the particulars in which this determination revealed the Work to be incomplete or defective. If the Engineer does consider the requirements of Final Acceptance to be met, Engineer will execute and deliver to the Owner a definitive certificate of Final Acceptance.

C. The Owner, who has sole discretion for final determination of definitive Final Acceptance, will review the Engineer’s definitive certificate that Final Acceptance has been achieved, and if the Owner concurs with that certification, the Owner will notify the Contractor, in writing, that the Work has achieved Final Acceptance.

D. Upon attainment of Final Acceptance, the Contractor shall become eligible for final payment, including any retainage being withheld after Substantial Completion was achieved. Once Final Acceptance is granted to the Contractor, the Owner shall become responsible for all security, operation, safety, and protection of the Work, maintenance, and insurance that were formerly the responsibility of the Contractor prior to achieving Final Acceptance.

1.28 TERMINATION OF THE CONTRACT

A. Upon seven (7) days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, elect to terminate the Agreement. In such case, Contractor shall be paid (without duplication of any items) for:

1. Completed and acceptable work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit directly on such work

2. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted work, plus fair and reasonable sums for overhead and profit directly on such expenses

3. Reasonable expenses directly attributable to termination (demobilization)
B. Contractor shall not be paid on account of loss of anticipated profits or revenue or extended overhead or interest or underutilization of personnel or economic loss whatsoever arising out of or resulting from such termination.

1.29 CLEARING OF SANITARY SEWER EASEMENT

A. Furnishing all labor, equipment, and materials for clearing of sanitary sewer easement to access a sanitary sewer and/or manhole shall be considered incidental to the sewer and manhole replacement work. The clearing of the sanitary sewer easement shall be the minimum necessary for the Contractor to access the sewer line and/or manhole with all necessary vehicles and equipment needed for replacement. After completing the Work, the Contractor shall remove all debris, construction materials, and equipment from the site and shall restore the entire construction area to a clean, neat, and serviceable condition in accordance with the requirements of Section 02910 – Final Grading and Landscaping.

1.30 ACQUISITION OF ADDITIONAL RIGHT-OF-WAY

A. Additional right-of-way may have been acquired for the sanitary sewer work. Any acquired permanent right-of-way and/or temporary construction easement shall be indicated on the Issued for Construction drawings. If right-of-way has not been acquired for the work, the Contractor shall determine the most practical means to gain access to each area where any sanitary sewers and manholes to be replaced are located and shall receive approval of these means from the Owner and Engineer. In these cases, the Contractor shall be responsible for negotiating temporary right-of-entry agreements with any property owner(s).

1.31 TEMPORARY ACCESS ROAD CONSTRUCTION

A. Temporary access road construction shall consist of furnishing all labor, equipment, and materials required to construct a temporary access road. Temporary access road surface shall consist of 6 inches of 2.5-inch to 3.5-inch diameter coarse aggregate backfill. All components of the temporary access road, including, but not limited to, excavation, geotextiles, stone backfill, erosion and sedimentation control, and restoration, shall be considered incidental to the Work with no additional payment.

B. The following Sections of the Specifications shall be used as references in the construction of the temporary access road.

1. Section 02200 – Earthwork
2. Section 02207 – Aggregate Materials
3. Section 02270 – Slope Protection and Erosion Control
4. Section 02910 – Final Grading and Landscaping
1.32 GOVERNING LAW/DISPUTE RESOLUTION

A. The parties agree that this Contract is made and entered into in Jefferson County, Alabama and that all services, materials, and equipment to be rendered pursuant to said Agreement are to be delivered in Jefferson County, Alabama. The interpretation and enforcement of this Agreement will be governed by the laws of the State of Alabama, without giving effect to the conflict of laws rules thereof. The parties agree that jurisdiction and venue over all disputes arising under this Agreement shall be in the Circuit Court of Jefferson County, Alabama, Birmingham Division.

1.33 ASSIGNMENT

A. No portion of this Contract may be sold, assigned, or transferred to a third party without the express written consent of the Owner, its successors, assigns, or designees. Any attempt to assign this Contract without the written consent of the Owner, its successors, assigns, or designees is null and void.

1.34 GENERAL CODE OF THE CITY OF BIRMINGHAM, 1980

A. The Contractor shall adhere to Ordinance No. 10-115 as it relates to Title 4, “Municipal Services”, Chapter 5, “Streets and Sidewalks” Article H, “Excavations”, of the General Code of the City of Birmingham, 1980 when performing work within the City of Birmingham. A copy of said Ordinance is attached as Appendix F.

1.35 CONTRACTOR OVERTIME

A. Contractor (and Subcontractor) regular working hours consist of up to ten (10) working hours within an 11-hour period between 7:00 a.m. and 6:00 p.m. on a regularly scheduled basis, excluding Sundays and holidays. Overtime work is work in excess of forty (40) hours per week.

B. The Contractor shall compensate the Engineer(s), Engineer’s Subconsultant(s), and the Resident Project Representative(s) for overtime work caused by the Contractor or his Sub-Contractor(s). The Owner shall evaluate what constitutes as overtime and their determination shall be final. Compensation shall be based on the following maximum rates:

1. Engineer: up to $150/hour
2. Resident Project Representative: up to $120/hour

1.36 CONTRACTOR’S RESPONSIBILITY FOR WORK:

A. Until final acceptance of the Work by the Owner as evidenced by approval of the final estimate, the Work shall be in the custody and under the charge and care of the Contractor and he shall take every necessary precaution against injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from execution or from
non-execution of the Work, unless otherwise provided for elsewhere in the Specifications or Contract.

B. The Contractor shall rebuild, repair, restore and make good, without extra compensation, all injuries or damage to any portion of the Work occasioned by any of the above causes before its completion and acceptance, and shall bear the expenses thereof. In case of suspension of the Work from any cause whatever, the Contractor shall be responsible for all materials and equipment and shall properly store them, if necessary, and shall provide suitable shelter from damage and shall erect temporary structures where necessary.

1.37 PROJECT IDENTIFICATION SIGNAGE

A. The Contractor shall furnish and install one (1) project identification sign no later than ten (10) days after the issuance of the Notice to Proceed, but prior to the commencement of any construction activities. The sign shall be erected at a location of high public visibility adjacent to the main entrance to the site. This sign shall remain the property of the Contractor during construction until the Certificate of Substantial Completion is executed by all parties. No additional compensation is provided for the sign.

1. a. Project identification sign shall be as shown on the following page.
   c. Commissioner: Lashunda Scales, District 1
   d. Projected Completion: XXXX 20XX
1. Project Sign to be made from ¾”x4’x8’ grade-A, Exterior Plywood or 4’x8’ Aluminum Composite.
2. Lettering to be painted Black. Lettering, Placards and Outside trim to be painted White.
3. Area surrounding Placards to be painted Blue.
4. Sign to be attached to 4”x4”x8’ treated posts painted white.
5. Sign to be maintained in good condition until completion of project.

DETAIL: PROJECT SIGN
B. The project identification sign surface shall be installed plumb and level. The Contractor shall erect structurally adequate supports and framing on a secure foundation, rigidly braced and framed to resist wind loadings.

C. Sign finishes shall be adequate to withstand weathering, fading and chipping for the duration of construction. The sign shall be freshly painted using two coats of exterior quality paint and primers, and neatly lettered as shown on the following page. Rough hardware shall be galvanized.

D. After the project is completed, the Contractor shall remove the project information sign, framing, supports and foundations and restore the area to original or better condition.

1.38 POLICY RESOLUTIONS

A. WHEREAS, Jefferson County Departments which put out County work for public bidding specify that the Bid Proposals must be received at a specified place by a specified time at the County Courthouse on the day for opening Bid Proposals, and WHEREAS, the County Commission understands that allowing a bidder to submit a Bid Proposal after the specified time may result in some unfair advantage to the bidder by allowing the bidder more time to obtain quotes from subcontractors and suppliers, and WHEREAS, the Commission desires to establish a uniform policy with respect to the submission of Bid Proposals after the time specified in the Bid Proposal documents. NOW THEREFORE BE IT RESOLVED BY THE JEFFERSON COUNTY COMMISSION that the following shall be the POLICY of the County Commission with respect to Bid Proposals submitted after the time stated in Bid Proposal documents.

It is the POLICY of the Jefferson County Commission that no Bid Proposals shall be accepted by the County after the time stated in the Bid Proposal documents for submission of Bid Proposals. In furtherance of this policy:

1. All invitations for sealed competitive Bid Proposals shall expressly include along with the statement of the time for submitting Bid Proposals, words to the effect that, “No Bid Proposals shall be accepted after the time stated for receipt of Bid Proposals. This requirement shall not be waived.”.

2. For Bid Proposals to be received at the County Commission Audience Chambers in the Jefferson County Courthouse in Birmingham and Bessemer, the clock inside the respective Chambers shall be used to determine the time if the clock appears to be set within five minutes of the correct time. If not, the time shall be as determined by the County official or employee who is responsible for receipt and opening of Bid Proposals.
3. The department shall use best efforts to inform prospective bidders of the foregoing POLICY by placing additional written notice thereof on the Bid Proposal documents and by emphasizing the POLICY at the Pre-Bid Proposal Conference.

APPROVED BY THE JEFFERSON COUNTY COMMISSION

DATE: March 6, 1996
MINUTE BOOK: 112
PAGE(S): 403

END OF SECTION
SECTION 00822

INSURANCE REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General
B. Workman's Compensation and Employer's Liability Insurance
C. Comprehensive General Liability Insurance
D. Contractual Liability
E. Comprehensive Automobile Liability Insurance (Owned, Non-Owned, and Hired)
F. Umbrella Excess Liability over All Primary Insurance
G. Property Insurance
H. Special Hazards or Perils
I. Measurement and Payment

1.2 GENERAL

A. The Contractor shall not commence any work on the project until he obtains, at his own expense, all required insurance; and the Contractor shall not, at any time conduct any operations on the project or associated with the project unless such operations are covered by the specified insurance. Such insurance must have the approval of the Owner as to limit, form, and amount. The Contractor shall not permit any subcontractor(s) to commence work on the project until the same insurance coverage requirements have been complied with by such subcontractor(s) with limits to be determined by the Contractor. However, the failure of the subcontractor(s) to carry adequate insurance shall in no way affect the coverage afforded by the Owner by the Contractor's insurance. The insurance coverage shall be maintained throughout the full period of the Contract. Any insurance bearing on adequacy of the performance shall be maintained after completion of project for the full guaranty period.

B. Proof of insurance coverage specified herein shall be furnished to the Director of Environmental Services, Jefferson County Courthouse, 716 Richard Arrington Jr. Boulevard North, A300, Birmingham, Alabama 35203, in the form of copies of the policies. The Owner, however, in lieu of copies of the policies, and at his discretion,
may accept certificates issued by the insurance carrier and showing such policies to be in force for specified periods. The Contractor shall furnish to the Owner, prior to the expiration date of any policy, renewal certificates showing that policies will remain in force throughout the full period of the Contract. The insurance carrier shall be satisfactory to the Owner. No insurance coverage shall be canceled or materially changed without prior written notice having been given to the Owner, and then only after arrangements satisfactory to the Owner have been made to ensure insurance coverage until the project has been completed and accepted. All Contractors in a joint venture shall have insurance coverage through the same company; or, if that is not practical, then the Owner must be furnished an endorsement which allocates primary and secondary payment responsibilities.

C. The Owner, its governing body, its elected officials, employees, and agents and the Engineer shall also be additional named insured in all insurance policies provided by the Contractor and his subcontractor(s) as respects all work performed under this Contract.

D. In the event that the Contractor or his Surety is prevented by law or by charter from naming the Owner, its governing body, its elected officials, employees, and his agents, and the Engineer as insured in the policies providing the coverage listed herein, the Contractor shall purchase and maintain during the life of this Contract an Owner's and Contractor's Protective Liability Insurance Policy in an amount equal to the maximum amount specified under the various coverage including Umbrella Excess Liability over primary insurance; and the named insured in the Owner's and Contractor's Protective Liability Insurance Policy shall be the Owner, its governing body, its elected officials, employees, agents, and the Engineer. The insurance shall protect the Owner and his agents, and the Engineer, from any claim or loss arising from any act of the Contractor or his subcontractors, or any failure to act on the part of the Contractor or his subcontractors, during the performance of work under this Contract.

E. The specified limits and coverage in any of the policies for the various types of insurance shall not be construed as limiting the Contractor's responsibility to provide contractual coverage sufficiently broad so as to ensure the provisions of the Articles of these specifications relating to Indemnity, or limiting the responsibilities of the Contractor as outlined under aforesaid Articles.

F. Nothing contained in these insurance requirements shall be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from his operation under this Contract.

G. Insurance carried by the Contractor on the Work shall not relieve the Contractor of the responsibility for the protection of all materials and all work until the project has been accepted by the Owner. Any loss, including insurance deductibles surrendered on the project, shall be borne by the Contractor and/or the insurance company
providing the coverage for the Contractor; and the Owner shall not be liable for any
cost or replacement of lost or damaged work or material.

H. All policies required under this section shall have a 60-day written Notice of
Cancellation or material change to coverage clause. All changes shall be reported
and addressed to the Risk Manager, Jefferson County Courthouse, 716 Richard
Arrington Jr. Boulevard North, Suite A610, Birmingham, Alabama 35203, and to the
Director of Environmental Services, 716 Richard Arrington Jr. Boulevard North,
Suite A300, Birmingham, Alabama 35203.

1.3 WORKMEN’s COMPENSATION AND EMPLOYER's LIABILITY INSURANCE

A. Workmen's Compensation and Employer's Liability Insurance shall be in strict
accordance with the requirements of the current and applicable Workmen's
Compensation Laws of the State of Alabama. The insurance shall cover all of the
Contractor's employees employed or associated with the project; and where any part
of the Work is subcontracted, the Contractor shall require subcontractor(s) to provide
similar Workmen's Compensation and employer’s liability insurance for all
employees of the subcontractor(s) unless such employees are covered by the
protection afforded by the Contractor. In case any class of employees engaged in
hazardous work under this Contract is not protected under the Workmen's
Compensation Statute, the Contractor shall provide, and shall cause such
subcontractor(s) to provide, adequate coverage for the protection of all employees on
the project not otherwise protected under applicable provisions of the Statutes
relating to Workmen's Compensation and Employer's Liability Insurance. The
minimum limits of coverage shall be as follows:

1. State of Alabama Statutory
2. Applicable Federal Statutory
3. Employer’s Liability $500,000.00
4. Voluntary Compensation Statutory
5. Broad Form All State Endorsement
6. Benefits received by Union Labor Contracts - As Applicable

1.4 COMPREHENSIVE GENERAL LIABILITY INSURANCE

A. Comprehensive General Liability Insurance shall protect the Contractor and any
subcontractor performing work under this Contract from any claims for bodily injury,
sickness or disease, death, personal injury, and property damages which may arise
either directly or indirectly out of, or in connection with, the performance of Work
under this Contract. The Comprehensive General Liability Insurance Coverage shall include: Premises - Operations; Independent Contractor's Protective; Explosion, Collapse, and Underground Property Damage; Broad Form Property Damage; Contractual Liability (written and oral); and fellow Employee Coverage. The minimum limits of coverage shall be as follows:

1. Bodily Injury  $1,000,000.00 Each Occurrence
   (Includes Personal Injury)  $2,000,000.00 Annual Aggregate

2. Property Damage  $1,000,000.00 Each Occurrence
   $2,000,000.00 Annual Aggregate

or

3. Bodily Injury and Property Damage, Combined Single Limit  $4,000,000.00 Annual Aggregate
   (where applicable)

1.5 CONTRACTUAL LIABILITY

A. The minimum limits of coverage shall be as follows:

1. Bodily Injury  $1,000,000.00 Each Occurrence

2. Property Damage  $1,000,000.00 Each Occurrence

3. Annual Aggregate  $2,000,000.00

1.6 COMPREHENSIVE AUTOMOBILE LIABILITY INSURANCE (OWNED, NON-OWNED, AND HIRED)

A. Comprehensive Automobile Liability Insurance (Owned, Non-owned, and Hired) shall protect the Contractor and any subcontractor performing work under this Contract from any claims for bodily injury, death, and property damage which may arise either directly or indirectly out of, or in connection with, the performance of work under this Contract. The minimum limits of coverage shall be as follows:

1. Bodily Injury  $1,000,000.00 Each Occurrence

2. Property Damage  $1,000,000.00 Each Occurrence

3. Bodily Injury and Property Damage  $2,000,000.00 Each Occurrence
1.7 UMBRELLA EXCESS LIABILITY OVER ALL PRIMARY INSURANCE

A. The minimum limits of coverage shall be as follows:
   1. Each Occurrence $5,000,000.00
   2. Aggregate (where applicable) $5,000,000.00

1.8 PROPERTY INSURANCE

A. Unless otherwise specified, the Contractor shall provide All Risk Course of Construction Insurance (excluding floods and earthquakes) to cover the interests of all Contractor and subcontractors of any tiers. The Contractor and subcontractors of any tiers shall be responsible for all risks of physical loss to the Work.
   1. The total amount of the insurance shall be the amount of the Contract.
   2. The policy or policies shall be endorsed to waive all rights of subrogation among, between, and to each insured under the policy or policies. The waiver, however, shall apply only to the policy, or policies, and not to another part or parts of this Contract.
   3. Any claim coming under the terms and conditions of the policy or policies, shall be immediately reported to the Engineer.

1.9 SPECIAL HAZARDS OR PERILS

A. The Liability and Property Damage Insurance Coverage of the Contractor's operations shall provide adequate protection against any death, any bodily injury, or any property damage resulting from the blasting operations in connection with the Contractor's work, or in connections with the work of his subcontractors.

1.10 MEASUREMENT AND PAYMENT

A. The cost of insurance required herein shall be included in the unit prices bid on other Bid Proposal items, and no additional amount will be paid.

END OF SECTION
SELECTION 00825

ALABAMA LAW

AN ACT

Alabama Code Section 39-2-14

(a) Every nonresident Contractor, as defined in Section 39-2-12 of the Code of Alabama 1975, shall register with the Department of Revenue prior to engaging in the performance of a Contract in this state. At the time of registration, the Contractor shall deposit with the Department of Revenue five per centrum (5%) of the amount such Contractor is to receive for the performance of the Contract which shall be held within a "Contractors Use Tax Fund" pending the completion of the Contract, the determination of the taxes due this state and other governmental bodies, and the payment of same. In lieu of such deposit, the Contractor may provide a corporate surety bond to be approved by the Commissioner of Revenue as to form, sufficiency, value, amount, stability, and other features necessary to provide a guarantee of payment of the taxes due this state and other governmental bodies.

(b) In addition, within thirty (30) days after registration, the Contractor shall file a statement with the Department of Revenue itemizing the machinery, materials, supplies, and equipment that he has or will have on hand at the time he begins the fulfillment of the Contract where such tangible personal property has been brought, shipped, or transportation from outside the State of Alabama upon which neither the use taxes or ad valorem taxes have been paid and shall pay the tax due thereon at the time of filing and thereafter shall report and pay the tax as required by the Commissioner of Revenue.

(c) Upon payment of the said taxes due, as required hereby, the deposit or the surety bond required herein shall be returned forthwith to the out-of-state Contractor posting same.

(d) The Commissioner of Revenue shall have authority to promulgate rules and regulations to carry out the provisions of this Act.
ALABAMA LAW

Alabama Code Section 39-3-5

Preference to resident contractors in letting of certain public contracts.

(a) In the letting of public Contracts in which any state, county; or municipal funds are utilized, except those Contracts funded in whole or in part with funds received from a federal agency, preference shall be given to resident Contractors, and a non-agency, preference shall be given to resident Contractors, and a non-resident bidder domiciled in state having laws granting preference to local Contractors shall be awarded Alabama public Contracts only on the same basis as the non-resident bidder's state awards Contracts to Alabama Contractors bidding under similar circumstances; and resident Contractors of Alabama, as defined in Section 39-2-12, Code of Alabama 1975, be they corporate, individuals, or partnerships, are to be granted preference over non-residents in awarding of the Contracts in the same manner and to the same extent as provided by the laws of the state of domicile of the non-resident.

(b) A summary of this law shall be made a part of the advertised specifications of all projects affected by this law.
ALABAMA LAW


By signing this contract, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

Alabama Act 2016-312

Contractor certifies that it is not currently engaged in, and for the duration of this agreement will not engage in, the boycott of a person or an entity based in or doing business with a jurisdiction with which this state enjoys open trade.

END OF SECTION
SECTION 01010

SUMMARY OF WORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Work to be done under this Contract and in accordance with these Specifications and Drawings consists of furnishing all equipment, superintendence, labor, skill, material, and all other items necessary for the construction of the Sanitary Sewer System – Asset Management Program – Contract No.2019 AMP01 – Wylam PS Service Area Comprehensive Rehabilitation, including, but not limited to, all civil, mechanical, structural, and appurtenant work, complete in-place, tested, and ready for full operation, including temporary facilities as required, all in conformance with the Contract Documents and as directed by the Engineer.

The Contractor shall perform all work required for such construction in accordance with the Contract Documents and subject to the terms and conditions of the Contract, complete and ready for use.

B. The major items of the Work to be performed under this Contract include:

1. Mobilization and demobilization in accordance with Section 01505 – Mobilization and Demobilization

2. Rehabilitation of existing sanitary sewer pipe measuring 8 inches in diameter in approximately 11,789 linear feet of existing vitrified clay and iron sewer pipes via cured-in-place pipe lining.

3. Rehabilitation of approximately 194 existing sanitary sewer service laterals in mainline pipe and 3 existing sanitary sewer service laterals in manholes via cured-in-place pipe lining. These lateral rehabilitations are intended to be installed without the installation of a new cleanout.

4. Rehabilitation existing sanitary sewer pipe in approximately 9 locations with the use of an internal sectional cured-in-place liner.

5. Replacement of approximately 24 existing sanitary sewer service laterals via open cut excavation.

6. Rehabilitation of approximately 548 vertical feet of existing manholes.

7. Site restoration, including provision of permanent sodding and riprap, reset or replacement of fences, and replacement of concrete sidewalks; curb and valley gutter; asphalt roadways, driveways, and parking lots; concrete driveways and parking lots.
a. All required replacement of concrete sidewalks; asphalt roadways, driveways, and parking lots; and concrete driveways and parking lots for pipeline and manhole replacement shall be performed in accordance with Section 02575 – Pavement Repair.

8. Traffic control and regulation as required in accordance with Section 01570 – Traffic Regulation

9. Allowance which shall constitute full payment to perform Owner-Directed repairs which, in the sole judgment of the Owner, could not have been determined from the Bidding Documents.

10. All work necessary, including bypass pumping if required, to temporarily remove portions of the existing sanitary sewer system from operation and divert wastewater flows around construction activities to perform the previously-listed work in accordance with Section 02600 – Wastewater Flow Control

11. Installation, maintenance, and removal of erosion, sedimentation, and pollution control devices in accordance with Section 02270 – Slope Protection and Erosion Control

12. Incidental work associated with each of the previously-listed items of work

13. The estimated quantities of the previously-listed features of the Work shall be as stated in Section 00300 – Bid Proposal.

C. The Project site (site of the Work) is located in various locations throughout Jefferson County, Alabama as shown on the Drawings.

D. The foregoing descriptions shall not be construed as a complete description of all work required. All appurtenances related to the work as previously described herein shall also be provided.

E. All Work shall be in compliance with all federal, state, county, and local codes and regulations, standards, and specifications as applicable at the time of Bid unless otherwise directed in writing by the Owner.

1.02 CONTRACT DOCUMENTS

A. The Work to be done is shown on the set of Drawings entitled “Sanitary Sewer System Rehabilitation – Asset Management Program – Contract No. 2019 AMP01 Wylam PS Service Area Comprehensive Rehabilitation”. The numbers and titles of all Drawings appear on the Index of Drawings on Drawing G02 – General Notes and Index of Drawings Sheet. All Drawings so enumerated shall be considered an integral part of the Contract Documents as defined herein.

B. Certain Document Sections refer to Divisions of the Contract Specifications. Sections are each individually numbered portions of the Specifications (numerically) such as 08110, 13182, 15206, etc. The term Division is used as a convenience term meaning all
Sections within a numerical grouping. Division 16 would thus include Sections 16000 through 16903.

C. Where references in the Contract Documents are made to Contractors for specific disciplines of work (i.e. Electrical Contractor, etc.), these references shall be interpreted to be the single prime Contractor when the project is bid or awarded as a single prime contract.

D. The intent of the Drawings and Specifications is to prescribe a complete Work which the Contractor undertakes to perform in full compliance with the Contract. The Contractor shall perform all Work as shown on the Drawings and described in the Specifications and in other parts of the Contract Documents and shall do such additional extra and incidental work as may be considered necessary to complete the Work in a satisfactory and acceptable manner. Any work or material not shown on the Drawings or described in the Specifications, but which may be fairly implied as included in any Bid Item of the Contract, shall be performed and/or provided by the Contractor without additional charges to the Owner. The Contractor shall furnish all labor, materials, tools, equipment, and incidentals necessary to the prosecution and successful completion of the Work.

1.03 GENERAL ARRANGEMENT

A. Drawings indicate the extent and general arrangement of the work. If any departures from the Drawings are deemed necessary by the Contractor to accommodate the materials and equipment he proposes to furnish, details of such departures and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer. Approved changes shall be made without additional cost to the Owner for this work.

B. The specific materials and equipment proposed for use by the Contractor on the project may require changes in structures, auxiliary equipment, piping, electrical, mechanical, controls, or other work to provide a complete satisfactory operating installation. The Contractor shall submit to the Engineer, for approval, all necessary drawings and details showing such changes to verify conformance with the overall project requirements and operating performance. The Bid Price shall include all costs in connection with the preparation of new drawings and details and all changes to construction work to accommodate the proposed materials and equipment.

1.04 CONSTRUCTION PERMITS

A. The Contractor shall obtain, keep current, and pay all fees for any necessary construction permits from those authorities, agencies, or municipalities having jurisdiction over land areas, utilities, or structures which are located within the Contract limits and which will be occupied, encountered, used, or temporarily interrupted by the Contractor’s operations unless otherwise stated. Record copies of all permits shall be furnished to the Owner and Engineer.

1. When the Work includes excavating within the limits of a street located in the City of Birmingham, the Contractor shall obtain a Street Excavation (Private) Permit from the City of Birmingham Department of Planning, Engineering & Permits. The current version of the application form for this Permit is located at...
B. When construction permits are accompanied by regulations or requirements issued by a particular authority, agency, or municipality, it shall be the Contractor's responsibility to familiarize himself and comply with such regulations or requirements as they apply to his operations on this Project.

1.05 ADDITIONAL ENGINEERING SERVICES

A. In the event that the Engineer is required to provide additional engineering services as a result of substitution of materials or equipment by the Contractor which are not "or equal", or changes by the Contractor in dimension, weight, power requirements, etc., of the materials, equipment, and accessories furnished, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

B. Structural design shown on the Contract Drawings is based upon typical weights for major items of equipment as indicated on the Contract Drawings and specified. If the equipment furnished exceeds the weights of said equipment, the Contractor shall assume the responsibility for all costs of redesign and for any construction changes required to accommodate the equipment furnished, including the Engineer's expenses in connection therewith.

C. In the event that the Engineer is required to provide additional engineering services as a result of Contractor's errors, omissions, or failure to conform to the requirements of the Contract Documents, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Engineer's charges in connection with such additional services shall be charged to the Contractor by the Owner.

1.06 ADDITIONAL OWNER'S EXPENSES

A. In the event the Work of this Contract is not completed within the time set forth in the Contract or within the time to which such completion may have been extended in accordance with the Contract Documents, the additional engineering or inspection charges incurred by the Owner may be charged to the Contractor and deducted from the monies due him. Extra work or supplemental Contract work added to the original Contract, as well as extenuating circumstances beyond the control of the Contractor, will be given due consideration by the Owner before assessing engineering and inspection charges against the Contractor.

B. Unless otherwise specifically permitted, the normal time of work under this Contract shall be as specified in Section 01015 – Prosecution and Progress. Work beyond these hours will result in additional expenses to the Owner. Any expenses and/or damages, including the cost of the Owner's inspector and/or other onsite personnel who are normally employed as part of the Work, arising from the Contractor's operations beyond the hours and days specified in Section 01015 – Prosecution and Progress shall be borne by the Contractor.
C. Charges assessed to the Contractor for additional engineering and inspection costs will be determined based on actual hours charged to the job by the Owner. Daily rates will depend on the number, classifications, and salaries of employees involved, but in no case shall such charges exceed $960 per day for field personnel and $1,210 per day for engineering personnel, based on an 8-hour workday.

D. Charges for additional Owner's expenses shall be in addition to any liquidated damages assessed in accordance with the Contract.

1.07 SURVEYS AND LAYOUT

A. All work under this Contract shall be constructed in accordance with the lines, grades, and elevations shown on the Drawings or as directed by the Engineer or Owner. Existing conditions (i.e. elevations and locations of existing ground surfaces, structures, equipment, piping, etc.) shown on the Drawings were derived from the best available information at the time of their preparation and are believed to be reasonably correct but are not guaranteed to be absolute; therefore the existing conditions presented shall be considered only as an approximation. The Contractor shall perform any and all field surveys at his/her expense that he/she deems necessary to verify the actual details and conditions of the existing facility prior to submitting his/her Bid, upon which his/her Bid shall be based.

1. No attempt has been made to locate vertical bends or horizontal bends in existing piping.

B. The Work and its connections, routing, and design intent are based on the information currently available showing the existing conditions. The Contractor shall field-verify the nature and extent of the Work prior to ordering any materials. No payment shall be authorized for materials not retained as part of the Owner's sewage facilities and appurtenances.

C. All survey, layout, and measurement work for establishing horizontal and vertical control points to be used as baselines for construction control purposes shall be performed by the Contractor at his expense as a part of the Work. The Contractor shall provide a Licensed Surveyor as Chief of Party, an experienced instrument person, competently qualified men as assistants, and all necessary instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement work. In addition, Contractor shall furnish, without additional charge, competent persons and such instruments, tools, stakes, and other materials as Engineer may require in checking survey, layout, and measurement work performed by Contractor.

D. Contractor shall establish all horizontal and vertical baselines for the location of the principal component parts of the Work together with a suitable number of benchmarks and batter boards adjacent to the Work. Based upon the information provided by the Contract Drawings, the Contractor shall develop and make all detail surveys necessary for construction, including slope stakes, batter boards, stakes for all working points, lines, and elevations.

E. Contractor shall have the responsibility of carefully preserving and protecting the benchmarks, reference points, and stakes from damage, and in the case of destruction thereof by the Contractor or resulting from his negligence, the Contractor shall be
charged with the expense and damage resulting therefrom and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such benchmarks, reference points, and stakes, including removing and reconstructing work which is improperly located.

F. Existing or new control points, property markers, and monuments that will be or are damaged or destroyed during the normal course of construction operations shall be reestablished and replaced by the Contractor, and all reference ties recorded therefore shall be furnished to the Engineer. If Contractor needs to relocate any existing or new control points, property markers, or monuments that will be impacted by the construction operations, they shall be relocated to a location on the site which is acceptable to the Owner and Engineer. All computations necessary to establish the exact position of the work shall be made and preserved by the Contractor.

G. The Engineer may check all or any portion of the Work, and the Contractor shall afford all necessary assistance to the Engineer in carrying out such checks. Any necessary corrections to the Work shall be immediately made by the Contractor. Such checking by the Engineer shall not relieve the Contractor of any responsibilities for the accuracy or completeness of his work.

H. At completion of the work, the Contractor shall furnish Record Drawings to the Owner indicating the final layout of all structures, piping, supports, roads, existing benchmarks, etc. in accordance with Section 01300 – Submittals and Section 01720 – Project Record Documents. The Record Drawings shall indicate all critical as-installed elevations and dimensions of piping, supports, structures, finish grades, etc.

1.08 FIRE PROTECTION

A. Contractor shall take all necessary precautions to prevent fires at or adjacent to the work, buildings, etc. and shall provide adequate facilities for extinguishing fires which do occur. Burning shall not be permitted.

B. When fire or explosion hazards are created in the vicinity of the work as a result of the locations of fuel tanks or similar hazardous utilities or devices, the Contractor shall immediately alert the local Fire Marshal, the Engineer, and the Owner of such tank or device. The Contractor shall exercise all safety precautions, shall comply with all instructions issued by the Fire Marshal, and shall cooperate with the Owner of the tank or device to prevent the occurrence of fire or explosion.

1.09 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of either the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with all applicable rules and regulations.
1.10 FIRST AID FACILITIES AND ACCIDENTS

A. First Aid Facilities

1. The Contractor shall provide at the site such equipment and facilities as are necessary to supply first aid to any of his personnel who may be injured in connection with the work.

B. Accidents

1. The Contractor shall promptly report, in writing, to the Engineer and Owner all accidents whatsoever out of, or in connection with, the performance of the Work, whether on or adjacent to the site, which cause death, personal injury, or property damage, giving full details and statements of witnesses.

2. If death, serious injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Owner and the Engineer.

3. If any claim is made by anyone against the Contractor on account of any accidents, the Contractor shall promptly report the facts, in writing, to the Engineer and Owner, giving full details of the claim.

1.11 ULTIMATE DISPOSITION OF CLAIMS BY ONE CONTRACTOR ARISING FROM ALLEGED DAMAGE BY ANOTHER CONTRACTOR

A. During the progress of the work, other contractors may be engaged in performing other work or may be awarded other Contracts for additional work on this project. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other contractors and the Contractor shall fully cooperate with such other contractors and carefully fit its own work to that provided under other Contracts as may be directed by the Engineer. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other Contractor.

B. If the Engineer shall determine that the Contractor is failing to coordinate his work with the work of the other contractors as the Engineer directed, then the Owner shall have the right to withhold any payments otherwise due hereunder until the Contractor completely complies with the Engineer's directions.

C. If the Contractor notifies the Engineer in writing that another Contractor is failing to coordinate his work with the work of this Contract as directed, the Engineer will promptly investigate the charge. If the Engineer finds it to be true, he will promptly issue such directions to the other Contractor with respect thereto as the situation may require. The Owner, the Engineer, nor any of their agents shall not, however, be liable for any damages suffered by the Contractor by reason of the other Contractor's failure to promptly comply with the directions so issued by the Engineer, or by reason of another Contractor's default in performance, it being understood that the Owner does not guarantee the responsibility or continued efficiency of any Contractor.

D. The Contractor shall indemnify and hold the Owner and the Engineer harmless from any and all claims of judgments for damages and from costs and expenses to which the
Owner may be subjected or which it may suffer or incur by reason of the Contractor's failure to comply with the Engineer's directions promptly.

E. Should the Contractor sustain any damage through any act or omission of any other Contractor having a Contract with the Owner for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the work to be performed hereunder, or through any act or omission of a Subcontractor of such Contract, the Contractor shall have no claim against the Owner or the Engineer for such damage, but shall have a right to recover such damage from the other Contractor under the provision similar to the following provisions which have been or will be inserted in the Contracts with such other contractors.

F. Should any other Contractor having or who shall hereafter have a Contract with the Owner for the performance of work upon the site sustain any damage through any act or omission of the Contractor hereunder or through any act or omission of any Subcontractor of the Contractor, the Contractor agrees to reimburse such other Contractor for all such damages and to defend at his own expense any suit based upon such claim and if any judgment or claims against the Owner shall be allowed, the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and shall indemnify and hold the Owner harmless from all such claims.

G. The Owner's right to indemnification hereunder shall in no way be diminished, waived, or discharged by its recourse to assessment of liquidated damages as provided in the Contract or by the exercise of any other remedy provided for by Contract Documents or by law.

1.12 BLASTING AND EXPLOSIVES

A. The use of blasting or explosives shall not be allowed under this Project.

1.13 LIMITS OF WORK AREA

A. The Contractor shall confine his construction operations within public properties, rights-of-way, and permanent easements located within the portions of sanitary sewer collection system basins as shown on the Drawings and as approved by the Owner. For any portion of the Work located on private property outside of public properties, rights-of-way, and permanent easements, Contractor shall coordinate with the respective private property owner for accessing those areas. Storage of equipment and materials and/or erection and use of temporary sheds shall be confined to the Owner's property and shall be subject to the Owner's approval. Such storage or temporary structures shall not be placed on properties designated as easements or rights-of-way unless specifically permitted elsewhere in the Contract Documents.

1.14 WEATHER CONDITIONS

A. No work shall be done when the weather is unsuitable. The Contractor shall take necessary precautions (in the event of impending storms) to protect all work, materials, and equipment from damage or deterioration due to floods, driving rain, wind, and snow storms. The Owner reserves the right, through the opinion of the Engineer, to order that additional protection measures over and beyond those proposed by the Contractor be
taken to safeguard all components of the Project. The Contractor shall not claim any compensation for such precautionary measures so ordered, nor claim any compensation from the Owner for damage to the Work from weather elements.

B. The mixing and placing of concrete or pavement courses, the laying of masonry, and installation of sewers and water mains shall be stopped during rainstorms if ordered by the Engineer, and all freshly placed work shall be protected by canvas or other suitable covering in such manner as to prevent running water from coming in contact with it. Sufficient coverings shall be provided and kept ready at hand for this purpose. The limitations and requirements for mixing and placing concrete or laying of masonry in cold weather shall be as described elsewhere in these Specifications.

1.15 PERIODIC CLEANUP: BASIC SITE RESTORATION

A. During construction, the Contractor shall regularly remove from the site of the Work all accumulated debris and surplus materials of any kind which result from his operations. Unused equipment and tools shall be stored at the Contractor's yard or base of operations for the Project.

B. When the work involves installation of sewers, drains, water mains, manholes, underground structures, or other disturbance of existing features in or across streets, rights-of-way, easements, or private property, the Contractor shall (as the work progresses) promptly backfill, compact, grade, and otherwise restore the disturbed area to the basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or functions consistent with the original use of the land. The requirements for temporary paving of streets, walks, and driveways are specified elsewhere. Unsightly mounds of earth, large stones, boulders, and debris shall be removed so that the site presents a neat appearance.

C. The Contractor shall perform the cleanup work on a regular basis and as frequently as ordered by the Owner. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the Owner, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

D. Upon failure of the Contractor to perform periodic cleanup and basic restoration of the site to the Owner's satisfaction, the Owner may, upon five (5) days prior written notice to the Contractor, without prejudice to any other rights or remedies of the Owner, cause such work for which the Contractor is responsible to be accomplished to the extent deemed necessary by the Owner, and all costs resulting therefrom shall be charged to the Contractor and deducted from the amounts of money that may be due him.

E. Engineer and Owner will not approve any Application for Payment if, at the time of approval, the site is not adequately cleaned and/or restored to the Engineer's and Owner's satisfaction.

1.16 USE OF FACILITIES BEFORE COMPLETION

A. The Owner reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this Contract. However, only
those portions of the facilities which have been completed to the Engineer’s satisfaction, as evidenced by his issuing a Certificate of Substantial Completion covering that part of the work, shall be placed in service.

B. It shall be the Owner’s responsibility to prevent premature connections to or use of any portion of the installed facilities by private or public parties, persons, or groups of persons, before the Engineer issues a Certificate of Substantial Completion covering that portion of the work to be placed in service.

C. Consistent with the approved progress schedule, the Contractor shall cooperate with the Owner, his agents, and the Engineer to accelerate completion of those facilities, or portions thereof, which have been designated for early use by the Owner.

1.17 CONSTRUCTION VIDEO

A. The Contractor shall video the surface features of the entire project site, including concrete and asphalt roadway and driveway pavements, sidewalk, curb and gutter, fencing, structures, landscaping, etc. located in the immediate areas surrounding the pipes and manholes to be installed or replaced. The original video file shall be submitted to the Engineer prior to beginning construction activities. The video shall be provided as an Audio Video Interleave (.avi) file on DVD-ROM. The video shall clearly identify existing site and structural conditions prior to excavation occurring.

B. Engineer and Owner will not approve the first Application for Payment if the Contractor has not submitted an acceptable construction video.

1.18 INTOXICATING LIQUORS

A. The Contractor shall neither permit nor suffer the introduction or use of intoxicating substances, such as but not limited to alcohol or illegal drugs, upon or about the project site.

1.19 EMERGENCY RESPONSE

A. The Contractor shall respond within four (4) hours to any emergency that may arise in connection with the Work on a twenty-four (24) hour per day, seven (7) days per week basis. Should the Owner’s maintenance forces be called upon by the Owner to rectify a problem created by the Contractor, the Contractor shall be responsible for all costs incurred by the Owner, plus twenty-five (25) percent, with a minimum charge of one hundred (100) dollars per occurrence. This charge shall be subject to change depending upon the severity of the emergency and shall be determined by the Owner.

1.20 AVAILABILITY OF CONTRACT DOCUMENTS

A. Contractor shall maintain one (1) complete set of Contract Documents, including both the Drawings and Specifications, onsite at all times during performance of the Work that shall be made available to the Owner upon their request.

1.21 ATTENTION TO WORK
A. The Contractor shall give his personal attention to and shall supervise the Work to the end that it shall be faithfully prosecuted. When Contractor is not personally present on the Work, he shall at all times be represented by a competent superintendent or foreman who shall be present at the Work to receive and obey all instructions or orders given under this Contract. Superintendent or foreman shall have full authority to execute these instructions or orders; supply materials, tools, and labor without delay; and serve as the legal representative of the Contractor. The Contractor shall be liable for the faithful observance of any instructions delivered to him or to his authorized representatives.

1.22 ACCESS TO WORK

A. Contractor shall at all times provide proper facilities for access and inspection of the Work by representatives of the Owner and of such official governmental agencies as may be designated by the Owner as having jurisdictional rights to inspect the Work in accordance with Section 01550 – Site Access and Storage.

PART 2 -- PRODUCTS
(NOT USED)

PART 3 -- EXECUTION
(NOT USED)

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SECTION 01011

DEFINITIONS

PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. Definitions of Selected Terms Used in These Specifications

1.02 DEFINITIONS OF SELECTED TERMS USED IN THESE SPECIFICATIONS

A. Wherever the words, forms, or phrases defined or pronouns used in their stead occur in the Specifications, in the Contract, in the Advertisement, or in any document or instrument herein contemplated or to which these Specifications apply, the intent and meaning shall be construed and interpreted as follows:

1. Abbreviations: The following organizations are referred to in these Specifications by the following abbreviations of their titles:

   a. AASHTO – American Association of State Highway and Transportation Officials
   b. ACI – American Concrete Institute
   c. ACIFS – American Cast Iron Flange Standards
   d. ADEM – Alabama Department of Environmental Management
   e. AFBMA – Anti-Friction Bearing Manufacturers Association
   f. AGA – American Gas Association
   g. AGMA – American Gear Manufacturers Association
   h. AIA – American Institute of Architects
   i. AISC – American Institute of Steel Construction
   j. AISI – American Iron and Steel Institute
   k. ALDOT – Alabama Department of Transportation
   l. ANSI – American National Standards Institute
   m. API – American Petroleum Institute
n. ASA – American Standards Association
o. ASCE – American Society of Civil Engineers
p. ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers
q. ASME – American Society of Mechanical Engineers
r. ASTM – American Society for Testing and Materials
s. AWS – American Welding Society
t. AWWA – American Water Works Association
u. CEMA – Conveyor Equipment Manufacturers Association
v. CRSI – Concrete Reinforcing Steel Institute
w. DIPRA – Ductile Iron Pipe Research Association
x. EPA – United States Environmental Protection Agency
y. FDA – United States Food and Drug Administration
z. Fed Spec – Federal Specifications
aa. ICRI – International Concrete Repair Institute
bb. IEEE – Institute of Electrical and Electronic Engineers
cc. IPCEA – Insulated Power Cable Engineers Association
dd. ISO – Insurance Services Offices
ee. NACE – National Association of Corrosion Engineers
ff. NASSCO – National Association of Sewer Service Companies
gg. NBS – National Bureau of Standards
hh. NEC – National Electrical Code
ii. NEMA – National Electrical Manufacturers Association
jj. OSHA – Occupational Safety and Health Administration
kk. PCI – Precast Concrete Institute
II. SSPC – The Society for Protective Coatings

mm. UL – Underwriters Laboratories, Inc.

nn. USDA – United States Department of Agriculture

oo. USGS – United States Geological Survey

2. Addenda: Any clarification, correction, or change to Drawings and/or Specifications after advertisement for bids has commenced but prior to opening of bids shall be made by addenda, with appropriate supplemental Drawings and/or Specifications issued to all Bidders. After issuance, any addenda shall become a part of the Contract Documents as much as though fully contained therein.

3. Advertisement: A public announcement inviting bids for Work to be performed and materials to be furnished.

4. Bid: The offer or Bid Proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. Bid Bond: The approved form of security furnished by the Bidder and his surety, with the Bid Proposal, as a guarantee that the Bidder will enter into an agreement with the Owner for construction of the Work should the Contract be awarded to him.

6. Bid Proposal: The written and signed statement of the Bidder submitted on the prescribed form setting forth the prices to perform the contemplated Work and furnish the necessary materials in accordance with the provisions of the Drawings and Specifications.

7. Bid Proposal Form: The prescribed form on which the offer of a Bidder is to be submitted.

8. Bidder: Any individual, firm, partnership, or corporation submitting a Bid for the advertised Work.

9. Calendar Days: Every day shown on the calendar, beginning and ending at midnight, including Sundays and holidays.

10. Change Order: A written order to the Contractor covering changes in the Drawings, Specifications, or Bid Proposal quantities and establishing the basis of payment and Contract Time adjustment, if any, for the Work affected by such changes.

11. Contract: The written agreement between the Owner and the Contractor covering the performance of the Work.

12. Contract Documents: The Contract, including Advertisement for Bids, Bid
Proposal, Contractor Performance Requirements, Special Conditions, Technical Specifications, Agreement, Bonds, Drawings, Notice of Award, Notice to Proceed, Addenda, if any, and all approved Change Orders

13. **Contract Time:** The number of calendar days or working days, stated in the Bid Proposal, allowed for completion of the Contract, including authorized time extensions. If a calendar date of completion is stated in the Bid Proposal in lieu of a number of calendar or working days, the Contract shall be completed by that date.

14. **Contractor:** The individual, firm, partnership, or corporation selected by the Owner as the successful Bidder, who has become a party to the Contract, and his duly authorized representatives for performance of prescribed Work.

15. **County:** The County of Jefferson, within the State of Alabama, the party of the first part of the Contract, acting by and through the Jefferson County Commission.

16. **Drawings:** The official Contract Drawings or exact reproduction thereof which show and describe the Work to be done and which are to be considered as a part of the Contract, supplementary to the Specifications.

17. **Employee:** Any person working on the project to which these Specifications apply who is under the direction or control of, and receives compensation from, the Contractor or subcontractors.

18. **Engineer:** An authorized agent of the Jefferson County Environmental Services Department assigned to make interpretation and enforcement of the Drawings and Specifications, approve submittals, generally oversee the quality and progress of the Work, and determine the amount, quantity, acceptability, and fitness of the Work as specified in the Drawings and Specifications. In some circumstances, the Owner may elect to act as Engineer on all or a portion of the Project.

19. **Equipment:** All machinery, together with the necessary supplies for upkeep and maintenance, and all tools and apparatus necessary for the proper construction and acceptable completion of the Work.

20. **Extra Work:** An item of Work not provided for in the awarded Contract as previously modified by Change Order but which is found by the Engineer to be necessary to complete the Work within the intended scope of the Contract as previously modified.

21. **Final Acceptance:** As defined in Section 00820 – Special Conditions.

22. **Inspector:** An authorized representative of the Engineer assigned to make all necessary inspections and/or tests of the Work performed or of the materials furnished or being furnished by the Contractor.

23. **Laboratory:** The official testing laboratories of the Owner or such other
laboratories as may be designated by the Engineer

24. **Mainline Sanitary Sewer**: A pipe or conduit which is closed and not flowing full, which is intended to carry only sanitary and industrial wastewater from residences, commercial buildings, industrial parks, and institutions

25. **Major and Minor Contract Items**: A major Contract item shall be any item that is listed in the Bid Proposal Form, the total cost of which is equal to or greater than ten percent (10%) of the total amount of the awarded Contract. All other items shall be considered minor Contract items.

26. **Materials**: Any substance specified for use in the Contract Work and its appurtenances

27. **Notice of Award**: The written notice of the acceptance, by the Owner, of the successful Bidder’s Bid Proposal

28. **Notice to Proceed**: The written notice issued by the Owner to the Contractor authorizing him to proceed with the Contract Work and establishing, when applicable, the date of commencement and termination of the Contract Time

29. **Or Equal**: Wherever a particular process, material, device, detail, or part is specified herein, followed by these words or by similar or equivalent expressions, such words or expressions shall be understood to mean and permit the use of another process, material, device, or part that the Engineer shall determine is fully equal in suitability, quality, durability, performance, and in all other respects, to the process, material, device, detail, or part herein specified for such use, and shall approve for such use in the Work.

30. **Owner**: The term Owner shall mean the Jefferson County Commission (Alabama), its successors, assigns, or designees.

31. **Partial Utilization**: As defined in Section 00820 – Special Conditions

32. **Pay Item**: A specifically described unit of Work for which a price is provided in the Contract

33. **Payment Bond**: The approved form of security furnished by the Contractor and his Surety as a guarantee that he will pay in full all bills and accounts for materials and labor used in the construction of the Work

34. **Performance Bond**: The approved form of security furnished by the Contractor and his Surety as a guarantee that the Contractor will complete the Work in accordance with all Contract Documents

35. **Project**: The agreed Work to be performed as provided in the Contract

36. **Proposal Guaranty**: The certified check or Bid Bond furnished with a bid to assure that the Bidder will enter into the Contract if his bid is accepted
37. **Resident Project Representative:** An authorized representative of the Owner who is assigned to observe the construction of the Work and advise the Owner of the Work’s prosecution.

38. **Samples:** Physical examples which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.

39. **Sanitary Sewer:** A sewer which carries wastewater.

40. **Sanitary Sewer Overflow (SSO):** An SSO shall occur when uncontained wastewater outside the construction work area (that does not drain back into the trench) comes in contact with the ground or is able to reach waters of the State. This may include non-dewatered spoils removed from trench excavation (that does not drain back to the trench) as determined by the on-site inspector. This does include leakage of water from dump trucks and/or excavation equipment traveling on public streets. This also includes overflow of manholes and/or trenches due to contractor’s work (failure of bypass pumps, inadequate plugs, etc.).

41. **Sanitary Sewer Service Lateral:** Any pipe connected to a mainline sewer which carries sanitary and industrial wastewater from residences, commercial buildings, industrial facilities, and institutions to the mainline sanitary sewer.

42. **Shop Drawings:** All drawings, diagrams, illustrations, brochures, schedules, and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier, or distributor, which illustrates how specific portions of the Work shall be fabricated, erected, or installed.

43. **Special Conditions:** Additions and revisions to the Standard Specifications applicable to an individual project. The Special Conditions are intended to supplement, modify, or delete items covered in the Standard Specifications. Special Conditions shall prevail over General Conditions.

44. **Specifications:** A part of the Contract Documents containing the written directions, provisions, and requirements for completing the Contract Work. Standards for specifying materials or testing which are cited in the Contract Specifications by reference shall have the same force and effect as if included in the Contract physically.

45. **State:** The State of Alabama.

46. **Station:** A specific point on the centerline of the sewer or on the survey baseline designating some specific distance from the point of origin. Stations are numbered in terms of one hundred linear feet measured horizontally.

47. **Storm Sewer:** A sewer which carries surface runoff and subsurface waters.

48. **Structures:** Facilities such as bridges, culverts, catch basins, inlets, retaining walls, cribbing, storm and sanitary sewer lines, water lines, under drains,
electrical ducts, manholes, handholes, lighting fixtures and poles, transformers, flexible and rigid pavements, buildings, vaults, and other manmade features that may be encountered in the Work and not otherwise classified herein

49. **Subcontractor:** An individual, firm, partnership, or corporation, approved by the Owner, having a direct contract with the Contractor for the performance of specified portions of the Contract

50. **Substantial Completion:** As defined in Section 00820 – Special Conditions

51. **Superintendent:** The Contractor's representative who is present on the Work during progress, authorized to receive and fulfill instructions from the Engineer, and who shall supervise and direct the construction

52. **Supplier:** Any individual, firm, partnership, or corporation who sells, rents, or supplies materials or equipment for the proper execution of the Work, including that fabricated to a special design, but who does not perform labor at the site. Establishment of a temporary plant or facility of any kind on or near a project for the purpose of furnishing material for that project only will not be considered a “Supplier” but will be considered a “Subcontractor” as defined in these Specifications, unless such plant is established and operated by the Contractor.

53. **Surety:** The individual, firm, partnership, or corporation, other than the Contractor, executing Bid, Payment, or Performance Bonds which are furnished to the Owner by the Bidder or Contractor, licensed under the Laws of Alabama

54. **Work:** The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the Contract, Drawings, and Specifications

55. **Written Notice:** Any notice to any party of the Contract relative to any part of the Contract in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the Work

**PART 2 -- PRODUCTS (Not Used)**

**PART 3 -- EXECUTION (Not Used)**

- END OF SECTION -
SECTION 01015

PROSECUTION AND PROGRESS

PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. Subcontractors and Assignments
B. Notice to Proceed
C. Beginning and Completion of Work
D. Prosecution of the Work
E. Temporary Suspension of the Work
F. Weekend, Holiday, and Night Work
G. Contract Time
H. Failure to Complete Work on Time and Liquidated Damages
I. Annulment of Contract
J. Termination for National Emergencies
K. Notice and Service Thereof

1.02 RELATED WORK

A. Section 01010 – Summary of Work
B. Section 01025 – Measurement and Payment
C. Section 01310 – Progress Schedules

1.03 SUBCONTRACTS AND ASSIGNMENTS

A. The Contractor may utilize the services of specialty subcontractors on those parts of the Work which, under traditional contracting practices, are performed by specialty subcontractors.

B. The Contractor shall not award any Work to any subcontractor without prior written approval of the Owner; such approval shall not be given until the Contractor submits to the Owner a written statement, which shall contain such information as the Owner may
require, concerning the proposed award to the subcontractor. All subcontractors shall carry insurance as specified in Section 00822 – Insurance Requirements.

C. The Owner shall not recognize any subcontractor on the Work. The Contractor shall at all times, when Work is in progress, be represented either in person by a qualified superintendent or by other designated qualified representative who is duly authorized to receive and execute orders of the Engineer. The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

D. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to the Contractor by the terms of the General Conditions and other Contract Documents, insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

E. Nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

F. The Contractor shall not assign the whole or any part of this Contract or any monies due him or to become due under this Contract without written consent of the Owner. In case the Contractor assigns all or any part of any monies due him or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior liens of all persons, firms, partnerships, and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract.

1.04 NOTICE TO PROCEED

A. The Notice to Proceed shall state the date which the Owner directs the Contractor to begin the construction and from which date Contract Time shall be charged. The Contractor shall begin the Work to be performed under this Contract within 10 days of the date of the written Notice to Proceed, but in any event, the Contractor shall notify the Engineer at least 24 hours in advance of the time actual construction operations shall begin on the site.

1.05 BEGINNING AND COMPLETION OF WORK

A. It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning, rate of progress, and the time for completion of the Work to be performed under this Contract are ESSENTIAL CONDITIONS of this Contract, and it is further mutually understood and agreed that the Work embraced in this Contract shall be commenced within 10 days of the Notice to Proceed. Should the Contractor fail to initiate and prosecute the Work as previously stated herein, then the Owner may act to annul the Contract in accordance with this Section.
B. The Contractor agrees that said Work shall be prosecuted regularly, diligently, and
uninterruptedly at such rate of progress to ensure full completion thereof within the time
specified. It is expressly understood and agreed, by and between the Contractor and
the Owner, that the time for the completion of the Work described in this Contract is a
reasonable time for the completion of the same, taking into consideration the average
climatic range and usual industrial conditions prevailing in this locality.

C. It is further agreed that time is of the essence of each and every portion of this Contract
and of the Specifications wherein a definite and certain length of time is fixed for the
performance of any act whatsoever, and where under the Contract an additional time is
allowed for the completion of any work, the new time limit fixed by such extension shall
be of the essence of this Contract. Provided that the Contractor shall not be charged
with liquidated damages or any excess cost when the delay in completion of the Work is
due:

1. To any preference, priority, or allocation order duly issued by the State or Federal
government;

2. To unforeseeable cause beyond the control and without the fault or negligence of
the Contractor including, but not limited to, Acts of God or of the public enemy,
acts of another Contractor in the performance of a contract with the Owner, fires,
floods, epidemics, quarantine restrictions, strikes, freight embargoes, and
unusually severe weather; and

3. To any delays of subcontractors occasioned by any of the causes specified in
Article 1.05, Paragraph C, Items 1 and 2.

D. Provided, further, that the Contractor shall, within ten (10) days from the beginning of
such delay, notify the Owner in writing of the causes of the delay, who shall ascertain the
facts and extent of the delay and notify the Contractor within a reasonable time of its
decision in the matter.

1.06 PROSECUTION OF THE WORK

A. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting
the Work to full completion in the manner and time required by the Contract, Drawings,
and Specifications.

B. All workers shall have sufficient skill and experience to properly perform the work
assigned to them. Workers engaged in special work or skilled work shall have sufficient
experience in such work and in the operation of the equipment required to perform the
work satisfactorily.

C. Any person employed by the Contractor or by any subcontractor who, in the opinion of
the Engineer, does not perform his Work in a proper and skillful manner or is
intemperate or disorderly shall, at the written request of the Engineer, be removed
forthwith by the Contractor or subcontractor employing such person and shall not be
employed again in any portion of the Work without the approval of the Engineer.
D. Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper prosecution of the Work, the Engineer may suspend the Work by written notice until compliance with such orders.

E. The Contractor shall comply with all federal, state, and local laws, regulations, and ordinances governing the employment of labor and the payment of wages thereto for Work performed under this Contract.

F. The Contractor shall furnish such equipment as is considered necessary for the prosecution of the Work in an acceptable manner and at a satisfactory rate of progress. All equipment which is proposed to be used on the Work shall be of sufficient size and in such mechanical condition as to meet requirements of the Work and to produce a satisfactory quality of Work. Equipment used on any portion of the Work shall be such that no injury to previously completed Work, adjacent property, or existing facilities shall result from its use. All equipment, tools, and machinery shall be subject to the approval of the Engineer.

G. When methods and equipment to be used by the Contractor in accomplishing the Work are not prescribed in the Contract, the Contractor is free to use any methods or equipment that he demonstrates, to the satisfaction of the Engineer, shall accomplish the Work in conformity with the requirements of the Contract, Drawings, and Specifications.

H. When the Contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If definite work methods are not prescribed in the Contract or if the Contractor desires to use a method or type of equipment other than specified in the Contract, he may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and the reasons for desiring to make the change. If approval is given, it shall be on the condition that the Contractor shall be fully responsible for producing Work in conformity with the Contract requirements and making demonstrations which are satisfactory to the Engineer. If, after trial use of the substituted methods or equipment, the Engineer determines that the Work produced does not meet Contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining Work with the specified methods and equipment. The Contractor shall remove any deficient Work and replace it with Work of specified quality or take such other corrective action as the Engineer may direct. No change shall be made in basis of payment for the Contract items involved nor in Contract Time as a result of authorizing a change in methods or equipment under this Section.

1.07 TEMPORARY SUSPENSION OF THE WORK

A. The Engineer shall have the authority to suspend the Work wholly or in part for such period or periods of time as he may deem necessary due to unsuitable weather or such other reason as determined by the Owner to be in the best interest of the County. The Contractor shall proceed with the Work promptly when notified by the Engineer to resume operations.

B. The Contractor shall not suspend Work without written authority from the Engineer.
1.08 TIME OF WORK

A. The normal time of work for this Contract is limited to 40 hours per week, 8 hours per day, and shall generally be between the hours of 7:00 a.m. and 6:00 p.m., Monday through Friday.

B. Unless otherwise specifically permitted, all work that would be subject to damage shall be stopped during inclement, stormy, or freezing weather. Only such work as will not suffer injury to workmanship or materials will be permitted. Contractor shall carefully protect his work against damage or injury from the weather, and when work is permitted during freezing weather, he shall provide and maintain approved facilities for heating the materials and for protecting the finished work.

1.09 WEEKEND, HOLIDAY, AND NIGHT WORK

A. Work at night or on Saturdays, Sundays, trade-recognized legal holidays, or Owner’s governmental-recognized legal holidays shall not be permitted except in case of emergency, and then only to such an extent as is absolutely necessary and with the written permission of the Owner.

B. Work at night or on weekends or holidays may be required when special connections to existing systems are to be made, when new facilities are to be placed in service, when existing facilities are to be taken out of service, when it is more advantageous to the utilities involved, or when an emergency arises in the Work schedule. In such cases, the permission of the Owner shall be received well in advance of the Work schedule, and arrangements shall be made for prosecution of the Work with all safety and minimum inconvenience to the public. All work necessary to be performed at night or on weekends or holidays shall be so performed without additional expense to the Owner.

1. Contractor’s Notification of the Public for Night Work: For any work that the Owner specifically permits the Contractor to perform at night, the Contractor shall notify all property owners which could potentially be affected between 24 hours and 48 hours prior to beginning the work at night. This notification shall be accomplished by the Contractor distributing a door hanger, previously approved by the Owner, describing the work to be performed to adjacent residences and businesses that may be impacted. Door hangers shall be double-sided with the notification information in the English language on one side and in the Spanish language on the reverse side.

C. The Contractor may request permission from the Owner to work beyond the hours specified in Article 1.08, Paragraph A, or on weekends or holidays for his/her convenience provided that the extended work hours are approved at least 48 hours in advance in writing by the Owner and all costs incurred by the Owner and/or Engineer for additional engineering and inspection services performed by their inspectors and/or
other personnel shall be borne by the Contractor in accordance with Section 01010 – Summary of Work and Section 00820 – Special Conditions.

1. The Owner shall have the right to deduct sufficient sums from monies due the Contractor to cover these additional engineering and inspection costs.

D. If it shall become imperative to perform work at night, the Owner and Engineer shall be informed a reasonable time in advance of the beginning of such work. Temporary lighting and all other necessary facilities for performing and inspecting the work shall be provided and maintained by the Contractor.

E. Maintenance work normally required for protection of persons, the Work, or property shall be permitted at anytime.

1.10 CONTRACT TIME

A. The number of calendar days allowed for completion of the Work shall be stated in the Proposal and Contract and shall be known as the Contract Time.

B. Should the Contract Time require extension for reasons beyond the Contractor’s control, it shall be adjusted as follows:

1. Contract Time shall consist of the number of calendar days stated in the Contract counting from the effective date of the Notice to Proceed and including all Saturdays, Sundays, holidays, and non-work days. All calendar days elapsing between the effective dates of the Engineer’s orders to suspend and resume all Work due to causes not the fault of the Contractor shall be excluded.

2. When the Contract Time is a specified completion date, it shall be the date by which all Contract Work shall be fully completed. If the Contractor finds it impossible, for reasons beyond his control, to complete the Work within the Contract Time as specified or as extended in accordance with the provisions of this Section, he may, at any time prior to the expiration of the Contract Time as extended, make a written request to the Engineer for an extension of time, setting forth the reasons which he believes shall justify the granting of his request. The Contractor’s plea that insufficient time was specified is not a valid reason for extension of time. If the Engineer finds that the Work was delayed because of conditions beyond the control of the Contractor, he may recommend that the Owner extend the time for completion in such amount as the conditions justify. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

3. The Director of Environmental Services may issue a time extension provided that the time extension does not change the Contract amount.

1.11 FAILURE TO COMPLETE WORK ON TIME AND LIQUIDATED DAMAGES

A. In case of delay in completion of the Work and in case the Owner does not terminate the Contractor’s right to proceed, then the actual damages caused by the delay shall be impossible to accurately determine, in which event the Contractor shall pay to the Owner
in lieu thereof, as fixed, agreed, and liquidated damages, an amount as stipulated in the Special Conditions for each calendar day of delay until the Work has been completed and accepted, and the Contractor and his sureties shall be liable to the Owner for the total amount thereof.

B. The Contractor is hereby advised that time is of the essence and that the Contract completion date shall be strictly observed. LIQUIDATED DAMAGES WILL BE ASSESSED IF THE CONTRACT TIME IS EXCEEDED. The Contractor may apply for an extension of time in accordance with provisions of the Contract. Such an extension of time must be approved prior to the Contract completion date to avoid imposition of liquidated damages. At the Owner’s option, liquidated damages due may be taken from funds being retained.

1.12 ANNULMENT OF CONTRACT

A. The Contract may be annulled by the Owner for any of the following reasons:

1. Substantial evidence and belief that the progress being made by the Contractor is insufficient to complete the Work within the specified time

2. Deliberate failure on the part of the Contractor to proceed with the construction of the Work when so instructed by the Engineer or to observe any requirement of these Specifications

3. Failure on the part of the Contractor to promptly make good any defects in materials or construction that may be called to his attention by the Engineer

4. In case the Contractor becomes insolvent or is declared bankrupt, or allows any final legal judgment to stand against him unsatisfied, or shall make an assignment for the benefit of his creditors

B. Before the Contract is annulled, the Contractor and his surety shall first be notified in writing by the Owner of the conditions which make annulment of the Contract imminent. Fifteen (15) days after notice is given, if no effective effort has been made by the Contractor or his surety to correct the conditions for which complaint is made, the Owner may declare the Contract annulled, and shall notify the Contractor and his surety accordingly.

C. Upon receipt of notice from the Owner that the Contract has been annulled, the Contractor shall immediately discontinue all operations, safely secure all items of the Work, and remove his equipment. The Owner may then proceed with the construction in any lawful manner that it may elect until it is finally completed. When thus finally completed, the total cost of the Work (including all previous payments made to the Contractor) shall be computed and if this total cost is greater than the Contract price, the difference shall be paid to the Owner by the Contractor or his surety.

1.13 TERMINATION FOR NATIONAL EMERGENCIES

A. The Owner shall terminate the Contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction Contract as a direct result
of an Executive Order of the President with respect to the prosecution of war or in the
interest of national defense.

B. When the Contract, or any portion thereof, is terminated before completion of all items of
Work in the Contract, payment shall be made for the actual number of units or items of
Work completed at the Contract price or as mutually agreed for items of Work partially
completed or not started. No claims for loss of anticipated profits shall be considered.

C. Reimbursement for organization of the Work, other overhead expenses (when not
otherwise included in the Contract), and moving equipment and materials to and from
the job shall be considered, the intent being that an equitable settlement shall be made
with the Contractor.

D. Acceptable materials, obtained or ordered by the Contractor for the Work but not
incorporated in the Work, shall, at the option of the Contractor, be purchased from the
Contractor at actual cost as shown by receipted bills and actual cost records at such
points of delivery as may be designated by the Engineer.

E. Termination of the Contract or a portion thereof shall neither relieve the Contractor of his
responsibilities for the completed Work, nor shall it relieve his surety of its obligation for
and concerning any just claim arising out of the Work performed.

1.14 NOTICE AND SERVICE THEREOF

A. All notices, demands, requests, instructions, approvals, and claims shall be in writing.

B. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the
local office of the Contractor, or by personal service upon the representative of the
Contractor in local charge of the Work, or by depositing in the United States mail in a
sealed envelope with sufficient postage prepaid, addressed to such Contractor at the
address stated by the Contractor in the Proposal, or at the local address used by the
Contractor in the Proposal, or at the local address used by the Contractor during the
process of the Work, or at such other address as the Contractor may from time to time
designate to the Owner in writing. Any notice to or demand upon the Contractor shall
also be sufficiently given if transmitted to the Contractor through electronic facsimile.

C. Any notice to or demand upon the Owner shall be sufficiently given if delivered to the
Owner or deposited in the United States mail in a sealed envelope with sufficient
postage prepaid, or delivered with charges prepaid to said Owner or to authorized
representatives of the Owner, or to such address as the Owner may subsequently
specify in writing to the Contractor for such purposes.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -
PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The following subsections describe the measurement and payment for Work to be done under the items listed in the Bid Proposal Form of the Bid Proposal. Each lump sum price stated in the Bid Proposal Form shall constitute full compensation for each item of Work completed. The Contractor shall provide all labor, materials, tools, equipment, and services required to complete the Work as specified and shown in the Contract Documents.

B. Payment for the various items in the Bid Proposal Form, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, supervision, operations, taxes, materials, commissions, transportation and handling, bonds, permit fees, insurance, overhead and profit, and incidentals appurtenant to the items of Work being described, as necessary to fully complete the various items of the Work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). Such compensation shall also include payment for any loss or damages arising directly or indirectly from the Work.

C. The Contractor’s attention is called to the fact that the quotations for the various items of Work are intended to establish a total price for completing the Work in its entirety. Should the Contractor feel that the cost for any item of Work has not been established by the Bid Items of the Bid Proposal Form or this Section, he shall include the cost for that Work in some other applicable Bid Item, so that his proposal for the Project does reflect his total price for completing the Work in its entirety.

1.02 ITEMS OF THE BID PROPOSAL

A. The specific areas, pipelines, and manholes where the replacement work described herein and in the Bid Proposal Form of the Bid Proposal shall be performed by the Contractor is detailed on the Drawings.

B. Bid Item No. 1 – Mobilization and Demobilization (Not to Exceed 5% of the Grand Total of Bid): Payment for Bid Item No. 1 will be made according to the lump sum price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to provide the items specified in Section 01505 – Mobilization and Demobilization. The work under Bid Item No. 1 shall also include, but not be limited to, any permits, licenses, fees, insurance, bonds, assembling all equipment, materials, tools, etc., and transporting them to and from the work site. The amount bid for Bid Item No. 1 – Mobilization and Demobilization shall not exceed 5 percent of the Grand Total of Bid.
C. Bid Item No. 2 – Sanitary Sewer Service Television Inspection and Cleaning: Payment for Bid Item No. 2 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Sanitary Sewer Television Inspection for sanitary sewer service laterals as specified in Section 02731 – Sanitary Sewer Television Inspection, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 2 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to clean small amounts of accumulated debris and/or root growth out of all existing sanitary sewer service laterals located within the project area measuring from 4 inches through 6 inches in diameter, remove the dislodged materials, and properly dispose of the removed materials in accordance with all current OSHA, federal, state, and local regulations. Measurement for Bid Item No. 2 will be by each service lateral that is inspected/televised and cleaned as directed by the Owner or Engineer.

D. Bid Item No. 3 – Post Installation Television Inspection: Payment for Bid Item No. 3 will be made according to the unit prices in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Sanitary Sewer Television Inspection (4-inch through 8-inch Diameter Pipes) as specified in Section 02731 – Sanitary Sewer Television Inspection, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 3 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to perform a NASSCO Pipeline Assessment and Certification Program (PACP) television inspection of all existing sanitary sewers located within the project site measuring from 4 inches to 8 inches in diameter. Measurement for Bid Item No. 3A will be by linear foot length of sanitary sewer pipe that is television inspected as measured from center of upstream manhole to center of downstream manhole after all required service lateral rehabilitation is completed. Payment of Bid Item No. 3A will only be made for sanitary sewer pipes that have at least one service connection requiring work under Bid Items Nos. 5A, 6, and 9. If a sanitary sewer line has mainline cured-in-place lining installed but there are no active service connections for that line then the post video payment is included in the unit price for Bid Item No. 4A. Payment for each linear foot length of sanitary sewer pipe will only be made to the Contractor after the submitted sewer inspection data/videos have successfully passed the quality review as specified in Section 02731 – Sanitary Sewer Television Inspection. Measurement for Bid Item No. 3B will be per each service lateral that is television inspected. Each lateral inspection will show the entirety of the replaced and/or rehabilitated lateral as launched from the mainline or inside the manhole.

E. Bid Item No. 4 – Cured-In-Place Pipe Lining: Payment for Bid Item No. 4 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Cured-in-Place Pipe (CIPP) Lining as specified in Specification Section 02740 – Cured-in-Place Pipe Lining, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 4 shall include, but not be limited to, providing all labor, materials, tools, and equipment to reconstruct sections of pipelines by installing resin-impregnated flexible tubes to produce continuous and tight-fitting CIPPs. Bid Item No. 4A is for CIPP lining of pipes measuring 8 inches in diameter as noted in the Bid Proposal Form of the Bid Proposal. Bid Item No. 4B is for reinstating service laterals on the interior of pipelines after CIPP lining is performed. Measurement for Bid Item No. 4C is for providing and installing end seals as specified by the manufacturer and in Specification Section 02740 – Cured-in-Place Lining prior to CIPP lining of pipes measuring 8 inches in diameter as noted in the Bid Proposal Form of the Bid Proposal.

F. Bid Item No. 5 – Sanitary Sewer Service Renewal by Cured-In-Place Lining: Payment for Bid Item No. 5 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Cured-in-Place Pipe (CIPP) Lining as specified in Specification Section 02740 – Cured-in-Place Pipe Lining, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 5 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to clean small amounts of accumulated debris and/or root growth out of all existing sanitary sewer service laterals located within the project area measuring from 4 inches through 6 inches in diameter, remove the dislodged materials, and properly dispose of the removed materials in accordance with all current OSHA, federal, state, and local regulations. Measurement for Bid Item No. 5 will be by each service lateral that is inspected/televised and cleaned as directed by the Owner or Engineer.
Proposal, which shall constitute full payment to perform a Sanitary Sewer Service Renewal by Cured-In-Place Lining as specified in Specification Section 02770 – Full-Circle Main to Lateral Connection Lining, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 5 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to rehabilitate a particular mainline section and the adjacent lateral sewer without excavation by providing a one-piece, leak-free connection at the interface of the mainline and lateral pipelines using CIPP. Measurement for Bid Item No. 5A will be for each service connection and lateral rehabilitated using a full-circle liner and lateral rehabilitation for a length of 15 feet or less. Bid Item No. 5B will be for each additional linear foot of lateral rehabilitation over the 15 feet installed under Bid Item No. 5A or Bid Item No. 5C. Bid Item No. 5C will be for each service connection within a manhole and lateral rehabilitated for a length of 15 feet or less.

G. **Bid Item No. 6 – Sanitary Sewer Service External Replacement (EX):** Payment for Bid Item No. 6 will be made according to the unit prices in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform a service lateral replacement with excavation, as specified in Section 02740 – Cured-In-Place Pipe Lining, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 6 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to replace sanitary sewer laterals by removing pavement (if required); excavating; performing dewatering; removing the existing pipe and fittings; providing an approved saddle, fittings, and couplings (if required); up to 15 feet of lateral pipe; providing pipe bedding; and backfilling as specified. Bid Item No. 6A is for an excavation where the mainline is located in an improved surface and Bid Item No. 6B is for an excavation where the mainline is located in an unimproved surface. Measurement for Bid Item No. 6A and Bid Item No. 6B will be for each service external replacement performed.

H. **Bid Item No. 7 – 4-Inch Diameter Service Lateral Pipe:** Payment for Bid Item No. 7 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform 4-inch Diameter Service Lateral Pipe installation for connection of an existing 4-inch diameter lateral. Measurement for Bid Item No. 7 will be each additional linear feet of 4-inch lateral pipe not included in Bid Item No. 6.

I. **Bid Item No. 8 – Cleanout Installation:** Payment for Bid Item No. 8 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to provide cleanout as specified in Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 8 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to, only if directed by the Owner and/or Engineer, provide a cleanout, including excavation, pipe bedding, pipe, fittings, connection to existing lateral, and backfill, on a specific lateral prior to it being rehabilitated with a CIPP liner or replaced. All cleanouts shall be provided in accordance with the Owner’s standards and requirements. Bid Item No. 8A is for a cleanout installation with a fiberglass/composite box in an unimproved area. Bid Item No. 8B is an additional unit price to be added to Bid Item No. 8A if the cleanout location is in an improved area or as directed by the Engineer and requires a concrete box. Measurement for Bid Item No. 8A is for each cleanout that is installed as directed by the Owner and/or Engineer. Measurement for Bid Item No. 8B is for each cleanout installation that requires a concrete box instead of the fiberglass/composite box.

J. **Bid Item No. 9 – Internal Sectional Liner, In Mainline Pipe:** Payment for Bid Item No. 9 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall
constitute full payment to perform Internal Spot Sectional Liner as specified in Specification Section 02730 – Sectional Cured-in-Place Pipe Lining, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 9 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to rehabilitate sections of pipelines by installing resin-impregnated flexible tubes to produce continuous, watertight and tight-fitting sectional CIPPs for the purpose of abandoning service lateral connections. Bid Item No. 9 is for internal spot sectional liners in 8-inch diameter mainline pipe measuring 3 feet in length. Measurement for Bid Item No. 9 will be for each internal sectional liner installed.

K. Bid Item No. 10 – Manhole Rehabilitation: Payment for Bid Item No. 10 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Manhole Rehabilitation as specified in Specification Section 02800 – Manhole Rehabilitation, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 10 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to rehabilitate manholes by applying a liner system to the interior of the manholes. Bid Item No. 10 is for providing a multilayered polyurethane/polymeric stress skin panel system or an epoxy/polyurethane coating on the interior of the manholes. Measurement for Bid Item No. 10 will be by vertical foot height of manhole rehabilitated using a multilayered polyurethane/polymeric stress skin panel system or epoxy/polyurethane coating.

L. Bid Item No. 11 – Surface Restoration For Unimproved Replacement and Cleanout Installation: Payment for Bid Item No. 11 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to provide complete surface restoration to all unimproved surfaces associated Sanitary Sewer Service External Replacement (EX) and/or Cleanout Installation as specified in Specification Section 02200 – Earthwork, Specification Section 02500 – Surface Restoration, Section 02910 – Final Grading and Landscaping, as specified in other Sections of the Specifications, and as shown on the Drawings. Measurement for Bid Item No. 11 will be for each service lateral location that requires excavation. Bid Item No. 11 will only be paid once for each service lateral location unless directed by the Engineer.

M. Bid Item No. 12 – Curb and Valley Gutter Replacement: Payment for Bid Item No. 12 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Curb and Gutter Replacement as specified in Section 02575 – Pavement Repair, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Item No. 12 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to, only if directed by the Owner or Engineer, provide in-kind concrete curb and gutter, including ALDOT 825 Type B Crushed Aggregate subgrade, formwork, and Class A concrete, in a specific location after existing curb and gutter is removed as part of the replacement or repair of a pipeline or manhole. All curb and gutter shall be replaced in accordance with the Owner’s standards and requirements. Measurement for Bid Item No. 12 will be by linear foot length of curb and gutter that is replaced as directed by the Owner or Engineer.

N. Bid Item No. 13 – Asphalt Roadway Pavement Milling and 424 Wearing Surface Overlay: Payment for Bid Item No. 13 will be made according to the unit prices in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Asphalt Roadway Pavement Replacement as specified in Section 01525 – Working Within the Rights-of-Ways of Highways, Railways, or Streets, as specified in Section 02575 – Pavement Repair, as
specified in other Sections of the Specifications, and as shown on other Drawings. The work under Bid Item No. 13 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to, only if directed by the Owner or Engineer, provide a 3-inch thick 424 asphalt pavement binder in a specific location after existing asphalt roadway pavement is removed as part of the replacement of a pipeline or manhole, mill existing asphalt roadway pavement to a 1-inch depth at a specific location, and provide a 1.5-inch thick 424 asphalt pavement wearing surface layer in a specific location. All asphalt roadway pavement shall be milled and replaced in accordance with the Owner’s standards and requirements. Measurement for Bid Item No. 13A will be by square yard area of binder layer that is installed as directed by the Owner or Engineer. Measurement for Bid Item No. 13B will be by square yard area of asphalt roadway pavement milling and wearing surface layer that is replaced as directed by the Owner or Engineer.

O. Bid Item No. 14 – Concrete Replacement, In Kind, Driveway or Parking Lot: Payment for Bid Item No. 14 will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Concrete Driveway Replacement as specified in Section 02575 – Pavement Repair, Section 03250 – Concrete Accessories, Section 03300 – Cast-in-Place Concrete, Section 03350 – Concrete Finishes, as specified in other Sections of the Specifications, and as shown on the Drawings. The work under Bid Items No. 14 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to, only if directed by the Owner or Engineer, provide a minimum 4-inch thick (match existing thickness) concrete sidewalk or driveway, including ALDOT 825 Type B Crushed Aggregate subgrade, formwork, Class A concrete, 1/2-inch Type IV expansion joints, contraction joints, and a Type E concrete finish, in a specific location after existing concrete is removed as part of the replacement or repair of a pipeline or manhole. All concrete shall be replaced in accordance with the Owner’s standards and requirements. Measurement for Bid Item No. 14 will be by square yard area of concrete that is replaced as directed by the Owner or Engineer.

P. Bid Item No. 15 – Concrete Sidewalk Replacement: Payment will be made according to the unit price in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform concrete replacement as specified in Section 02575 – Pavement Repair, Section 03250 – Concrete Accessories, Section 03300 – Cast-in-Place Concrete, Section 03350 – Concrete Finishes, as specified in other Sections of the Specifications, and as shown on the Drawings. The work performed shall be in kind replacement with a minimum thickness of 4-inches. The work shall include, but not be limited to, providing all labor, materials, equipment, and tools required to, only if directed by the Owner or Engineer, provide 4-inch thick minimum concrete sidewalk, including ALDOT 825 Type B Crushed Aggregate subgrade, formwork, Class A concrete, 1/2-inch Type IV expansion joints, contraction joints, and a Type E concrete finish, in a specific location after existing concrete sidewalk is removed as part of the replacement or repair of a pipeline or manhole. All concrete sidewalk shall be replaced in accordance with the Owner’s standards and requirements. Measurement will be by square yard area of concrete sidewalk that is replaced as directed by the Owner or Engineer.

Q. Bid Item No. 16 – Owner-Directed Allowance: Payment for Bid Item No. 16 will be limited to the fixed bid price shown in the Bid Proposal Form of the Bid Proposal, which shall constitute full payment to perform Owner-Directed repairs which, in the sole judgment of the Owner, could not have been determined from the Bidding Documents. The work under Bid Item No. 16 shall include, but not be limited to, providing all labor, materials, equipment, and tools required to repair pipe or manholes when directed by the Owner. The Owner reserves
the right to include the additional Owner-directed work listed under Bid Item No. 16 in the Contract or not include this Owner-directed work in the Contract. Any unused balance of the Owner-Directed Allowance shall revert to Owner at completion of the Project. All repairs shall be performed in accordance with the standards and requirements of the Owner. Owner-Directed Allowance repairs shall include, but not be limited to, coordination with the utility companies having jurisdiction over the existing utilities, relocation and/or temporary support of aboveground utility poles and guy wires, relocation and/or temporary support of buried utilities (potable water, gas, electric, telecommunications, etc.), and all associated work required to completely correct unforeseen conflicts with existing utilities, all traffic control, temporary utilities, erosion and sedimentation control, bypass pumping, excavation, dewatering, cleaning, piping, fittings, hardware, flushing and testing, soil and aggregate backfill, repaving, restoration, accessories, appurtenances, etc. meeting all requirements of the Contract Documents, as directed by the Owner. As part of any Application for Payment on which the Contractor requests payment for performing Owner-directed repairs, Contractor shall submit a detailed invoice indicating the direct cost of any labor, materials, equipment, and tools provided to perform the repair and the associated indirect costs and profit, which shall be limited to the amounts specified herein in Paragraph E of Article 1.11, associated with performing the repair during the period covered by that Application for Payment.

R. No separate measurement or payment shall be made for the following activities included in the Work. The costs of all equipment, labor, materials, and tools required by the Contractor for performing the following activities shall be considered incidental to the Work and shall be included in the Contractor’s unit prices bid for other various items of Work provided in the Contract.

1. Temporary roadway paving repairs, temporary patch paving, steel plate bridging, or the repair of any asphalt or concrete pavement, including concrete curb and gutter, concrete valley gutter, concrete sidewalk, and driveways, that is damaged by the Contractor during performance of the Work

2. Providing, maintaining, and removing additional temporary slope protection and erosion control devices and measures, which shall include, but not be limited to, construction exits, sediment structures, check dams, seeding and mulching, riprap, and rolled erosion control mat, and obtaining a construction general permit in accordance with Specification Section 02270 – Slope Protection and Erosion Control and Drawing D03

3. Any and all flushing and testing, including material testing by a third party, required by the Specifications after the Contractor performs replacement of pipelines or manholes.

4. Site restoration, which shall include, but not be limited to, excavating, stripping, hauling, placing, and finish grading of topsoil; the disposition of material and structures encountered in the Work; cleanup, seeding, and fertilization of right-of-way; and any additional site restoration work required for which there is not a specific unit price Bid Item

1.03 AUTHORITY
A. Measurement methods delineated in the individual Specification Sections are intended to complement the criteria of this Section. In the event of conflict, the requirements of the individual Specification Section shall govern.

1.04 UNIT QUANTITIES SPECIFIED

A. Quantities and measurements indicated in the Bid Proposal Form are estimated and are only to be used as a basis for estimating the probable cause of the Work and for the purpose of comparing the Bids submitted for the Work. Actual quantities and measurements supplied or placed in the Work and verified by the Engineer may differ from the estimated quantities and shall be the basis for payment.

B. If the actual Work requires more or fewer quantities than those approximate quantities indicated, the Contractor shall provide the actual quantities required at the unit prices contracted. Contractor agrees that he shall make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts therefore.

C. The Owner reserves the right to alter the quantities of Work to be performed or to extend or shorten the improvement at any time, as may be found to be necessary or desirable. Such increases, decreases, and/or other alterations shall not invalidate the Contract nor release the Surety and the Contractor. The Contractor agrees to accept the Work as altered, the same as if it had been part of the original Contract. No claims shall be made by the Contractor for any loss of anticipated profits because of any such alteration, nor shall such alteration be considered as waiving or invalidating any conditions or provisions of the Contract.

1.05 MEASUREMENT OF QUANTITIES

A. The determination of quantities of Work acceptably completed under the terms of the Contract will be made by the Engineer, based on measurements taken by him or his assistants. These measurements will be taken according to the United States standard measurements and in the manner as specified in these Specifications.

B. Measurement Devices

1. Scales shall be inspected, tested, and certified by the applicable Weights and Measures Department within the past year and shall be of sufficient size and capacity to accommodate the conveying vehicle.

2. Metering devices shall be inspected, tested, and certified by the applicable department within the past year.

C. Volume shall be determined by cubic dimension by multiplying mean length by mean width by mean height or thickness.

D. Area shall be determined by square dimension by multiplying mean length by mean width or height.

E. Linear measurement shall be measured by linear dimension along the item centerline or
mean chord.

F. Stipulated price measurement shall include items measured by number, weight, volume, area, length, or combination thereof, as appropriate.

1.06 SCOPE OF PAYMENT

A. The Contractor shall receive and accept compensation, as herein provided, as full payment for furnishing all labor, materials, tools, equipment, and incidentals; for performing all Work contemplated and embraced under the Contract; for all loss or damage arising out of the nature of the Work or from the action of the elements; for any unforeseen defects or obstructions which may arise during the prosecution of the Work and before its Final Acceptance by the Owner; for all risks connected with the prosecution of the Work; for all expenses incurred by or in consequence of suspension or discontinuance of such prosecution of the Work herein specified; for any infringement of patents, trademarks, or copyrights; and for completing the Work in an acceptable manner according to the Drawings and Specifications.

B. Upon payment therefore, materials or work in place shall become the property of the Owner; however, the payment of any partial or periodical estimates prior to Final Acceptance of the Work by the Owner shall in no way constitute an acknowledgment of the acceptance of the Work, in part or in total, nor in any way prejudice or affect the obligation of the Contractor to repair, correct, renew, or replace, at his expense, any defects or imperfections in the construction or in strength or quality of the materials used in the construction of the Work under the Contract.

C. Final payment for work governed by unit prices shall be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price for the work which is incorporated in or made necessary by the Contract.

D. Final payment for work governed by lump sum shall be made after the Engineer accepts the lump sum work.

E. Payment for this Project will be by monthly payments to be paid upon the Engineer's approval. A pay request will be submitted at the end of each month to the Engineer.

1.07 ALTERATION OF DRAWINGS AND SPECIFICATIONS

A. Owner reserves the right, at any time, to make such changes to the Drawings and the character of the Work as may be necessary or desirable to ensure completion in the most satisfactory manner, provided such changes do not materially alter the original Drawings and Specifications or change the general nature of the Work as a whole. Such changes shall not be considered as waiving or invalidating any conditions or provision of the Contract.

1.08 COMPENSATION FOR ALTERED QUANTITIES

A. When the accepted quantities of work vary from the quantities in the Proposal, the Contractor shall accept as payment in full, so far as Contract Items are concerned, payment at the original Contract price for the quantities of work actually completed and accepted. No allowance shall be made for increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such
alterations or indirectly from his unbalanced allocation of overhead and profit among the
Contract Items or from any other cause.

1.09 PAYMENT FOR OMITTED ITEMS

A. The Owner may, in the Owner's best interest, omit from the Work any Contract Item. Such
omission of Contract Items shall not invalidate any other Contract provision or requirement. No claim for lost profit on deleted work will be allowed.

B. The Engineer shall have the right to omit from the Work any non-performed Contract Item which, in his opinion, is in the best interest of the Owner.

C. Should a Contract Item be omitted or otherwise ordered not to be performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be as specified in this Section.

D. Should the Engineer omit or order nonperformance of a Contract Item or portion of such item from the Work, the Contractor shall accept payment in full at the Contract unit price for any work actually completed and acceptable prior to the Engineer's order to omit or non-perform such Contract Item.

E. Acceptable materials ordered by the Contractor or delivered on the Work prior to the date of the Engineer's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

F. In addition to the reimbursement provided in this section, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted Contract Item prior to the date of the Engineer's order. Such additional costs incurred by the Contractor must be directly related to the deleted Contract Item and shall be supported by certified statements by the Contractor as to the nature and amount of such costs.

1.10 CLAIMS FOR EXTRA WORK

A. If the Contractor claims that any instructions by the Engineer or otherwise involve extra cost on his part, he shall give the Engineer written notice of said claim within ten (10) days after the receipt of such instructions, and in any event before proceeding to execute that portion of Work, stating clearly and in detail the basis of his claim or claims. No such claim shall be valid unless so made.

B. Claims for additional compensation for extra work due to alleged errors in spot elevations, contour lines, or benchmarks will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material or performing more Work than would reasonably be estimated from the Drawings and topographical maps issued.

C. Any discrepancies which may be discovered between actual conditions and those represented by the topographical maps and Drawings shall be reported to the Engineer at once, and Work shall not proceed, except at the Contractor's risk, until written instructions have been received by the Contractor from the Engineer.

D. If, on the basis of the available evidence, the Engineer determines that an adjustment of the
Contract price or time is justifiable, the procedure shall then be as provided in Section 01028 – Change Order Procedures.

E. By execution of this Contract, the Contractor warrants that he has visited the site of the proposed Work, has fully acquainted himself with the existing conditions relating to construction and labor, and fully understands the facilities, difficulties, and restrictions attending the execution of the Work under this Contract. The Contractor further warrants that he has thoroughly examined and is familiar with the Drawings, Specifications, and all other documents comprising the Contract. The Contractor further warrants that by execution of this Contract, his failure when he was bidding on this Contract to receive or examine any form or document, or to visit the site and acquaint himself with existing conditions, in no way relieves him from any obligation under the Contract, and the Contractor agrees that the Owner shall be justified in rejecting any claim based on facts regarding which he should have been on notice as a result thereof.

1.11 PAYMENT FOR EXTRA WORK

A. Should acceptable completion of the Contract require the performance of an item of Work for which no basis of payment has been provided in the original Contract or previously issued Change Orders, the same shall be called "Extra Work". Extra Work that is within the general scope of the Contract shall be covered by written Change Order. Change Orders for such Extra Work shall contain unit prices, lump sum, or time and material prices agreed upon through negotiation for performing the Work covered by the Change Order, in accordance with the requirements specified in the Change Order, and shall contain any adjustment to the Contract time that, in the Owner's opinion, is necessary for completion of such Extra Work. The Contractor shall not perform any Work on a proposed Change Order until he receives written authorization from the Engineer.

B. The Owner may, at its discretion, elect to perform the Extra Work with its own forces or hire any such person, firm, partnership, or corporation to perform the Extra Work. Performance of the Extra Work by either of these methods shall not waive or invalidate any conditions or provisions of the Contract.

C. Any claim for payment of Extra Work that is not covered by a Change Order shall be rejected by the Owner.

D. Extra Work, approved by the Engineer and performed in accordance with these Specifications, shall be paid for at the Contract unit prices or agreed prices specified in the Change Order authorizing such Extra Work.

E. When determined by the Engineer to be in the Owner's best interest, the Contractor may be ordered to proceed with Extra Work on the following basis:

1. **Labor**: For all labor (skilled and unskilled) and foremen in direct charge of a specific Extra Work item, the Contractor shall be reimbursed at the same rate of wage (or scale) being paid to such skilled and unskilled labor and foremen under the original Contract. Such wage or scale shall be agreed upon prior to beginning the Extra Work. The Contractor shall be reimbursed for the actual costs paid to, or on behalf of, workers by reason of subsistence and travel allowances, health and welfare benefits, pension fund benefits, or other benefits, when such amounts are required by collective bargaining agreement or other employment contract generally
applicable to the classes of labor employed on the Work.

2. **Insurance and Taxes:** For property damage, liability, and Workmen's Compensation Insurance premiums, unemployment insurance contributions, and social security taxes on the Extra Work, the Contractor shall be reimbursed at the actual cost. The Contractor shall furnish satisfactory evidence of the rate or rates paid for such insurance and taxes.

3. **Materials:** For materials installed and accepted by the Engineer, the Contractor shall receive the actual cost of such materials, including transportation charges paid by him (exclusive of machinery rentals as hereinafter set forth).

4. **Equipment:** For any machinery or special equipment (other than small tools), including the costs of fuel, lubricants, and transportation, the use of which has been authorized by the Engineer, the Contractor shall be reimbursed at the rental rates agreed upon in writing before such work is begun for the actual time that such equipment is committed to the Work and necessary for the actual prosecution of the Work.

5. **Miscellaneous:** No additional reimbursement will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.

6. **Overhead and Profit:** Fifteen (15) percent shall be added to the actual reimbursable cost, as previously enumerated, for overhead and profit. The Contractor shall be entitled to eight (8) percent of subcontractors’ costs to defer cost of insurance, supervision, and management. The subcontractors shall be entitled to actual cost of performing the Extra Work plus fifteen (15) percent of actual cost to cover supervision, overhead, bond, and profit. The Contractor shall submit to the Owner itemized cost sheets showing actual cost of performance of the Extra Work. Actual costs are defined as follows:

   a. Labor costs, including time of foremen, while directly engaged on the Extra Work
   b. Labor Insurance and Workmen’s Benefits
   c. Social Security and unemployment contributions
   d. Ownership or rental costs of construction equipment used in the actual prosecution of the Extra Work. Such costs shall not exceed those listed in the latest publication of the Rental Rate Blue Book for Construction Equipment published by PRIMEDIA Information Incorporated or rental rates prevailing in the area of the Work. Charges for equipment already allocated to the Project shall be based upon standard or prevailing monthly rental rates. Rental rates or use rates shall not be charged for equipment having a value of $200.00 or less since equipment and tools of the lesser value stated are considered to be "small tools" and, as such, are considered to be part of overhead.
   e. Costs of materials and/or equipment entering permanently into the Work
f. Costs of power and consumable supplies for the operation of power equipment where such costs are not included in rental rates or use charges

7. **Comparison of Records**: The Contractor and the Engineer shall compare records of the cost of Extra Work at the end of each day. Agreement shall be indicated by signature of the Contractor and Engineer or their daily authorized representatives.

8. **Statement**: No payment will be made for Extra Work performed until the Contractor has furnished the Engineer with duplicate itemized statements of the cost of such work detailed as follows:

   a. Name, classification, date, daily hours, total hours, rate, and extension for each laborer and foreman
   
   b. Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment
   
   c. Quantities of materials, prices, and extensions
   
   d. Transportation of materials
   
   e. Cost of property damage, liability and Workmen's Compensation Insurance premiums, unemployment insurance contributions, and Social Security tax
   
   f. Statements shall be accompanied and supported by receipted invoices for all materials used and transportation charges. However, if materials used on the Extra Work are not specifically purchased for such Work but are taken from the Contractor's stock, then, in lieu of the invoices, the Contractor shall furnish an affidavit certifying that such materials were taken from his stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor.
   
   g. Payment for overhead and profit based on the percentages previously specified shall constitute full compensation for all items of expense incurred but not specifically detailed for the Extra Work. The total payment made as previously described shall constitute full compensation for such work.

**1.12 PARTIAL PAYMENTS (ESTIMATES)**

A. At the end of each calendar month during the life of the Contract, the Engineer and Contractor shall agree on an estimate of the quantities of Work completed and of the total amount due therefor. Upon acceptance of the estimate by the Contractor and the Engineer, a partial payment will be made to the Contractor equivalent in amount to the value of all work done to the end of the preceding month, less the percent of such amount to be retained as specified in this Section, less previous payment.

**1.13 RETAINAGE**

A. In making partial payments, the Owner shall retain five (5) percent of the estimated value of work done until fifty (50) percent completion of the Work has been accomplished. No
additional retainage will be withheld after fifty (50) percent completion.

B. The Contractor may request that the Owner accept a Certificate of Deposit (CD) issued in the joint names of the Owner and the Contractor in place of retainage. The CD shall be conditionally assigned by the Contractor to the Owner. CD's shall be issued in increments of $10,000.00 minimum by a federally insured Bank or Savings and Loan Association in Jefferson County. The issuer of certificates shall not cash the CD without written approval of the Owner. Interest will be retained with the CD and all subsequent renewals. The Contractor shall be required to request the acceptance of the CD in place of retainage and, upon approval, shall receive specific instructions from the Owner regarding procedures to be followed.

C. The Contractor agrees that he will indemnify and save the Owner harmless from all claims arising out of the lawful demands of subcontractors, laborers, workmen, mechanics, and suppliers of machinery, parts, equipment, power tools, fuel, materials, and other construction items, incurred in the performance of Work under this Contract. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature herein previously described have been paid, discharged, or waived. If the Contractor should fail to do so, then the Owner may, after having served written notice on the Contractor, either directly pay those unpaid bills for which the Owner has received written notice or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is presented that all such liabilities have been fully discharged, whereupon payment to the Contractor shall be resumed in accordance with the terms of this Contract, but in no event shall the provisions of this article be construed to impress upon the Owner any obligations to either the Contractor or his Surety. In paying any unpaid bills of the Contractor, the Owner shall be deemed to be the temporary agent of the Contractor for this specified purpose; any payment so made by the Owner shall be considered as a payment made under the Contract by the Owner to the Contractor, and the Owner shall not be liable to the Contractor for any such payments made in good faith.

1.14 FINAL PAYMENT

A. When the Work provided for by the Contract has been completely performed on the part of the Contractor and all parts of the Work have been approved by the Engineer and accepted by the Owner, a final estimate will be prepared which shows the total cost of the Work performed under the Contract, including Extra Work as authorized by Change Orders, the total amount retained, and the total amount paid on previous partial estimates. All prior estimates upon which payments have been made are subject to necessary corrections or revisions in the final payment. All pay estimates will be certified as correct by the Engineer and approved by the Owner before payment.

B. The final payment will be made to the Contractor after Final Acceptance by the Owner.

C. Advertisement of completion shall be done in accordance with requirements of Section 01700 – Contract Closeout.

1.15 CLAIMS FOR ADJUSTMENT AND DISPUTES

A. If, for any reason, the Contractor deems that additional compensation is due him for work or materials not clearly provided for in the Contract, Drawings, Specifications, or previously
authorized Extra Work, he shall notify the Engineer, in writing, of his intention to claim such additional compensation before he begins the work on which he bases the claim. The Engineer will then make such recommendations, as he sees fit, regarding the validity of the claim to the Owner. It is expressly understood that the Owner shall be the governing body on the validity of any and all claims. No work is to be done without prior written approval of the Engineer. If such notification is not given or the Engineer is not afforded proper opportunity by the Contractor for keeping strict account of actual costs required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the Engineer has kept account of the cost of the Work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within ten (10) calendar days, submit his written claim to the Engineer, who will present it to the Owner for consideration in accordance with local laws or ordinances.

B. Nothing in this Section shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

1.16 PROHIBITED INTEREST

A. No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept, or approve, or take part in negotiating, making, accepting, or approving, any architectural, engineering, inspection, construction, or material supply contract or any subcontract in connection with the construction of the Project shall become directly or indirectly interested personally in this Contract or in any part thereof. No officer, employee, architect, attorney, engineer, or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory, or other similar functions in connection with the construction of the Project shall become directly or indirectly interested personally in this Contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the Project.

1.17 BUY AMERICAN CLAUSE

A. The Contractor agrees that preference will be given to United States domestically-produced materials and equipment by the Contractor, subcontractors, materialmen, and suppliers in the performance of this Contract.

1.18 DEFECT ASSESSMENT

A. The Contractor shall replace the Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the work, the Engineer will direct one of the following remedies:

1. The defective work may remain, but the unit price/sum will be adjusted to a new price/sum at the discretion of the Engineer.

2. The defective work will be partially repaired to the instructions of the Engineer, and the unit price/sum will be adjusted to a new price/sum at the discretion of the
Engineer.

3. The individual Specification Sections may modify these options or may identify a specific formula or percentage price/sum reduction.

1.19 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable
2. Products determined as unacceptable before or after placement
3. Products not completely unloaded from the transporting vehicle
4. Products placed beyond the lines and levels of the required Work
5. Products remaining on hand after completion of the Work
6. Loading, hauling, and disposing of rejected products

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

- END OF SECTION -
PART 1 -- GENERAL

1.01 SECTION INCLUDES
   A. Format
   B. Preparation of Applications
   C. Submittal Procedures
   D. Substantiating Data
   E. Payment Terms

1.02 RELATED SECTIONS
   A. Section 00500 – Contract
   B. Section 00700 – General Conditions
   C. Section 01010 – Summary of Work
   D. Section 01015 – Prosecution and Progress
   E. Section 01025 – Measurement and Payment
   F. Section 01028 – Change Order Procedures
   G. Section 01310 – Progress Schedules
   H. Section 01700 – Contract Closeout
   I. Section 01720 – Project Record Documents

1.03 FORMAT
   A. The Contractor shall use the form provided by the Engineer or approved equal. Form shall have a column, for each item, listing: item number, description of work, scheduled value, previous applications, work in-place, authorized Change Orders, total completed to date of application, percent of completion, balance to finish, and retainage.

1.04 PREPARATION OF APPLICATIONS
   A. The Contractor shall present required information on electronic media printout.
B. The Contractor shall execute certification by signature of authorized officer.

C. This form to be executed shall serve as the source of the approved Schedule of Values prior to any Application for Payment.

D. The Contractor shall list each authorized Change Order as an extension on the continuation sheet(s), including Change Order number and dollar amount as for an original item of work.

E. The Contractor shall prepare final Application for Payment as specified in Section 01700 – Contract Closeout.

1.05 SUBMITTAL PROCEDURES

A. The Contractor shall submit five (5) signed copies of each Application for Payment, which shall include all required substantiating information (supporting invoices, etc.) as necessary.

B. The Contractor shall submit an updated construction Progress Schedule in accordance with Section 01310 – Progress Schedules with each Application for Payment.

C. The Contractor shall submit at intervals stipulated in the Contract.

D. The Contractor shall sequentially number Applications for Payment.

E. When the Engineer determines that the Application for Payment is proper and correct, he will transmit a Certificate for Payment to the Owner with a copy to the Contractor.

F. Engineer and Owner will not approve any Application for Payment if the Contractor, at the time of review, either has not:

   1. Satisfactorily maintained a day-to-day “as-built” record of the construction progress on a full-size set of Contract Drawings in accordance with Section 01720 – Project Record Documents

   2. Adequately cleaned and/or restored the site in accordance with Section 01010 – Summary of Work

G. Engineer and Owner will not approve the first Application for Payment if the Contractor has not submitted an acceptable construction video in accordance with Section 01010 – Summary of Work.

1.06 SUBSTANTIATING DATA

A. When the Engineer requires substantiating information, the Contractor shall submit data justifying quantities or dollar amounts in question.

1.07 PAYMENT TERMS
A. The Owner shall make payment to the Contractor within fifteen (15) days upon receipt of the payment request by the Finance Department.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -
SECTION 01028
CHANGE ORDER PROCEDURES

PART 1 -- GENERAL

1.01 SECTION INCLUDES
A. Submittals
B. Change Order Procedures
C. Field Directive
D. Stipulated Price (Lump Sum) Change Order
E. Unit Price Change Order
F. Time and Material Change Order
G. Documentation of Change in Contract Price and Contract Time
H. Execution of Change Orders
I. Correlation of Contractor Submittals

1.02 RELATED SECTIONS
A. Section 00500 – Contract
B. Section 00700 – General Conditions
C. Section 01025 – Measurement and Payment
D. Section 01027 – Applications for Payment
E. Section 01310 – Progress Schedules
F. Section 01700 – Contract Closeout
G. Section 01720 – Project Record Documents

1.03 SUBMITTALS
A. The Contractor shall submit the name of the individual authorized to receive Change Order Documents and be responsible for informing others in the Contractor’s employ.
1.04 CHANGE ORDER PROCEDURES

A. Change Orders shall be issued for any item of work defined as "Extra Work" that is to be performed by the Contractor and for any significant increase or decrease in quantities included in the Contract. Change Orders shall be on a form prescribed by the Owner and shall be subject to approval by the Owner.

B. The Engineer shall advise the Contractor of minor changes in the Work, which, in his judgment, do not involve an adjustment of Contract Price or Contract Time as authorized by the General Conditions, by issuing Supplemental Instructions.

C. The Engineer may issue a proposal request, request for change, or notice of change which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in contract time for executing the change (with a stipulation of any overtime work required), and the period of time during which the requested price will be considered valid. The Contractor shall prepare and submit an estimate within 10 days.

D. The Contractor may propose a change by submitting a request for change to the Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change and the effect on the Contract price and Contract Time with full documentation.

1.05 FIELD DIRECTIVE

A. The Engineer may issue a field directive, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

B. The field directive shall describe changes in the Work and shall designate the method of determining any change in Contract Sum/Price or Contract Time.

C. The Contractor shall promptly execute the change in Work upon receipt of the field directive.

D. When field directives require an extension in Contract Time, the time extension shall apply only to that work related to the field directive and shall not be utilized by the Contractor for completion of original work items.

1.06 STIPULATED PRICE (LUMP SUM) CHANGE ORDER

A. Change Orders shall be based on proposal request, notice of change or request for change, and Contractor’s fixed price quotations, or Contractor’s request for a Change Order as approved by the Engineer.

1.07 UNIT PRICE CHANGE ORDER

A. For predetermined unit prices and quantities, the Change Order shall be executed on a fixed unit price basis.
B. For unit costs or quantities of units of work which are not covered in the Contract, the Contractor shall execute the Work under a field directive.

C. Changes in Contract Price or Contract Time shall be computed as specified for time and material Change Order.

D. If any work under such a unit price item is not performed, if only a small percentage of the quantity listed is used, or if the quantity listed is exceeded, the Contractor shall not make any claims for not using said item, for exceeding the stated quantity, or for higher unit prices because of the quantity used or small or high percentage.

1.08 TIME AND MATERIAL CHANGE ORDER

A. After completion of a change, the Contractor shall submit an itemized account and supporting data within time limits indicated in the conditions of the Contract.

B. The Engineer will determine the change allowable in Contract Price and Contract Time as provided in the Contract Documents.

C. The Contractor shall maintain detailed records of Work done on time and material basis.

D. The Contractor shall provide full information required for evaluation of proposed changes to substantiate costs for changes in the Work.

1.09 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. The Contractor shall maintain detailed records of work done on a time and material basis and provide full information required for evaluation of proposed changes and to substantiate costs of changes in the Work.

B. The Contractor shall document each quotation for a change in cost or time with sufficient and complete data to allow evaluation of the quotation.

C. When requested by the Engineer, the Contractor shall provide additional data to support calculations including:

1. Quantities of products, labor, and equipment
2. Taxes, insurance, and bonds
3. Overhead and profit
4. Justification for any change in Contract Time
5. Credits for deletions from the Contract shall be similarly documented.

D. The Contractor shall support each claim for additional costs and for work done on time and material basis with additional information including:

1. Origin and date of claim
2. Dates and times work was performed and by whom
3. Time records and wage rates paid
4. Invoices and receipts for products, equipment, and subcontractors (similarly documented)
E. The Contractor shall support each claim for additional Contract Time with a detailed time logic analysis in accordance with the requirements of Section 01310 – Progress Schedules.

1.10 EXECUTION OF CHANGE ORDERS
A. The Engineer will issue Change Orders for signatures of parties.

1.11 CORRELATION OF CONTRACTOR SUBMITTALS
A. The Contractor shall promptly revise Schedule of Values and Application for Payment Forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

B. Before resubmitting them, the Contractor shall promptly revise Progress Schedules to reflect any change in Contract Time and revise sub-schedules to adjust time for other items of Work affected by the change.

C. The Contractor shall promptly enter changes in Project Record Documents.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -
SECTION 01040
COORDINATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall allow the Owner or his agents, and other project contractors or their agents, to enter upon the work for the purpose of constructing, operating, maintaining, removing, repairing, altering, or replacing such pipes, sewers, conduits, manholes, wires, poles, or other structures and appliances which may be required to be installed at or in the work. The Contractor shall cooperate with all aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the Owner, or others, to be done in connection with his work, or in connection with normal use of the facilities.

B. The Contractor shall cooperate fully with the Owner, the Engineer, and all other contractors employed on the work, to effect proper coordination and progress to complete the project on schedule and in proper sequence. Insofar as possible, decisions of all kinds required from the Engineer shall be anticipated by the Contractor to provide ample time for inspection or the preparation of instructions.

C. The Contractor shall assume full responsibility for the correlation of all parts of his Work with that of other contractors. The Contractor’s superintendent shall correlate all Work with other contractors in the laying out of Work. The Contractor shall lay out his own Work in accordance with the Drawings, Specifications, and instructions of latest issue and with due regard to the work of other contractors.

D. Periodic coordinating conferences shall be held per Section 01200 – Project Meetings, of these Contract Documents.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
SECTION 01090

REFERENCE STANDARDS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Wherever reference is made to any published standards, codes, or standard specifications, it shall mean the latest standard code, specification, or tentative specification of the technical society, organization, or body referred to, which is in effect at the date of invitation for Bids.

B. All materials, products, and procedures used or incorporated in the work shall be in strict conformance with applicable codes, regulations, specifications, and standards.

C. A partial listing of codes, regulations, specifications, and standards includes the following:

Air Conditioning and Refrigeration Institute (ARI)

Air Diffusion Council (ADC)

Air Moving and Conditioning Association (AMCA)

The Aluminum Association (AA)

American Architectural Manufacturers Association (AAMA)

American Concrete Institute (ACI)

American Gear Manufacturers Association (AGMA)

American Hot Dip Galvanizers Association (AHDGA)

American Institute of Steel Construction (AISC)

American Iron and Steel Institute (AISI)

American National Standards Institute (ANSI)

American Society of Civil Engineers (ASCE)

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

American Society of Mechanical Engineers (ASME)

American Society for Testing and Materials (ASTM)

American Standards Association (ASA)
American Water Works Association (AWWA)
American Welding Society (AWS)
American Wood Protection Association (AWPA)
Anti-Friction Bearing Manufacturers Association (AFBMA)
Building Officials and Code Administrators (BOCA)
Conveyor Equipment Manufacturers Association (CEMA)
Consumer Product Safety Commission (CPSC)
Factory Mutual (FM)
Federal Specifications
Instrument Society of America (ISA)
Institute of Electrical and Electronics Engineers (IEEE)
National and Local Fire Codes
Lightning Protection Institute (LPI)
National Association of Sewer Service Companies (NASSCO)
National Electrical Code (NEC)
National Electrical Manufacturers Association (NEMA)
National Electrical Safety Code (NESC)
National Electrical Testing Association (NETA)
National Fire Protection Association (NFPA)
Regulations and Standards of the Occupational Safety and Health Act (OSHA)
Southern Building Code Congress International (SBCCI)
Sheet Metal and Air Conditioning Contractors’ National Association (SMACNA)
Standard Building Code
Standard Mechanical Code
Standard Plumbing Code
Uniform Building Code (UBC)

Underwriters Laboratories Inc. (UL)

D. Contractor shall, when required, furnish evidence satisfactory to the Engineer that materials and methods are in accordance with such standards where so specified.

E. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on-site by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
PART 1 -- GENERAL

1.01 PRE-BID CONFERENCE

A. A Pre-Bid Conference will be held at the time and place to be designated in the Notice to Bidders.

B. The Engineer will be available to discuss the project and answer pertinent questions. No oral interpretation will be made as to the meaning of the Documents. Interpretation, if deemed necessary by the Engineer, will be in the form of an Addendum to the Contract Documents.

1.02 PRECONSTRUCTION MEETING

A. A Preconstruction Meeting will be held after Award of Contract, but prior to starting work at the site.

B. Attendance:

1. Owner
2. Engineer
3. Contractor
4. Major subcontractors
5. Safety representative
6. Representatives of governmental or other regulatory agencies.

C. Minimum Agenda:

1. Tentative construction schedule
2. Critical work sequencing
3. Designation of responsible personnel
4. Processing of Field Decisions and Change Orders
5. Adequacy of distribution of Contract Documents
6. Submittal of Shop Drawings and samples
7. Procedures for maintaining record documents
8. Use of site and Owner's requirements
9. Major equipment deliveries and priorities
10. Safety and first aid procedures
11. Security procedures
12. Housekeeping procedures
13. Processing of Partial Payment Requests
14. General regard for community relations

1.03 PROGRESS MEETING

A. Progress Meetings will be held monthly at a location as selected by the Owner during the performance of the work of this Contract. Additional meetings may be called as progress of work dictates.

B. Engineer will preside at meetings and record minutes of proceedings and decisions. Engineer will distribute copies of minutes to participants.

C. Attendance:
   1. Engineer
   2. Contractor
   3. Major subcontractors, only with Engineer's approval or request, as pertinent to the agenda

D. Minimum Agenda:
   1. Review and approve minutes of previous meetings.
   2. Review progress of Work since last meeting.
   3. Review proposed 30-60 day construction schedule.
   4. Note and identify problems which impede planned progress.
   5. Develop corrective measures and procedures to regain planned schedule.
   6. Revise construction schedule as indicated and plan progress during next work period.
7. Maintaining of quality and work standards.

8. Complete other current business.

9. Schedule next progress meeting.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
SECTION 01300

SUBMITTALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Equipment and Material Orders Schedule

1. Contractor shall prepare and submit five (5) copies of his schedule of principal items of equipment and materials to be purchased to the Engineer for review and approval in accordance with Section 01310 – Progress Schedules.

2. If so required, the schedule shall be revised until it is approved by the Engineer.

3. Schedule shall be updated monthly and five (5) copies submitted to the Engineer not later than the fifth day of every month with the application for progress payment.

4. The updated schedule shall be based on the Progress Schedule developed under Section 01310 – Progress Schedules.

B. Working Drawings

1. Within thirty (30) days after the Notice to Proceed, the Contractor shall prepare and submit five (5) copies of his preliminary schedule of Working Drawing submittals to the Engineer for review and approval. If so required, the schedule shall be revised until it is approved by the Engineer.

2. Working Drawings include, but are not limited to, Shop Drawings, layout drawings in plan and elevation, installation drawings, manufacturer's data, etc. Contractor shall be responsible for securing all of the information, details, dimensions, Drawings, etc., necessary to prepare the Working Drawings required and necessary under this Contract and to fulfill all other requirements of his Contract. Contractor shall secure such information, details, Drawings, etc., from all possible sources including the Drawings, Working Drawings prepared by subcontractors, Engineers, suppliers, etc.

3. Working Drawings shall accurately and clearly present the following:

   a. All working and installation dimensions.
   
   b. Arrangement and sectional views.
   
   c. Materials in the proposed positions for installation, details of required attachments and connections, and dimensioned locations between materials and in relation to the structures.
4. In the event that the Engineer is required to provide additional engineering services as a result of a substitution of materials or equipment by the Contractor, the additional services will be provided in accordance with Section 01010 – Summary of Work, and will be covered in supplementary or revised Drawings which will be issued to the Contractor. All changes indicated that are necessary to accommodate the equipment and appurtenances shall be incorporated into the Working Drawings submitted to the Engineer.

5. Working Drawings specifically prepared for this Project shall be on mylar or other approved reproducible material sheets of the same size as the Drawings. Working Drawings shall conform to recognized drafting standards and be neat, legible and drawn to a large enough scale to show in detail the required information.

6. The Drawings are used for engineering and general arrangement purposes only and are not to be used for Working Drawings.

7. Shop Drawings
   a. Contractor shall submit for review by the Engineer Shop Drawings for all fabricated work and for all manufactured items required to be furnished by the Contract Documents.
   b. Structural and all other layout Drawings prepared specifically for the Project shall have a plan scale of not less than 1/4-inch = 1 foot.
   c. Where manufacturer’s publications in the form of catalogs, brochures, illustrations or other data sheets are submitted in lieu of prepared Shop Drawings, such submittals shall specifically indicate the item for which approval is requested. Identification of items shall be made in ink, and submittals showing only general information are not acceptable.

8. Layout and Installation Drawings
   a. Contractor shall prepare and submit for review by the Engineer layout and installation drawings for all pipes, valves, fittings, sewers, manhole components, etc., under this Contract. The final dimensions, elevation, location, etc., of pipe, valves, fittings, sewers, manhole components, equipment, etc., may depend upon the dimensions of equipment and materials to be furnished by the Contractor.
   b. Layout and installation drawings are required for piping, valves, fittings, sewers, manhole components, etc.
   c. Layout and installation Drawings shall show connections to structures, pipes, fittings, etc.
   d. Drawings shall show the location and type of all supports, hangers, foundations, etc.

9. Contractor Responsibilities
a. All submittals from subcontractors, manufacturers or suppliers shall be sent directly to the Contractor for checking. Contractor shall thoroughly check all Drawings for accuracy and conformance to the intent of the Contract Documents. Drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors, manufacturers, or suppliers by the Contractor for correction before submitting them to the Engineer.

b. All submittals shall be bound, dated, properly labeled and consecutively numbered. Information on the label shall indicate Specification Section, Drawing number, subcontractor's, manufacturer's or supplier's name and the name or type of item the submittal covers. Each part of a submittal shall be marked and tabulated.

c. Working Drawings shall be submitted as a single complete package including all associated drawings relating to a complete assembly of the various parts necessary for a complete unit or system.

d. Shop Drawings shall be submitted as a single complete package for any operating system and shall include all items of equipment and any mechanical units involved or necessary for the functioning of such system.

e. ALL SUBMITTALS SHALL BE THOROUGHLY CHECKED BY THE CONTRACTOR FOR ACCURACY AND CONFORMANCE TO THE INTENT OF THE CONTRACT DOCUMENTS BEFORE BEING SUBMITTED TO THE ENGINEER AND SHALL BEAR THE CONTRACTOR'S STAMP OF APPROVAL CERTIFYING THAT THEY HAVE BEEN SO CHECKED. SUBMITTALS WITHOUT THE CONTRACTOR'S STAMP OF APPROVAL WILL NOT BE REVIEWED BY THE ENGINEER AND WILL BE RETURNED TO THE CONTRACTOR.

f. If the submittals contain any departures from the Contract Documents, specific mention thereof shall be made in the Contractor's letter of transmittal. Otherwise, the review of such submittals shall not constitute approval of the departure.

g. No materials or equipment shall be ordered, fabricated, shipped or any work performed until the Engineer returns to the Contractor the submittals, herein required, annotated "Furnish as Submitted", "Furnish as Corrected", or "Furnish as Corrected – Confirm." If a submittal is returned "Furnish as Corrected – Confirm" the portions of work covered by the submittal that require confirmation by the Engineer shall not be ordered, fabricated, shipped, or any work performed until those portions are approved in a subsequent submittal either "Furnish as Submitted" or "Furnish as Corrected".

h. Where errors, deviations, and/or omissions are discovered at a later date in any of the submittals, the Engineer's prior review of the submittals does not relieve the Contractor of the responsibility for correcting all errors, deviations, and/or omissions.
10. Procedure for Review

a. Submittals shall be transmitted in sufficient time to allow the Engineer at least thirty (30) working days for review and processing.

b. Contractor shall transmit seven (7) hard copies and three (3) electronic copies of all technical data or drawings to be reviewed. Electronic copies of both preliminary and final Shop Drawings shall be submitted in accordance with the following requirements:

i. Electronic copies shall be in Adobe Acrobat® Portable Document Format (*.pdf), Version 1.3 or more recent, shall be searchable, shall be submitted on CD-ROM, and shall be suitable for downloading into the Owner’s Infor database system. Electronic copies shall be PDF Formatted Text and Graphics (formerly Normal) format or PDF Searchable Image (formerly Image+Text) format. PDF Image Only format is not acceptable. If submitted in PDF Searchable Image format, the Optical Character Recognition shall be at a 95% confidence level, using Adobe Acrobat® Capture® 3.x or an equivalent product.

ii. All Bill of Material sheets and/or tables indicating product data, quantities, physical location and reference, catalog number, reference, cost, and any other field entered in the bill of materials sheet and/or any other spreadsheets and/or any other table and/or listings of references, etc., shall be electronically developed and submitted in a database format, using current version of either Microsoft® Excel or Microsoft® Access software. This applies to all summary sheets, material listings, etc., to be submitted for this Project. Submittals shall include hard copies and an electronic version developed in current version of either Microsoft® Excel or Microsoft® Access software. Electronic version shall be submitted on CD-ROM.

iii. Binders and File Organization of the Electronic Copies: Clearly label each CD-ROM copy of the electronic version. The CD-ROM volume numbers, content and organization of the electronic files contained within, and labeling formats shall match and shall be identical to those of the hard copies. All labels shall be neatly typed and labeled. Handwritten labels shall not be accepted. Organize electronic copies in a hard-plastic case with locking and hinged cover. Install a neatly typed label on each case that shall provide all the information required to be listed on the cover by these Specifications.

c. Submittal shall be accompanied by a letter of transmittal containing date, project title, Contractor’s name, number and titles of submittals, a list of relevant specification sections, notification of departures from any Contract requirement, and any other pertinent data to facilitate review.
d. Submittals will be annotated by the Engineer in one of the following ways:

"Furnish as Submitted" (FAS) - no exceptions are taken

"Furnish as Corrected" (FAC) - minor corrections are noted and shall be made.

“Furnish as Corrected – Confirm” (FACC) - some corrections are noted and a partial resubmittal or additional information are required as specifically requested.

"Revise and Resubmit" (R&R) - major corrections are noted and a full resubmittal is required.

"For Information Only – Not Reviewed" (FIO) – submittal was received and was distributed for record purposes without review.

e. If a submittal is satisfactory to the Engineer in full or in part, the Engineer will annotate the submittal "Furnish as Submitted", "Furnish as Corrected", or “Furnish as Corrected – Confirm", retain four (4) hard copies and two (2) electronic copies and return remaining copies to the Contractor. If reproducible transparencies are submitted, the Engineer will retain the copies and return the reproducible transparencies to the Contractor. In the case of “Furnish as Corrected – Confirm” a partial resubmittal or additional information are required as specifically requested.

f. If a full resubmittal is required, the Engineer will annotate the submittal "Revise and Resubmit" retain three (3) hard copies and one (1) electronic copy and return remaining copies to the Contractor. If reproducible transparencies are submitted, the Engineer will retain the copies and return the reproducible transparencies to the Contractor.

g. Contractor shall continue to resubmit submittals in part if they are returned “Furnish as Corrected – Confirm” or in full if they are returned “Revise and Resubmit” as required by the Engineer until submittals are acceptable to the Engineer. It is understood by the Contractor that Owner may charge the Contractor the Engineer's charges for review in the event a submittal is not approved (either "Furnish as Submitted" or "Furnish as Corrected") by the second submittal (first re-submittal) for a system or piece of equipment. These charges shall be for all costs associated with engineering review, meetings with the Contractor or manufacturer, etc., commencing with the third submittal (second re-submittal) of a system or type of equipment submitted for a particular Specification Section.

h. Acceptance of a Working Drawing by the Engineer will constitute acceptance of the subject matter for which the Drawing was submitted and not for any other structure, material, equipment or appurtenances indicated or shown.

11. Engineer’s Review
a. Engineer’s review of the Contractor’s submittals shall in no way relieve the Contractor of any of his responsibilities under the Contract. An acceptance of a submittal shall be interpreted to mean that the Engineer has no specific objections to the submitted material, subject to conformance with the Contract Drawings and Specifications.

b. Engineer’s review will be confined to general arrangement and compliance with the Contract Drawings and Specifications only, and will not be for the purpose of checking dimensions, weights, clearances, fittings, tolerances, interferences, coordination of trades, etc.

12. Record Working Drawings for Project Record Documents

a. Project Record Documents shall be in accordance with Section 01720 – Project Record Documents.

b. Prior to final payment, the Contractor shall furnish the Engineer one complete set of all accepted Working Drawings, including Shop Drawings, for equipment, piping, manhole components, etc.

c. Working Drawings furnished shall be corrected to include any departures from previously accepted Working Drawings.

C. Samples

1. Contractor shall furnish for review all samples as required by the Contract Documents or requested by the Engineer.

2. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish or texture and shall be properly labeled to show the nature of the material, trade name of manufacturer and location of the work where the material represented by the sample will be used.

3. Samples shall be checked by the Contractor for conformance to the Contract Documents before being submitted to the Engineer and shall bear the Contractor’s stamp of approval certifying that they have been so checked. Transportation charges on samples submitted to the Engineer shall be prepaid by the Contractor.

4. Engineer’s review will be for compliance with the Contract Documents and his comments will be transmitted to the Contractor with reasonable promptness.

5. Accepted samples will establish the standards by which the completed work will be judged.
PART 3 -- EXECUTION
(NOT USED)

- END OF SECTION -
SECTION 01310
PROGRESS SCHEDULES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor’s approach to prosecution of the Work shall be disclosed to the Engineer by submission of computerized, cost-and-resource loaded CPM Progress Schedules as required in this Section. These requirements are in addition to, and not in limitation of, those imposed elsewhere in the Specifications.

B. A Pay Activity, as opposed to a CPM Activity, is an Activity used to simplify cost-loading of the Progress Schedule. When used, Pay Activities shall be loaded with the cost of Work that is included, at no cost, in related (generally, concurrent) CPM Activities. Pay Activities shall not control the rate of progress; however, their start and finish dates shall be consistent with those of their related CPM Activities to ensure accurate Early Date and Late Date payment plots. References to CPM (Critical Path Method) shall be CPM standards consistent with this Section.

1.02 PROGRESS SCHEDULE SUBMITTALS

A. Progress Schedule Submittals shall include a disk with the Contractor’s files, a narrative and seven (7) copies of the following reports, schedules, and plots, all in formats, sorts, and sequences acceptable to the Engineer.

1. Detailed Cost Breakdown

2. Activity Reports

3. Equipment and Material Order Schedule

4. Short Term Schedule

5. Logic Diagram

6. Resource Plots

B. The Contractor shall uniquely identify each Progress Schedule Submittal. Resubmissions shall be identified by reusing the corresponding Submittal number and the letter A, B, etc., and shall fully address all the Engineer’s Comments and objections.

C. No Progress Schedule review by the Engineer shall relieve the Contractor from the responsibility to: (1) comply with the Contract Times and any sequences of Work indicated in or required by the Contract Documents, and (2) complete omitted Work within the Contract Times. Nor will any such Progress Schedule review by the Engineer lead to approval of, or consent to, any variation from the Contract Documents, except as the Engineer may
otherwise approve or consent to individual variations by means of specific, separate notations in writing.

D. The Contractor shall submit the Preliminary Progress Schedule as stated in the Instruction to Bidders. This shall constitute the Rev. 0 Progress Schedule and shall meet all the submittal requirements specified herein.

E. Once the Rev. 0 Progress Schedule is approved, it shall become the Rev. 0 Record Schedule or As-Planned Schedule, and shall be used for Progress Payment submittals until the Record Schedule is revised by subsequent Progress Schedules.

F. The Contractor shall not submit Progress Payments Requests until the Rev. 0 Progress Schedule is approved.

G. The Contractor shall submit monthly Progress Schedule revisions (Rev.1, Rev. 2, etc.) with each monthly Progress Payment Request. Updated Progress Schedules shall be submitted a minimum of 7 days in advance of each construction progress meeting along with a detailed 30 day look ahead schedule.

H. Each monthly Progress Schedule shall be intended to document those agreements reached between the Owner and the Contractor concerning the Progress Schedule by incorporating revisions in activities, logic ties, and so forth, agreed to by the Owner upon completion of the Engineer’s review of any preceding Proposal Schedule submittals made by the Contractor.

I. The Contractor shall submit Proposal Schedules, which shall support proposals or claims for changes in Contract Price or Contract Time, schedule recovery plans and other Contractor-initiated Progress Schedule adjustments. A Proposal Schedule Submittal shall include all the reports, schedules, plots, etc. specified for a Progress Schedule Submittal.

1.03 DELAY PROVISIONS

A. The Contractor shall promptly take appropriate action to recover schedule whenever the Contractor anticipates, or any Progress Schedule Submittal demonstrates, and required CPM Activity to slip, due to acts or omissions within the control of the Contractor, by fifteen (15) or more days beyond any Target Time or Contract Time. If the Contractor is not responsible for such schedule slippage, the Contractor shall give prompt written notice of a delay justifying a Contract Time extension, and follow such notice by taking prompt appropriate action nonetheless, if so directed by the Engineer.

1. If schedule recovery is required, the Contractor shall enclose with the next Progress Schedule Submittal a schedule recovery plan consisting of (1) a narrative describing the cause of schedule slippage and the actions taken to recover schedule within the shortest reasonable time, and (2) a Proposal Schedule with the corresponding revisions in Activities and logic ties and other adjustments. Appropriate schedule recovery actions may include assignment of additional labor, subcontractors or construction equipment; Work during other than normal working hours; resequencing of the Work; expediting of Submittals and deliveries; and any combination of any of these or other similar actions. Activity shortening and overlapping shall be explained as to their basis (and be supported by increases in resources).
2. If the Contractor believes that an increase in Contract Time is justified, any such extension in Contract Time and associated increase in Contract Price will not be evaluated, unless the following requisites are met: (1) the Contractor, using the procedures in this Section, demonstrates that conditions justifying extensions in Contract Time or increases in Contract Price, or both, have arisen, and (2) the Contractor's analysis is verifiable by an independent, objective evaluation by the Engineer, using the electronic files and data furnished by the Contractor.

B. The Contractor's failure, refusal, or neglect to take appropriate schedule recovery action or, in the alternative, give written notice of a delay, and, in either case, to follow up with a timely Proposal Schedule shall be reasonable evidence that the Contractor is not prosecuting the Work with due diligence. Any such Contractor failure, refusal, or neglect shall give sufficient basis to the Owner, with the Engineer's advice, to elect any of the following: (1) demand adequate, written assurance of due performance, (2) withhold liquidated damages, and (3) in the Owner's sole discretion, direct alternate schedule recovery actions.

C. Once the As-Planned Schedule is established, the Engineer will select Progress Points. Progress Points will be assigned Target Times using the Late Dates in the Rev. 0 Record Schedule (As-Planned Schedule). As the Record Schedule is revised, Target Times shall be revised to reflect the Late Dates. Target Times shall be interim, Contractor-imposed deadlines; however, Target Times shall not be Contract Times.

D. In the event the Engineer is unable to approve any Progress Schedule Revision, both the Engineer and Contractor shall be required to use the Rev. 0 Record Schedule and Rev. 0 Target Times, and not any disputed Record Schedule, to resolve issues affecting Contract Time and Contract Price, as follows: (1) The As-Planned Schedule will be updated through several Progress Payment closing dates, and (2) actual dates for the Progress Points shall be compared with the Rev. 0 Target Times, and any slippage, by trade or equivalent Contract phase, shall be correspondingly explained.

1. Any such updating of the As-Planned Schedule through a closing date (1) shall purposely exclude all Contractor-initiated revisions affecting Work after the closing date, even if such revisions were incorporated into any Revision Submittal, but (2) shall include adjustments in Activities and logic tie changes covering changes and delays that were consented to by the Owner before the closing date. Adjustments in Activities and logic ties for Contractor-initiated revisions (including schedule recovery plans) shall be incorporated only in the update for the period when the Work reflected by those Contractor-initiated revisions actually took place.

1.04 PROGRESS SCHEDULE SOFTWARE

A. The Progress Schedule software shall be current version of Primavera Project Planner® that runs on IBM PC compatible equipment and is capable of: (1) processing and plotting the required Progress Schedule information, and (2) creating data bases accessible by other software.

1.05 MEASUREMENT AND PAYMENT

A. The Contractor represents to have included in the Contract Price all costs for Work under this Section. Payment for Work performed under this Section will be made as part of those
payments made on in-progress and completed Detailed Cost Breakdown pay items, or using the Earned Values for Progress Schedule Submittal pay items, if any such pay items are established.

PART 2 -- PRODUCTS

2.01 PROGRESS SCHEDULE; NARRATIVE

A. The Progress Schedule shall detail CPM Activities and logic ties to the extent required to show the Contractor's overall approach to the Work.

B. The Progress Schedule shall clearly define the prosecution of the Work from Notice to Proceed to Final Acceptance by using separate CPM Activities for, but not limited to: construction/installation; permitting (by the Contractor and Owner); submittal preparation; submittal review and return; submittal resubmissions and submittal re-reviews, as advisable; deliveries to the site or storage; Owner-furnished items; interfaces with other work (other contractors, public utilities, etc.); testing and Punch List; Owner training; and start-up.

C. CPM Activity durations shall equate to the days required to complete the associated work. Activities shall not combine: (a) separate items of Unit Price or lump sum work; (b) distinct classes of work (e.g., CSI Divisions or equivalent); (c) work in separate areas, structures or facilities and, if requested by the Engineer, work in separate locations or elevations within an area, structure or facility; or (d) rough-in and finish work.

D. Installation CPM Activities shall last from fifteen (15) to forty-five (45) days, unless a shorter duration results from the rules in Article 2.01, Paragraph C. Unless longer review times are specified in other Specifications, Submittal review CPM Activities also shall last a minimum of fifteen (15) working days as determined by the Engineer. Submittal, delivery, and start-up CPM Activities may combine materials and equipment in the same class of work, based on the detail of related installation CPM Activities.

E. Activities shall be assigned consistent descriptions, codes, and sort codes. Sort code schemes shall: be subject to the Engineer's prior consent; indicate whether the Contractor (or a subcontractor or Supplier), Engineer, or Owner the lead; distinguish CPM Activities from pay Activities; and group Activities by unit price, area, change, Submittals, deliveries and other such schemes. Constraint dates shall be explained as to bases.

F. The narrative shall list the CPM Activities on each Critical Path and compare Early and Late Dates for CPM Activities designating Contract Times and Target Times. The narrative shall also recap progress and days gained or lost vs. the current Record Schedule, describe changes in resources to be used on remaining Work and identify delays, their extent and causes. The narrative shall also itemize changes in Activities, logic ties and DCB pay items by each change, recovery plan and Contractor-initiated revision.

2.02 REPORTS; SCHEDULES; PLOTS

A. Activity Reports shall include CPM Activity code, description, duration, calendar, Early and Late Dates (calendar dates), Total Float, labor manhours, and sort codes. The Late Finish Date (or the Early Start Date) of any CPM Activity highlighting a Contract Time (or
commencement of all or any part of the Work) shall equal the corresponding Contract Time (or Contract date). In addition, for precedence-based Progress Schedules, Activity Reports shall show, for each CPM Activity, all preceding and succeeding logic ties (lead/lag and lead times) or attach a separate report combining such Activity and logic tie data.

B. **Equipment and Material Order Schedule** shall be submitted in accordance with Section 01300 – Submittals and shall be in tabular form with appropriate spaces to include the following information for principal items of equipment and materials:

1. Dates on which Shop Drawings are requested and received from the manufacturer.
2. Dates on which certification is received from the manufacturer and transmitted to the Engineer.
3. Dates on which Shop Drawings are submitted to the Engineer and returned by the Engineer for revision.
4. Dates on which Shop Drawings are revised by manufacturer and resubmitted to the Engineer.
5. Date on which Shop Drawings are returned by Engineer annotated either "Furnish as Submitted" or "Furnish as Corrected".
6. Date on which accepted Shop Drawings are transmitted to manufacturer.
7. Date of manufacturer’s scheduled shop test.
8. Date of manufacturer's scheduled delivery.
9. Date on which delivery is actually made.

C. The **Detailed Cost Breakdown (DCB)** shall divide the Work into pay items by significant Sections of the Specifications within areas, structures, and facilities, or vice versa. If requested by the Engineer in writing, there shall be separate DCB reports for self-performed Work and the Work of each Subcontractor.

1. Pay Activities or the features of the software shall be used to ensure that any total CPM Activity Value or, if appropriate, that any Activity labor, Subcontract, etc. Values roll up to only one DCB pay item. Once the Rev. 0 DCB is approved, the Contractor shall not modify any DCB pay item or Activity Value, unless otherwise authorized by the Engineer in writing.

D. **Short-Term Schedules** shall subdivide CPM Activities into detailed tasks and cover the prior two (2) weeks and the next four (4) weeks. Each installation task shall be cross-referenced to a CPM Activity and shall not combine the Work for more than one crew. Submittals shall segregate preparation from review and shall not combine items furnished by separate Suppliers.

E. **Logic Diagrams** shall be arrow or precedence and, once the Engineer has designated time-scales, shall be plotted on a time-scaled calendar, on 22-inch x 34-inch sheets. Logic
Diagrams shall identify the Contract Times and Critical Path(s). CPM Activities shall be shown on the Early Dates, and Total Floats shall be noted beside the CPM Activities. Logic connectors, whether on the same sheet or not, shall identify predecessors and successors.

F. **Resource Plots** shall graph monthly (or weekly, if chosen by the Engineer) and cumulative payments and manpower, using current Early Dates and Late Dates and, when requested by the Engineer, comparing As-Planned Schedule and current Early Dates. The specific trades shall be chosen by the Engineer.

**PART 3 -- EXECUTION**

(NOT USED)

- END OF SECTION -
SECTION 01370

SCHEDULE OF VALUES

PART 1 -- GENERAL

1.01 REQUIREMENT INCLUDED:
   A. Procedures for preparation and submittal of Schedule of Values.

1.02 RELATED REQUIREMENTS:
   A. Drawings, Technical Specification Sections, General and Supplementary Conditions of the Contract and other Division 00 and Division 01 Specifications Sections, apply to this Section.
   B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.03 RELATED SECTIONS: Specified Sections elsewhere may include but are not limited to:
   A. Section 00700: General Conditions.
   B. Section 01027: Applications for Payment.
   C. Section 01300: Submittals.

1.04 FORMAT:
   A. Type on Jefferson County Environmental Services Department (JCESD) provided forms or approved format.

1.05 CONTENT:
   A. List installed value of each major item of work and each subcontracted item of work as a separate line item to serve as a basis for computing values for Progress Payments. Round off values to nearest dollar.
   B. Coordinate listings with Progress Schedule.
   C. For items on which payments will be requested for stored products, list sub-values for cost of stored products.
   D. Submit a sub-schedule for each separate stage of work specified in the project manual.
   E. The sum of values listed shall equal total Contract or lump sum price items.
1.06 SUBMITTALS:

A. Submit Preliminary Schedule of Values within fifteen (15) days after the tentative award of the Contract.

B. Submit finalized Schedule of Values within ten (10) days from the approval date of the Overall Construction Progress Schedule.

C. Submit one (1) digital copy of Schedule.

1.07 SUBSTANTIATING DATA:

A. When JCSD requires substantiating information, submit data justifying line item amounts in question.

1.08 ACTION:

A. No payment will be made for work performed on a lump sum contract or a lump sum item until the appropriate Schedule of Values is approved by the Owner

B. The equitable value of work deleted from a lump sum contract or lump sum item shall be determined from the approved Schedule of Values

PART 2 -- PRODUCTS
(Not used)

PART 3 -- EXECUTION
(Not used)

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

A. Work for Schedule of Values shall not be measured separately for payment.

4.02 PAYMENT:

A. No separate payment will be made for work under this Section. The cost thereof shall be distributed among the appropriate items specified in the technical sections of these specifications.

- END OF SECTION -
PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Testing Laboratory Services

1. Laboratory testing and checking required by the Specifications, including the cost of transporting all samples and test specimens, shall be provided and paid for by the Contractor unless otherwise indicated in the Specifications.

2. Materials to be tested include, but are not necessarily limited to the following: cement, concrete aggregate, concrete, bituminous paving materials, structural and reinforcing steel, waterproofing, select backfill, crushed stone or gravel and sand.

3. Tests required by the Owner shall not relieve the Contractor from the responsibility of supplying test results and certificates from manufacturers or suppliers to demonstrate conformance with the Specifications.

4. Procedure

a. The Contractor shall plan and conduct his operations to permit taking of field samples and test specimens, as required, and to allow adequate time for laboratory tests.

b. The collection, field preparation and storage of field samples and test specimens shall be as directed by the Engineer with the cooperation of the Contractor.

5. Significance of Tests

a. Test results shall be binding on both the Contractor and the Owner, and shall be considered irrefutable evidence of compliance or noncompliance with the Specification requirements, unless supplementary testing shall prove, to the satisfaction of the Owner, that the initial samples were not representative of actual conditions.

6. Supplementary and Other Testing

a. Nothing shall restrict the Contractor from conducting tests he may require. Should the Contractor at any time request the Owner to consider such test results, the test reports shall be certified by an independent testing laboratory acceptable to the Owner. Testing of this nature shall be conducted at the Contractor’s expense.
1.02 IMPERFECT WORK, EQUIPMENT, OR MATERIALS

A. Any defective or imperfect work, equipment, or materials furnished by the Contractor which is discovered before the Final Acceptance of the Work, as established by the Certificate of Substantial Completion, or during the subsequent guarantee period, shall be removed immediately even though it may have been overlooked by the Engineer and estimated for payment. Any equipment or materials condemned or rejected by the Engineer shall be tagged as such and shall be immediately removed from the site. Satisfactory work or materials shall be substituted for that rejected.

B. The Engineer may order tests of imperfect or damaged work, equipment, or materials to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor; and the nature, tester, extent and supervision of the tests will be as determined by the Engineer. If the results of the tests indicate that the required functional capability of the work, equipment, or material was not impaired, consistent with the final general appearance of same, the work, equipment, or materials may be deemed acceptable. If the results of such tests reveal that the required functional capability of the questionable work, equipment, or materials has been impaired, then such work, equipment, or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect work, equipment, or material in lieu of performing the tests.

1.03 INSPECTION AND TESTS

A. The Contractor shall allow the Engineer ample time and opportunity for testing materials and equipment to be used in the work. He shall advise the Engineer promptly upon placing orders for material and equipment so that arrangements may be made, if desired, for inspection before shipment from the place of manufacture. The Contractor shall at all times furnish the Engineer and his representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship. The Contractor must anticipate possible delays that may be caused in the execution of his work due to the necessity of materials and equipment being inspected and accepted for use. The Contractor shall furnish, at his own expense, all samples of materials required by the Engineer for testing, and shall make his own arrangements for providing water, electric power, or fuel for the various inspections and tests of structures and equipment.

B. Where other tests or analyses are specifically required in other Sections of these Specifications, the cost thereof shall be borne by the party (Owner or Contractor) so designated in such Sections. The Owner will bear the cost of all tests, inspections, or investigations undertaken by the order of the Engineer for the purpose of determining conformance with the Contract Documents if such tests, inspection, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the Engineer as a result of such tests, inspections, or investigations, the Contractor shall bear the full cost thereof or shall reimburse the Owner for said cost. In this connection, the cost of any additional tests and investigations, which are ordered by the Engineer to ascertain subsequent conformance with the Contract Documents, shall be borne by the Contractor.
PART 2 -- PRODUCTS
(NOT USED)

PART 3 -- EXECUTION
(NOT USED)

- END OF SECTION -
SECTION 01455

LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

PART 1 -- GENERAL

1.01 SECTION INCLUDES
   A. Laws to be Observed
   B. Permits, Licenses, and Taxes
   C. Patented Devices, Materials, and Processes
   D. Responsibility for Safety
   E. Sanitary, Health, and Safety Precautions
   F. Public Convenience and Safety
   G. Protection and Restoration of Property
   H. Responsibility for Damage Claims
   I. Third Party Beneficiary Clause
   J. Use of a Section or Portion of the Work
   K. Privileges of the Contractor in Streets, Alleys, and Rights-of-Way
   L. Railway and Highway Crossings
   M. Personal Liability of Public Officials
   N. No Waiver of Legal Rights
   O. Environmental Protection
   P. Archeological and Historical Findings

1.02 RELATED SECTIONS
   A. Section 01560 – Temporary Environmental Controls
   B. Section 01570 – Traffic Regulations
   C. Section 02270 – Slope Protection and Erosion Control
1.03 LAWS TO BE OBSERVED

A. The Contractor shall be and remain fully informed of all federal and state laws, all local laws, ordinances, regulations, and all orders and decrees of bodies or tribunals having any jurisdiction or authority which in any manner affect those engaged or employed in the Work, or which in anyway affect the conduct of the Work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees and shall protect and indemnify the Owner and all his officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or his employees.

1.04 PERMITS, LICENSES, AND TAXES

A. The Contractor shall procure all permits and licenses, including those permits required by the Owner, pay all charges or fees, as applicable, and give all notices necessary and incident to the due and lawful prosecution of the Work. There shall be no charge for building permits obtained from the Owner when the Contractor is building a structure for the Owner.

1.05 PATENTED DEVICES, MATERIALS, AND PROCESSES

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

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

1.06 RESPONSIBILITY FOR SAFETY

A. The Contractor, in the prosecution of his Work under this Contract, is bound by the requirements of “Safety and Health Regulations for Construction” of OSHA, the U.S. Government Department of Labor, and of other authorities having jurisdiction in safety matters.

B. Under the terms and conditions of this Contract, the Engineer and/or the Owner shall not act as safety engineer or safety supervisor since such responsibility remains solely with the Contractor. The Engineer and/or the Owner shall not be responsible for establishing safety practices or for prescribing safety measures for the Contractor.
C. The Contractor is solely and completely responsible for conditions of the job site, including safety of all persons and property affected directly or indirectly by his operations during the performance of the Work, and this requirement is not limited in application to normal working hours, but applies continuously twenty-four (24) hours per day until acceptance of the Work by the Engineer, and thereafter shall be subject to the terms and conditions of the Guaranty.

D. The duty of the Owner and the Engineer to review the Work in order to determine its acceptability in accordance with the Specifications and to conduct construction review of the Contractor's performance for the benefit of the Owner shall not be construed as a duty to review the adequacy of the Contractor's safety measures on or near the construction site and/or to direct the actions of the Contractor's employees in the performance of the Work as such a duty is not included in the responsibilities of the Owner and the Engineer.

1.07 SANITARY, HEALTH, AND SAFETY PRECAUTIONS

A. The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements of the State and Local Board of Health or of other bodies or tribunals having jurisdiction. These accommodations shall be properly secluded from public observation. The Contractor is reminded that the guidelines set forth by OSHA shall be the minimum that will govern working conditions during construction.

B. Attention is directed to federal, state, and local laws, rules, and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions which are unsanitary, hazardous, or dangerous to his health or safety.

C. All chemicals used during construction of the Project or furnished for Project operation, whether herbicide, pesticide, disinfectant, polymer, reagent, or of other classification, must show approval by the EPA, USDA, or FDA according to the purpose for such chemicals. The disposal of residues therefrom are subject to the instructions of the manufacturers of the respective chemicals.

1.08 PUBLIC CONVENIENCE AND SAFETY

A. The Contractor shall control his operations and those of his subcontractors and all suppliers to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

B. Where the Work is located in or near streets, alleys, or highway right-of-ways, the Contractor shall store construction materials and perform the Work in such a manner as will provide adequate and satisfactory convenience for the general public and residents along the Work.

C. The Contractor shall contact all utilities affected by his Work and coordinate with them such that fire, police, sanitation services, etc. will not be adversely affected.

D. Storage of materials and the Work shall be arranged so that there shall be free access to
all fire hydrants, valves, manholes, and other utility appurtenances.

E. The Contractor shall take such precautionary measures in the performance of the Work as will give maximum protection at all times to persons and property near the Work.

1.09 PROTECTION AND RESTORATION OF PROPERTY

A. The Contractor shall not enter upon private property except right-of-way easements for any purpose without first obtaining written permission from its owner and lessees, and he shall be responsible for the preservation of, and shall use every precaution necessary to prevent damage to, all trees, shrubbery, fences, culverts, bridges, pavement, driveways, sidewalks, etc.; all water, sewer, gas, telephone, electric lines, and other utilities thereof; and all other public or private property along or adjacent to the Work. The Contractor shall notify the proper representatives of any public service corporation, any company, or any individual not less than twenty-four (24) hours in advance of any work which might damage or interfere with the operation of their property along or adjacent to the Work. The Contractor shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect, or misconduct in the manner or method of executing the Work or due to his non-execution of the Work or at any time due to defective work or materials.

B. The Contractor shall be responsible for the preservation of all public and private property, shall carefully protect all land monuments and property marks from disturbance or damage until the Engineer has witnessed or otherwise referenced their location, and shall not move these monuments and marks until directed by the Engineer.

C. When and where any direct or indirect damage or injury is done to public or private property on account of any act, omission, neglect, or misconduct in the execution of the Work or in consequence of the non-execution thereof on the part of the Contractor, he shall immediately restore, at his expense, such property to a condition equal to or better than that existing before such damage or injury occurred, by repairing, rebuilding, or otherwise restoring as may be directed by the Engineer, or the Contractor shall make good such damage or injury in a manner acceptable to the injured property owner.

1.10 RESPONSIBILITY FOR DAMAGE CLAIMS

A. The Contractor shall indemnify and save harmless the Engineer and the Owner and their officers and employees from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the Work; or through use of unacceptable materials in constructing the Work; or because of any act, omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act", or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of this Contract as may be considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, his surety may be held until such suit or suits, action or actions, or claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory proof that the sum payable is due and owing.
evidence that he is adequately protected by public liability and property damage insurance.

B. The Owner shall not be liable to the Contractor for damages or delays resulting from work by third parties or by injunctions or other restraining orders obtained by third parties, except that time will not be charged during such delays, as provided in Section 01015 – Prosecution and Progress.

1.11 THIRD PARTY BENEFICIARY CLAUSE

A. It is specifically agreed between the parties executing the Contract that it is not intended by any of the provisions of any part of the Contract to create the public or any member thereof as a third party beneficiary or to authorize anyone not a party to the Contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the Contract.

1.12 USE OF A SECTION OR PORTION OF THE WORK

A. Whenever, in the opinion of the Engineer, any portion of the Work or structure is in suitable condition, it may be put into use upon the written order of the Engineer, and such usage shall not be held to be in any way an acceptance of the Work or structure or any part thereof as a waiver of any of the provisions of these Specifications or Contract. Pending completion and Final Acceptance of the Work, all necessary repairs and renewals of any section of the Work so put into use due to defective material or workmanship, to natural causes other than ordinary wear and tear, or to the operation of the Contractor shall be performed by, and at the expense of, the Contractor. Warranty on equipment and structures shall begin on the date of Final Acceptance of the Work by the Owner; use or occupancy by the Owner will not constitute a waiver of this requirement.

1.13 PRIVILEGES OF THE CONTRACTOR IN STREETS, ALLEYS, AND RIGHTS-OF-WAY

A. For the performance of the Contract, the Contractor will be permitted to occupy such portions of the public property as will not unduly restrict traffic or endanger the public. The Contractor will ensure that such occupancy of public property shall be in accordance with traffic control plans developed for the Project.

1.14 RAILWAY AND HIGHWAY CROSSINGS

A. Where the Work encroaches upon the right-of-way of any railway, public highway, or other public utility, the Owner will obtain all easements or authority necessary to enter upon such right-of-way for the prosecution and completion of the Work, but the Contractor shall make all arrangements with the owner of the right-of-way for the actual construction work, shall perform the work on or across the right-of-way in the manner and at the times agreed upon with the right-of-way owner, and shall pay the costs thereof, including the costs, if any, of temporary construction performed by the right-of-way owner as a means of providing safe and continuous operation of its facilities during the construction period. The Contractor shall take extra precautions for the safety of the Work, the right-of-way facilities, and the general public as may be necessary by sheeting, bracing, and thoroughly supporting the sides of any excavation and supporting and protecting any adjacent structures.
B. Where required by any railway or highway owner, the Contractor shall post with the Owner thereof such bonds or insurance as may be required to guarantee the satisfactory replacement or repair of materials, paving, or grading within the right-of-way thereof.

1.15 PERSONAL LIABILITY OF PUBLIC OFFICIALS

A. In carrying out any of the Contract provisions or in exercising any power or authority granted to him by this Contract, there shall be no liability upon the Engineer, his authorized representatives, or any official of the Owner, either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

1.16 NO WAIVER OF LEGAL RIGHTS

A. Upon completion of the Work, the Owner will expeditiously make a final inspection and notify the Contractor of Final Acceptance. Such Final Acceptance, however, shall not preclude the Owner from correcting any measurement, estimate, or certificate made before or after completion of the Work, nor shall the Owner be precluded from recovering from the Contractor or his surety, or both, such overpayment as may be sustained by failure on the part of the Contractor to fulfill his obligations under the Contract. A waiver on the part of the Owner of any breach of any part of the Contract shall not be held to be a waiver of any other or subsequent breach.

B. The Contractor, without prejudice to the terms of the Contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards to the Owner's rights under any warranty or guaranty.

1.17 ENVIRONMENTAL PROTECTION

A. The Contractor shall comply with all Federal, State, and Local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and pollution of the atmosphere from particulate and gaseous matter.

1.18 ARCHAEOLOGICAL AND HISTORICAL FINDINGS

A. Should the Contractor encounter, during his operations, any building, part of a building, structure, or object which appears to be of historical or archaeological significance, he shall immediately cease operations in that location and notify the Engineer. The Engineer will immediately investigate the Contractor's finding and will direct the Contractor to either resume his operations or to suspend operations as directed.

B. Should the Engineer order suspension of the Contractor's operations in order to protect an archaeological or historical finding or order the Contractor to perform extra work, such shall be covered by an appropriate Contract modification (Change Order) as provided in Section 01028 – Change Order Procedures. If appropriate, the Contract modification shall include an extension of Contract Time in accordance with the requirements of Section 01015 – Prosecution and Progress.
PART 2 -- PRODUCTS
(NOT USED)

PART 3 -- EXECUTION
(NOT USED)

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PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Mobilization shall include the obtaining of all permits, moving equipment onto the site, furnishing and erecting temporary buildings and other construction facilities if required, fees, insurance, and bonds, all as required for the proper performance and completion of the Work. Mobilization shall include the following principal items:

1. Moving on to the site all of Contractor’s equipment, materials, tools, etc. required for operations
2. Arranging for and erection of Contractor’s work and storage area
3. Obtaining all required permits and licenses
4. Having all OSHA required notices and establishment of safety programs
5. Having the Contractor’s superintendent at the job site full time
6. All special scheduling necessary to complete the Work in an orderly manner
7. Moving materials, equipment, tools, and labor throughout the project site due to space restrictions

B. Demobilization shall include the removal of personnel, equipment, supplies, and incidentals from the Project site; the removal of all buildings and other facilities that were necessary for work on the Project; and the performance of other work or costs incurred after acceptable completion of construction operations on the Project.

1.02 PAYMENT FOR MOBILIZATION AND DEMOBILIZATION

A. The Contractor’s attention is directed to the condition that no payment for mobilization or any part thereof will be approved for payment under the Contract until all mobilization items previously listed herein have been completed as specified.

B. As soon as practicable after receipt of the Notice to Proceed, the Contractor shall submit a breakdown to the Engineer for approval, which shall show the estimated value of each major component of standard mobilization.

C. The lump sum price bid for mobilization and demobilization shall be limited to 5 percent of the total Contract amount. Any amount that exceeds 5 percent of the total Contract amount shall be included with other items of the Work.
D. Partial payment for mobilization and demobilization shall be made on the following basis:

1. Mobilization shall constitute 70 percent of the total lump sum bid for Bid Item No. 1 – Mobilization and Demobilization. Partial payments will be made in two equal or approximately equal payments as follows:
   a. The first payment will be made on the first Application for Payment as long as the work performed to date on other Contract pay items exceeds $25,000.00.
   b. The second payment will be made on the first Application for Payment after the Contractor has earned five (5) percent or more of the total Contract amount for other pay items. Both payments will be simultaneously made when the requirements listed in both Article 1.02, Paragraph D, Item 1, Sub-paragraphs a and b are met at the same time.

2. Demobilization shall constitute 30 percent of the total lump sum bid for Bid Item No. 1 – Mobilization and Demobilization. Payment for demobilization will only be authorized after Final Acceptance of the Project.

E. Partial payment for bonds, insurance, and permit fees is not subject to the limitations previously specified herein.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

- END OF SECTION -
1.01 THE REQUIREMENT

A. The Contractor shall provide temporary light and power, water, and sanitary facilities as required for his operations at the Project site. The temporary services shall be provided for use throughout the construction period.

B. The Contractor shall coordinate and install all temporary services in accordance with the requirements of the utility companies having jurisdiction and as required by applicable codes and regulations. All temporary systems shall comply with and meet the approval of the local authorities having jurisdiction.

C. At the completion of the work, or when the temporary services are no longer required, the facilities shall be restored to their original conditions.

D. All costs in connection with the temporary services including, but not limited to, installation, utility company service charges, maintenance, relocation, and removal shall be borne by the Contractor at no additional cost to the Owner.

E. Some temporary facilities that may be required may be indicated on the Drawings; however, the Drawings do not necessarily show any or all of the temporary facilities that the Contractor ultimately uses to complete the work.

F. At all times during performance of the Work, the Contractor shall be held entirely responsible for the security of all temporary utilities used for his operations at the Project site.

G. Temporary Light and Power

1. The temporary general lighting and small power requirements shall be serviced by 120/240 V, 1 phase, 3 wire temporary systems furnished and installed by the Contractor. This service shall be furnished complete with main disconnect, overcurrent protection, meter outlet, branch circuit breakers, and wiring as required; including branch circuit breakers and wiring as required for furnishing temporary power, all in accordance with the requirements of the servicing power company and applicable standards and codes. The meter for the temporary 120/240 V service for construction purposes shall be registered in the name of the Contractor and all energy charges for furnishing this temporary electric power shall be borne by the Contractor. Any Contractor with a need for power other than the 120/240 V, 1 phase, 3 wire shall provide such power at his own expense.

2. The Contractor shall make all necessary arrangements, and pay for all permits, inspections, and power company charges for all temporary service installations. All temporary systems shall comply with and meet the approval of the local authorities.
having jurisdiction. All temporary electrical systems shall consist of wiring, switches, necessary insulated supports, poles, fixtures, sockets, receptacles, lamps, guards, cutouts, and fuses as required to complete such installations. The Contractor shall furnish lamps and fuses for all temporary systems furnished by him and shall be responsible for replacing broken and burned out lamps, blown fuses, damaged wiring, etc. as required to maintain these systems in adequate and safe operating condition. All such temporary light and power systems shall be installed without interfering with the work of any other contractors working at the site of the Project at that time.

3. When it is necessary during the progress of construction that a temporary electrical facility installed under this Division interferes with construction operations, the Contractor shall relocate the temporary electrical facilities to maintain temporary power as required at no additional cost to the Owner. The Contractor shall be responsible at all times for any damage or injury to equipment, materials, or personnel caused by improperly protected, maintained, or installed temporary installations and equipment during performance of the Work.

4. The various subcontractors doing the work at the site shall be permitted to connect into the temporary general lighting system small hand tools, such as drills, hammers, and grinders, provided that:
   
   a. Equipment and tools are suitable for 120 V, 1 phase, 60 Hz operation and operating input does not exceed 1,500 volt-amperes.
   
   b. Tools are connected to outlets of the system with only one (1) unit connected to a single outlet.
   
   c. In case of overloading of circuits, the Contractor will restrict use of equipment and tools as required for correct loading.

5. The Contractor shall keep the temporary general lighting and power systems energized fifteen minutes before the time that the earliest trade starts in the morning and de-energized fifteen minutes after the time the latest trade stops. This applies to all weekdays, Monday through Friday, inclusive, which are established as regular working days.

6. Any Contractor requiring temporary light and power before or after the hours set forth hereinbefore, or on a Saturday, Sunday, or holiday, shall pay for the additional cost of keeping the system energized and repaired. If it is necessary for the Contractor or his employees to be in any structure after regular working hours and the temporary general lighting system is not required for illumination, that Contractor shall provide such illumination required by means of flashlights, electric lanterns, or other devices not requiring use of electricity from the temporary general lighting system.

7. Each subcontractor requiring additional power and lighting other than that specified herein (including power for temporary heating equipment to be provided by the Contractor) shall furnish his own service complete with all fuses, cutouts, wiring and other material and equipment necessary for a complete system between the service
point and the additional power consumers and shall install his own metering equipment in accordance with the requirements of the servicing power company.

8. Upon completion of the Work, but prior to acceptance by the Owner, the Contractor shall remove all temporary services, security lighting systems, temporary general lighting systems, and all temporary electrical work from the premises.

H. Temporary Sanitary Service

1. Sanitary conveniences, in sufficient numbers, for the use of all persons employed on the work and properly screened from public observation, shall be provided and maintained at suitable locations by the Contractor, all as prescribed by State Labor Regulations and local ordinances. The contents of same shall be removed and disposed of in a manner consistent with local and state regulations, as the occasion requires. Contractor shall rigorously prohibit the committing of nuisances within, on, or about the work. Sanitary facilities shall be removed from the site when no longer required.

I. Temporary Water

1. The Contractor shall provide temporary water for construction purposes, sanitary facilities, fire protection, cleaning, flushing, testing, etc. The Contractor shall make all arrangements for connections to the potable water system at the Project site. The Contractor shall comply with all requirements of the individual utility companies having local jurisdiction over the potable water system in the areas where the Project is located and as required by applicable codes and regulations, including requirements for backflow prevention.

2. The Contractor shall be responsible for contacting and coordinating with each individual utility company to obtain a fire hydrant meter for measuring the amount of water used during performance of the work. The Contractor shall pay all charges associated with the connection and all charges assessed by the utility companies for potable water used under this Contract.

3. The Contractor shall supply potable water for his employees either by portable containers or drinking fountains.

4. An adequate number of hose bibbs, hoses, and watertight barrels shall be provided for the distribution of water.

5. Water service shall be protected from freezing and the service shall be extended and relocated as necessary to meet temporary water requirements.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)
PART 1 -- GENERAL

1.01 SECTION INCLUDES
A. Working Around Existing Utilities

1.02 RELATED SECTIONS
A. Section 02200 – Earthwork

1.03 WORKING AROUND EXISTING UTILITIES

A. Gas lines for the transmission or distribution of natural, manufactured, or liquefied petroleum gas are dangerous to work around. Accidents can be caused by direct damage to these gas mains or service lines during construction or by settlement in the trenches or settlement of structures after construction is completed. The Contractor shall take every possible precaution to minimize the hazards of working in proximity to gas lines and shall be solely responsible for any damage to them or for any injury to persons or damage to property arising from or caused by his operations.

B. No excavation or other work shall be done by the Contractor within a gas pipeline right-of-way or within ten feet of a gas transmission line until the owner of the gas line has been notified not less than 48 hours in advance of such work and until the gas line has been exposed by the Contractor sufficiently to determine its exact horizontal and vertical location. In addition, the owner of the gas line shall be allowed to keep a qualified representative present while any construction work that could damage such line is being done. Methods of excavation specified by the owner of the utility must be adhered to by the Contractor.

C. Where work is to be done in areas served by medium- and low-pressure gas distribution systems, the owner of such system shall be notified by the Contractor not less than 24 hours in advance before such work is started, and such owner shall be given the opportunity to keep a representative present during this construction work or to locate and stake out all gas lines. In such case, the Contractor shall cooperate with the representative of the owner of the gas lines to avoid damage to them.

D. Should any gas main or service line or other gas facility be damaged during the construction Work, the following minimum precautions shall be taken by the Contractor:

1. Stop all construction work that could cause any further damage to the gas facilities or hazards to other personal property.

2. Give adequate warning to any persons who could be injured or owners of any property that could be damaged and take other necessary safety precautions.
3. Immediately notify the owner of the gas facility of the nature and location of such damage.

4. Permanent repairs shall be made by the owner of the gas facility or by the Contractor to the owner’s satisfaction and approval. Any repairs made by the Contractor shall be in accordance with ASME B31.8 “Gas Transmission and Distribution Piping Systems”, latest edition. The inspector or representative of the Engineer does not have the responsibility or authority to supervise or inspect repairs to damaged gas facilities.

E. No structure shall be constructed over or immediately adjacent to a gas pipeline or gas facility or within the gas line easement. Gas pipelines shall not pass through manholes or other sewer structures. When sanitary sewer lines cross over gas lines, the minimum cover, which is the vertical distance between the outside top and outside bottom of the two pipelines, shall be as specified by the owner of the gas line. In both cases, this cover space shall be carefully backfilled with thoroughly compacted selected material as required by the property owner. Where gas lines cross pipe trenches, the excavated space below such gas lines shall also be carefully backfilled with thoroughly compacted crushed stone.

F. Other utilities such as water lines, steam lines, electrical lines, telephone lines, television cable, and telegraph lines, whether overhead or underground, shall be carefully preserved by the Contractor.

G. In the event that interference with any existing utilities is imminent, the Contractor shall so notify the owner of the utility 48 hours in advance of any construction activities so that service may be relocated or otherwise preserved and protected.

H. The Contractor shall fully cooperate with the representative of the utility company to the extent necessary to satisfactorily accomplish the Work.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. Working Within the Rights-of-Way of Highways, Railways, or Streets

B. Special Construction

1.02 RELATED SECTIONS

A. Section 01570 – Traffic Regulation

B. Section 02200 – Earthwork

1.03 WORKING WITHIN THE RIGHTS-OF-WAY OF HIGHWAYS, RAILWAYS, OR STREETS

A. In the event a sewer or manhole to be replaced crosses, runs parallel to, or runs alongside any highway, county road, city street, or railroad right-of-way, the Contractor shall obtain a utility permit from the governing body affected. The Owner's utility permit provisions are printed below:

1. The applicant named hereon is responsible for adequately and properly protecting the public from loss or injury due to the work permitted. The following shall constitute proper protection:

   a. The applicant must comply with the Alabama Manual on Uniform Traffic Control Devices. All devices must be in place prior to start of construction and shall be properly maintained by applicant during construction.

   b. The applicant shall assume all liability, protect, and save harmless the Owner and its employees or agents from any and all claims originating from this work and from any and all liability or claims arising from its use or occupancy of said area covered in this revocable permit. Whenever any person or corporation making any excavation in the street, highway, or alley fails to backfill in the proper manner as required by these Specifications, then the local governing body shall cause the work to be done and the cost thereof shall be charged against the bond as required by these Specifications.

2. If the work contemplated requires a road to be temporarily closed, an inspection on the ground by the Engineer or his duly authorized representative will be necessary before a permit is issued.
3. Public or private service corporations shall furnish a map 8-1/2 inches by 11 inches or multiples thereof in duplicate showing location of utility to be installed. No map is required on individual services.

4. This permit may be revoked at any time by the Owner, either during the progress of the Work or at any time after the completion of the Work, if the provisions under which this permit was issued are not complied with or the provisions of any applicable ordinance are not complied with. The Contractor also agrees that he will remove any part or all of any installation made under this permit at no cost to the Owner if such removal is ordered by the Owner.

5. A bond, as required by the right-of-way owner and/or Plumbing, Gas, or Electrical Code, may be required of any applicant for a permit to excavate in any public easement or right-of-way.

6. The permit is limited to the interests and rights of the Owner in and to the area involved without warranty.

7. This permit, if granted, shall constitute an agreement and warranty on the applicant that all work required will be done in a good and workmanlike manner to be approved by the Owner and at the sole expense of the applicant. Where the valuation of any work proposed under this permit does not exceed $3,000.00, the work shall commence within thirty (30) calendar days, otherwise the permit shall become void.

8. The applicant shall be responsible for any and all drainage problems resulting from the work done hereto, shall be obligated to promptly complete the work in the area covered by this permit subject to the approval of the Engineer, and shall restore the land and easements in as good of a condition as before the work was commenced.

9. All excavations shall be as small in area as practical. Ditches shall be neatly cut with the sides kept vertical. Ample shoring shall be furnished and maintained where necessary. Material for backfilling shall be placed in six (6)-inch horizontal layers. Each layer shall be carefully tamped until completely compacted before adding the next layer. Incompressible backfill material (sand, slag, crushed stone, or gravel) will be required in all cuts that are made in pavement. In addition, permanent patch of a minimum of two (2) inches of plant mix will be required immediately after backfilling is completed. If municipality requires more than two (2) inches of plant mix, Contractor shall provide additional plant mix at no additional cost to the Owner. In cuts that are within three (3) feet of the edge of pavement, if, in the opinion of the Engineer, the excavated materials are unsuitable for tamping, suitable materials shall be provided by the Contractor to backfill, and all unsuitable material shall be disposed of by the Contractor. Upon completion of backfilling, trenches shall be inspected by the Engineer before the workmen leave the job. At least 24 hours notice shall be given to the Engineer prior to the time such inspection is desired. In all cuts made in concrete, the applicant shall backfill as provided above and shall repair or replace with new concrete of the same thickness as that of the existing concrete, but not less than four (4) inches minimum thickness.
10. This utility permit must be kept on the job while work is in progress.

1.04 SPECIAL CONSTRUCTION

A. Where the Work requires special stream or railroad crossings or any other extraordinary conditions, or where alternate types of construction are used that are not covered by these Specifications, the materials and construction methods shall be as shown on the Drawings and as specified in the Special Conditions.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION –
SECTION 01530
PROTECTION OF EXISTING FACILITIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this Contract. Any damage or injury occurring on account of any act, omission, or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

B. Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, his employees. In the event of the Contractor’s failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.

C. In the event of any claims for damage or alleged damage to property as a result of work under this Contract, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 PROTECTION OF WORK AND MATERIAL

A. During the progress of the Work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.

B. All work and materials shall be protected against damage, injury, or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the Engineer.

1.03 BARRICADES, WARNING SIGNS, AND LIGHTS

A. Contractor shall provide, erect, and maintain as necessary, strong and suitable barricades, danger signs, and warning lights along all roads accessible to the public, as required by the authority having jurisdiction, to ensure safety to the public. All barricades and obstructions
along public roads shall be illuminated at night, and all lights for this purpose shall be kept burning from sunset to sunrise.

B. Contractor shall provide and maintain such other warning signs, lights, and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work, the Owner’s operating personnel, or those visiting the site.

1.04 EXISTING UTILITIES AND STRUCTURES

A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.

B. Where existing utilities and structures are indicated on the Drawings, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

C. Prior to beginning any excavation work, the Contractor shall, through field investigations, determine any conflicts or interferences between existing utilities and new utilities to be constructed under this project. This determination shall be based on the actual locations, elevations, slopes, etc., of existing utilities as determined in the field investigations, and locations, elevation, slope, etc. of new utilities as shown on the Drawings. If an interference exists, the Contractor shall bring it to the attention of the Engineer as soon as possible. If the Engineer agrees that an interference exists, he shall modify the design as required. Additional costs to the Contractor for this change shall be processed through a Change Order as detailed elsewhere in these Contract Documents. In the event the Contractor fails to bring a potential conflict or interference to the attention of the Engineer prior to beginning excavation work, any actual conflict or interference which does arise during the Project shall be corrected by the Contractor, as directed by the Engineer, at no additional expense to the Owner.

D. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to insure uninterrupted service. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

E. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such appurtenance shall be given by the Contractor. All such work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at his discretion, have the respective authority to provide
such support or protection as may be necessary to insure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. This Section covers the demolition, removal, and disposal of existing structures, pavement, curbs, sidewalk, manholes, and piping and removal and disposal of asbestos materials required during performance of the Work as indicated on the Drawings and as specified hereinafter. The Contractor shall furnish all labor, materials, and equipment to demolish structures and to remove anchors, supports, piping, and accessories designated to be removed on the Drawings or as directed by the Engineer.

1.02 TITLE TO EQUIPMENT AND MATERIALS

A. Contractor shall have no right or title to any of the equipment, materials, or other items to be removed from the Project site unless and until said equipment, materials, and other items have been removed from the premises. The Contractor shall not sell or assign, or attempt to sell or assign any interest in, the said equipment, materials, or other items until the said equipment, materials, or other items have been removed.

B. Contractor shall have no claim against the Owner because of the absence of such materials.

1.03 CONDITION OF STRUCTURES AND EQUIPMENT

A. The Owner does not assume responsibility for the actual condition of structures and equipment to be demolished and removed.

B. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner so far as practicable.

C. The information regarding the existing structures and equipment shown on the Drawings is based on visual inspection and a walk-through survey only. Neither the Engineer nor the Owner will be responsible for interpretations or conclusions drawn therefrom by the Contractor.

PART 2 -- PRODUCTS

(NOT USED)
PART 3 -- EXECUTION

3.01 DEMOLITION AND REMOVALS

A. The removal of all equipment and all materials from the demolition of structures shall, when released by the Owner and Engineer, be performed by the Contractor, and these items shall become the Contractor’s property, unless otherwise noted, for disposition in any manner not contrary to the Contract requirements and shall be removed from the site to the Contractor’s own place of disposal.

B. The Contractor shall proceed with the removal of the equipment, materials, and appurtenances from the demolished structures and the structures themselves, or portions thereof, in a sequence designed to maintain the sanitary sewer collection system in continuous operation as described in Section 02600 – Wastewater Flow Control, and shall proceed only after approval of the Engineer.

C. Any equipment, piping, and appurtenances removed without proper authorization which are necessary for the operation of the existing sanitary sewer collection system shall be replaced to the satisfaction of the Engineer at no cost to the Owner.

D. Excavation caused by demolitions shall be backfilled with fill free from rubbish and debris.

3.02 PROTECTION

A. Demolition and removal work shall be performed by competent experienced workmen for the various type of demolition and removal work and shall be carried out through to completion with due regard to the safety of Owner employees, workmen onsite, and the public. The work shall be performed with as little nuisance as possible.

B. The work shall comply with the applicable provisions and recommendation of ANSI A10.2, Safety Code for Building Construction, all governing codes, and as hereinafter specified.

C. The Contractor shall make such investigations, explorations, and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal. The Contractor shall give particular attention to shoring and bracing requirements so as to prevent any damage to new or existing construction.

D. The Contractor shall provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs, and other items as required for proper protection of the public, workmen engaged in demolition operations, and adjacent construction.

E. The Contractor shall provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.

F. The Contractor shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal, and new work is being done, connections made, materials handled, or equipment moved.
G. The Contractor shall take necessary precautions to prevent dust from rising by wetting demolished masonry, concrete, plaster, and similar debris.

H. The Contractor shall provide adequate fire protection in accordance with local Fire Department requirements.

I. The Contractor shall not close or obstruct walkways, passageways, or stairways and shall not store or place materials in passageways, stairs, or other means of egress. The Contractor shall conduct operations with minimum traffic interference.

J. The Contractor shall be responsible for any damage to the existing structure or contents by reason of the insufficiency of protection provided.

3.03 WORKMANSHIP

A. The demolition and removal work shall be performed as described in the Contract Documents. The work required shall be done with care, and shall include all required shoring, bracing, etc. The Contractor shall be responsible for any damage which may be caused by demolition and removal work to any part or parts of existing structures or items designated for reuse or to remain. The Contractor shall perform patching, restoration, and new work in accordance with applicable Technical Sections of the Specifications and in accordance with the details shown on the Drawings. Prior to starting of work, the Contractor shall provide a detailed description of methods and equipment to be used for each operation and the sequence thereof for review by the Engineer.

B. All openings in concrete shall be closed in a manner meeting the requirements of the appropriate Sections of these Specifications, as shown on the Drawings, and as directed and approved by the Engineer.

C. Materials or items designated to remain the property of the Owner shall be as hereinafter tabulated. Such items shall be removed with care and stored at a location to be designated by the Owner.

D. Material or items damaged during removal shall be replaced with similar new material or items. Any equipment that is removed without proper authorization and is required for sanitary sewer collection system operation shall be replaced at no cost to the Owner.

E. Materials or items demolished and not designated to become the property of the Owner or to be reinstalled shall become the property of the Contractor and shall be removed from the property and legally disposed of.

F. The Contractor shall execute the work in a careful and orderly manner, with the least possible disturbance to the public.

G. In general, masonry shall be demolished in small sections, and where necessary to prevent collapse of any construction, the Contractor shall install temporary shores, struts, and bracing.

H. Where alterations occur, or new and old work join, the Contractor shall cut, remove, patch, repair, or refinish the adjacent surfaces to the extent required by the construction conditions,
so as to leave the altered work in as good a condition as existed prior to the start of the work. The materials and workmanship employed in the alterations, unless otherwise shown on the Drawings or specified, shall comply with that of the various respective trades which normally perform the particular items or work.

I. The Contractor shall finish adjacent existing surfaces to new work to match the specified finish for new work. The Contractor shall clean existing surfaces of dirt, grease, loose paint, etc., before refinishing.

J. The Contractor shall cut out embedded anchorage and attachment items as required to properly provide for patching and repair of the respective finishes.

K. The Contractor shall remove temporary work, such as enclosures, signs, guards, and the like when such temporary work is no longer required or when directed at the completion of the work.

3.04 MAINTENANCE

A. The Contractor shall maintain the structures and public properties free from accumulations of waste, debris, and rubbish caused by the demolition and removal operations.

B. The Contractor shall provide on-site dump containers for collection of waste materials, debris, and rubbish, and he shall wet down dry materials to lay down and prevent blowing dust.

C. At reasonable intervals during the progress of the demolition and removal work or as directed by the Engineer, the Contractor shall clean the site and properties, and dispose of waste materials, debris, and rubbish.

3.05 EQUIPMENT AND MATERIALS TO BE RETAINED BY OWNER

A. The following equipment and materials will be retained by the Owner:

   1. All manhole frames and covers removed by the Contractor but not reinstalled

B. The previously-listed equipment and materials shall be moved by the Contractor to storage areas to be designated by the Owner.

- END OF SECTION -
SECTION 01550
SITE ACCESS AND STORAGE

PART 1 -- GENERAL

1.01  THE REQUIREMENT

A.  Access Roads

1.  The Contractor shall construct and maintain such temporary access roads as required to perform the work of this Contract.

2.  Access roads shall be located within the property lines or existing permanent easements of the Owner unless the Contractor independently secures easements for his use and convenience. Contractor shall submit written documentation to the Engineer for any Contractor-secured easements across privately-held property. Easement agreement shall specify terms and conditions of use and provisions for site restoration. A written release from the property owner certifying that all terms of the easement agreement have been completed by the Contractor shall be furnished to the Engineer prior to final payment.

3.  Existing access roads used by the Contractor shall be suitably maintained by the Contractor at his expense during construction. Contractor shall not be permitted to restrict Owner access to existing facilities. Engineer may direct Contractor to perform maintenance of existing access roads when Engineer determines that such work is required to insure all-weather access by the Owner.

4.  The Contractor shall obtain and pay all costs associated with any bonds required by the Alabama Department of Transportation for the use of State-maintained roads.

B.  Parking Areas

1.  The Contractor shall be responsible for constructing and maintaining suitable parking areas for his construction personnel on the Project site where approved by the Engineer and the Owner.

C.  Restoration

1.  At the completion of the Work, the surfaces of land used for access roads and parking areas shall be restored by Contractor to its original condition and to the satisfaction of the Engineer. At a minimum, such restoration shall include establishment of a permanent ground cover adequate to restrain erosion for all disturbed areas.

D.  Traffic Regulations
1. Contractor shall obey all traffic laws and comply with all the requirements, rules, and regulations of the Alabama Department of Transportation and other local authorities having jurisdiction to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways.

E. Storage of Equipment and Materials

1. Contractor shall store his equipment and materials at the Project site in accordance with the requirements of the General Conditions, the Special Conditions, and as hereinafter specified. All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the Owner or Engineer, and in conformity to applicable statutes, ordinances, regulations, and rulings of the public authority having jurisdiction.

2. Contractor shall enforce the instructions of Owner and Engineer regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.

3. Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property.

4. Contractor shall not store unnecessary materials or equipment on the Project site, and shall take care to prevent any structure from being loaded with a weight which will endanger its security or the safety of persons.

5. Materials shall not be placed within ten (10) feet of fire hydrants. Gutters, drainage channels, and inlets shall be kept unobstructed at all times.

6. Contractor shall provide adequate temporary storage buildings/facilities, if required, to protect materials or equipment on the job site.

7. At all times during performance of the Work, Contractor shall be held entirely responsible for the security of all Contractor-provided equipment, materials, etc. being temporarily stored or staged.

PART 2 -- PRODUCTS
(NOT USED)

PART 3 -- EXECUTION
(NOT USED)

- END OF SECTION -
SECTION 01560
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Dust Control

1. Contractor shall take all necessary measures to control dust from his operations and to prevent spillage of excavated materials on public roads.

2. Contractor shall remove all spillage of excavated materials, debris, or dust from public roads by methods approved by the Engineer.

3. Contractor shall sprinkle water at locations and in such quantities and at such frequencies as may be required by the Engineer to control dust and prevent it from becoming a nuisance to the surrounding area.

4. Dust control and cleaning measures shall be provided at no additional cost to the Owner.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
SECTION 01570
TRAFFIC REGULATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Work may require traffic control plans to protect the public and the Contractor’s work force. The Contractor shall be responsible for contacting any and all agencies for stipulations regarding traffic control measures and shall be responsible for the development and submission to the proper authorities of any required traffic control plans. The Contractor shall be responsible for furnishing, operating, maintaining, moving, and relocating all required construction traffic control devices including, but not limited to, stationary construction signs for advance warning and detours, Type III barricades, portable temporary traffic control devices, flashing arrow panels, and lights that may be required as a condition of Federal, state, or local requirements.

1.02 RELATED SECTIONS

A. Section 01010 – Summary of Work
B. Section 01015 – Prosecution and Progress
C. Section 01560 – Temporary Environmental Controls
D. Section 02575 – Pavement Repair

1.03 SUBMITTALS

A. For all construction that may affect the flow of traffic, the Contractor shall submit a detailed Traffic Control Plan to the appropriate municipality(-ies) and entity(-ies) having jurisdiction over the specific street, road, or highway where the traffic control and regulation will occur for review and approval. The Contractor shall also submit all Traffic Control Plans to the Engineer and Owner for their review and records in accordance with Section 01300 – Submittals. Traffic Control Plan shall include:

1. Identification and location of all signage, cones, lights, barriers, flow of traffic arrows, flagmen, confirmation that all devices are visible, duration of traffic disruption, detours, driveway blocking, etc.

2. Outline of permit acquisition procedure for lane closures

3. Methods for proper signing and barricades in compliance with local requirements and the Owner’s requirements

4. Contractor’s emergency phone numbers
B. All Traffic Control Plans for work located within the City of Birmingham must be sealed by a Professional Engineer registered in the State of Alabama if the Plans include the closing or detouring of any roadways. Contractor shall be responsible for determining if any other municipalities in which the Work occurs will require that Traffic Control Plans for work located within their municipality must be sealed by a Professional Engineer registered in the State of Alabama.

PART 2 -- PRODUCTS

2.01 CONSTRUCTION TRAFFIC CONTROL DEVICES

A. **Description**: The work covered by this Section consists of furnishing, erecting, maintaining, relocating, and removing traffic control devices in accordance with the Specifications, MUTCD, or as required by local jurisdictions and/or as directed by the Engineer. The MUTCD referred to in this provision shall be the current edition of the Manual on Uniform Traffic Control Devices for Streets and Highways, as prepared by the National Advisory Committee on Uniform Traffic Control Devices, including all standard documents referred to in the second paragraph of Section 1A-7 of the MUTCD. The current edition shall be the edition current on the date of advertisement for the Project. All traffic control devices furnished by the Contractor shall remain the property of the Contractor, unless otherwise required by the Contract. Traffic control devices shall include, but not be limited to signs, non-metallic drums, barricades, cones, delineators, temporary guardrail, temporary pavement marking, raised reflective pavement markers, flaggers, and pilot vehicles, as required.

B. **Materials**: Unless otherwise required, materials used in the fabrication and installation of construction traffic control devices shall be in accordance with applicable provisions of the MUTCD. When traffic control devices are no longer required for traffic handling in the initial phase of construction requiring their use, they may be reused at various locations throughout the Project provided the device is not defaced, is structurally sound, clean, and otherwise conforms to the above requirements.

C. Traffic control devices which do not meet the requirements of this Section shall not be used. When during the life of the Project, a device ceases to meet the requirements of this Section, it shall be promptly removed and replaced with a conforming device at no additional compensation. The Engineer shall have the authority to determine the acceptability of the traffic control devices.

D. **Construction Methods**: Traffic control devices shall be installed at the inception of construction operations and shall be properly maintained, relocated as necessary, cleaned, and operated during the time they are in use. They shall remain in place only as long as they are needed and shall be immediately removed thereafter. Where operations are performed in stages, only those devices that apply to the conditions present shall be left in place.

E. The location, legends, sheeting, dimensions, number of supports, and horizontal and vertical placement of warning signs, barricades, and other traffic control devices shall be as required by the MUTCD or as directed by the Engineer. During periods when not warranted, warning signs and other devices shall be removed from the work area,
covered with specified material, or otherwise positioned so they do not convey their message to the traveling public. If covered, the covering material shall be exterior plywood and shall cover the entire face of the sign panel. The covering material shall be installed in such a manner that the sign panel will not be defaced. Covering material shall be maintained in a neat and workmanlike manner during its use.

F. Weeds, brush, trees, construction materials, equipment, etc., shall not be allowed to obscure any traffic control device in use.

G. If cones are used for delineation at night, each cone shall have an appropriate white reflectorized cone collar as required by the MUTCD or as directed by the Engineer.

H. Competent and properly trained flaggers, properly attired and equipped, shall be provided when directed by the Engineer or when the Contractor deems it necessary to safely handle traffic through the construction area.

I. The Contractor shall assume full responsibility for the continuous and expeditious maintenance of all construction warning signs, barricades, and other traffic control devices. Maintenance shall include repair and replacement of traffic control devices which, in the opinion of the Engineer, are damaged by traffic or other means, or deteriorated beyond effectiveness. Conditions covered under maintenance shall include, but not be limited to, replacement due to loss of reflectivity; replacement of broken supports; plumbing of leaning signs; cleaning of dirty signs, barricades, and other devices; repair of defaced sheeting and legend; and replacement of stolen or vandalized items. All items used for traffic control shall be maintained in a satisfactory condition. Failure to maintain all traffic control devices in a satisfactory condition may be cause for suspension of construction operations until proper traffic control is re-established.

J. The Contractor shall continuously review and maintain all traffic handling measures to assure that adequate provisions have been made for the safety of the public and workers.

2.02 STATIONARY CONSTRUCTION SIGNS

A. Description: The work covered by this Section consists of furnishing, erecting, relocating, maintaining, and removing stationary signs necessary for controlling traffic in accordance with the Specifications, MUTCD, or as required by local jurisdictions and/or as directed by the Engineer.

B. Materials: Reflective sheeting shall be used on all sign facing and shall meet the requirements of AASHTO M268. The reflective sheeting shall be enclosed lens (engineer’s grade) sheeting and shall have a smooth, sealed outer surface which will display the same color both day and night. The reflective sheeting on each sign shall have a smooth appearance. The reflective sheeting shall be applied in a workmanlike manner so that there are no bubbles or wrinkles in the material.

1. The Contractor shall furnish a material certification in accordance with the ALDOT Standard Specifications for Highway Construction, latest edition, for all new and used reflective sheeting as required by the Engineer.
C. **Construction Methods**: All work shall be in accordance with requirements of Article 2.01 herein.

2.03 **TYPE III BARRICADES**

A. **Description**: The work covered by this Section consists of furnishing, erecting, maintaining, and removing Type III Barricades in accordance with the Specifications, MUTCD, or as required by local jurisdictions and/or as directed by the Engineer.

B. **Construction Methods**: All work shall be in accordance with requirements of Article 2.01 herein.

2.04 **PORTABLE TEMPORARY TRAFFIC CONTROL DEVICES**

A. **Description**: The work covered by this Section consists of furnishing erecting, relocating, maintaining, and removing portable temporary traffic control devices necessary for controlling traffic in accordance with the Specifications, MUTCD, or as required by local jurisdictions and/or as directed by the Engineer. Portable temporary traffic control devices shall include but not be limited to portable signs, non-metallic drums, barricades, cones, delineators, flaggers, pilot vehicles, and any other traffic control device not covered by any other Sections included in this Contract.

B. **Portable Signs**: Reflective sheeting shall be used on all sign facing and shall meet the requirement of AASHTO M268. The reflective sheeting shall be enclosed lens (engineer’s grade) sheeting and shall have a smooth, sealed outer surface which will display the same color both day and night. The reflective sheeting on each sign shall have a smooth appearance. The reflective sheeting shall be applied in a workmanlike manner so that there are no bubbles or wrinkles in the material.

1. The Contractor shall furnish a material certification in accordance with the ALDOT Standard Specifications for Highway Construction, latest edition, for all new and used reflective sheeting as required by the Engineer.

C. **Non-Metallic Drums**: The drums shall be made of plastic impact resistant material. The drums shall have a two-piece, breakaway design that will maintain its integrity upon impact throughout a temperature range of –20°F to 125°F. Upon impact, the upper portion of the drum shall deform and breakaway from the base, minimizing damage to drums or vehicles. The base and ballast shall remain in position and vehicle shall easily pass over it.

1. The drums shall be designed to have two Type "A" or "C" light wells located on the top surface of the drums. The drums shall be designed with a top to completely seal the drums to prevent water from accumulating and freezing in the bottom of the drums. The base shall be designed to accommodate a sandbag of 40 lbs. to 60 lbs. A sandbag with 50 lbs. of sand shall be supplied with each drum.

2. The drums shall have an assembled minimum height of 36 inches, a minimum outside base diameter of 21 inches, and a combined minimum weight of 12 lbs.
3. The Contractor shall be required to furnish the Engineer a sample drum and its specifications for approval prior to the delivery of drums for the Project.

4. The markings on drums shall be horizontal, circumferential, orange and white stripes six to eight inches wide, covering entire outside. The entire area of orange and white shall be reflectorized with the enclosed lens (engineer’s grade) sheeting, except for the corrugation area where a 2-inch non-reflectorized band will be allowed. There shall be at least two orange and two white stripes on each drum. Reflectorized material shall have a smooth, sealed outer surface which shall display the same approximate color day and night. The reflective sheeting shall meet the requirements of AASHTO M268.

D. Construction Methods: All work shall be in accordance with the requirements of Article 2.01 herein.

2.05 FLASHING ARROW PANELS

A. Description: The work covered by this Section consists of furnishing, maintaining, moving, and relocating flashing arrow panels mounted on a trailer, truck, or other mobile unit in accordance with the Specifications, MUTCD, or as required by local jurisdictions and/or as directed by the Engineer.

B. Materials: The flashing arrow panels shall meet the requirements of the MUTCD (Section 6E) for a Type A panel.

C. Construction Methods: All work shall be in accordance with the requirements of Article 2.01 herein.

D. During periods of time that traffic is shifted from its normal pattern, a mobile flashing arrow panel shall be used at locations directed by the Engineer.

PART 3 -- EXECUTION

3.01 CONSTRUCTION PARKING CONTROL

A. The Contractor shall control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner’s operations.

B. The Contractor shall monitor parking of construction personnel’s vehicles in existing facilities and maintain vehicular access to and through parking areas.

C. The Contractor shall prevent parking on or adjacent to access roads or in non-designated areas.

3.02 MAINTENANCE OF TRAFFIC

A. Whenever and wherever, in the Engineer’s opinion, traffic is sufficiently congested or public safety is endangered, the Contractor shall furnish uniformed officers to direct traffic and to keep traffic off the highway area(s) affected by construction operations.
B. When the Contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of Work that is otherwise provided for in the Contract Drawings and Specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to safely accommodate traffic. The Contractor shall furnish, erect, and maintain barricades, warning signs, flagmen, and other traffic control devices in conformance with the latest edition of the MUTCD, unless otherwise specified herein. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary to ingress to and egress from abutting property or intersecting roads, streets, or highways. The Contractor shall maintain traffic in accordance with his approved Traffic Control Plan.

C. The Contractor shall make his own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of traffic as specified in this Section.

3.03 UNIFORMED POLICE OFFICER FOR TRAFFIC CONTROL

A. Police officers shall be placed solely by direction of the Engineer, and their usage shall be approved by the Engineer in writing in advance of the work for which the police officer will be performing traffic control.

B. Officers shall be currently employed by a local jurisdiction, be in full uniform, and have full arrest power while working.

C. Officers shall be employed by and paid by the Contractor.

D. It shall be the responsibility of the officer(s) to assist in the direction of traffic within the construction site.

3.04 FLAGMEN

A. The Contractor shall provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.05 FLASHING LIGHTS

A. The Contractor shall use flashing lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.06 HAUL ROUTES

A. The Contractor shall consult with authorities and establish public thoroughfares to be used for haul routes and site access.

B. The Contractor shall confine construction traffic to designated haul routes.

C. The Contractor shall provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.
3.07 ROAD CLOSURES ON COUNTY ROADS

A. No street, road, or highway shall be closed without the permission of the appropriate municipality(-ies) and entity(-ies) having jurisdiction over the specific street, road, or highway to be closed and also the fire department having jurisdiction. Prior to closing a specific street, road, or highway, signs forewarning of the imminent closing shall be posted for a minimum of seven (7) days prior to the actual closing. The appropriate municipality(-ies) and entity(-ies) having jurisdiction over the specific street, road, or highway shall determine the information to be placed upon the signs by the Contractor. Where traffic is diverted around construction work, the Contractor shall provide all materials and perform all work for the construction and maintenance of all required temporary roadways, structures, barricades, signs, and signalization.

B. To obtain approval to close a street or road, the Contractor must proceed as follows:

1. The Contractor must obtain approval of his Traffic Control Plan from the appropriate municipality(-ies) and entity(-ies) having jurisdiction. The Traffic Control Plan must be in accordance with the MUTCD.

2. The Contractor must obtain a utility permit.

3. The Contractor must apply in writing to the appropriate municipality(-ies) and entity(-ies) having jurisdiction for approval to close the street or road on a specific date.

4. The Contractor must obtain approval from the appropriate municipality(-ies) and entity(-ies) having jurisdiction over the specific street or road to be closed before posting closure signs. Signs must be posted for seven (7) days prior to the first day of closure.

5. Emergency road closures shall be handled by the Contractor.

C. Unless otherwise approved by the appropriate municipality(-ies) and entity(-ies) having jurisdiction over a specific street or road that was closed for a pipeline or manhole replacement, Contractor shall perform temporary pavement repairs in accordance with Section 02575 – Pavement Repair at the conclusion of each workday so the street or road that was closed is completely open to and passable by public traffic during times and days that are not included in the normal time of work as specified in Section 01015 – Prosecution and Progress.

3.08 BARRICADES AND WARNING SIGNS

A. The Contractor shall furnish, erect, and maintain all barricades and warning signs for hazards necessary to protect the public and the construction work. When used during periods of darkness, such barricades, warning signs, and hazard markings shall be suitably illuminated or reflectorized.

B. For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain
barricades, warning signs, lights, and other traffic control devices in conformity with the latest edition of the MUTCD.

C. The Contractor shall furnish and erect all barricades and warning signs for hazards prior to commencing work which requires such erection and shall maintain the barricades and warning signs for hazards until their dismantling is directed by the Engineer.

3.09 REMOVAL

A. The Contractor shall remove equipment and devices when no longer required and shall repair damage caused by installation.

-END OF SECTION -
PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. Quality Assurance

B. Submittals

C. Sign Material

D. Project Informational Signs

E. Installation

F. Maintenance

G. Removal

1.02 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Section 01300 – Submittals

C. Section 01560 – Temporary Environmental Controls

D. Section 01570 – Traffic Regulation

1.03 QUALITY ASSURANCE

A. All signs and structures shall be designed to withstand a wind velocity of 60 miles per hour.

B. Sign painters shall have a minimum of 3 years of experience.

C. Sign finishes shall be adequate to withstand weathering, fading, and chipping for the duration of construction.

1.04 SUBMITTALS

A. The Contractor shall submit sign layout showing content, lettering, color, foundation, structure, sizes, and grades of members.
PART 2 -- PRODUCTS

2.01 SIGN MATERIAL

A. Structure and framing shall be structurally adequate.

B. Sign surfaces shall be exterior grade plywood with medium density overlay, minimum 3/4-inch thick. Standard large sizes shall be used to minimize joints.

C. Rough hardware shall be galvanized.

D. Paint and primers shall be of exterior quality, with two coats and sign background of selected color.

E. Lettering shall be exterior quality paint with contrasting colors.

2.02 PROJECT INFORMATIONAL SIGNS

A. Lettering and colors of painted informational signs shall be in accordance with Series C of Standard Alphabet for Highway Signs. Lettering shall be sized to provide legibility at a distance of 100 feet.

B. The Contractor shall provide directional signs to direct traffic into and around the site. Signs shall be relocated as required by the progress of the Work.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. The Contractor shall erect supports and framing on a secure foundation, rigidly braced and framed to resist wind loadings.

B. The Contractor shall install sign surface plumb and level, with butt joints.

C. The Contractor shall paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. The Contractor shall clean and maintain signs and supports and repair deterioration and damage.

3.03 REMOVAL

A. The Contractor shall remove signs, framing, supports, and foundations at the completion of the Project and shall restore the area to original or better condition.

- END OF SECTION -
PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish and Install

1. Where the words "furnish", "provide", "supply", "replace", or "install" are used, whether singularly or in combination, they shall mean to furnish and install, unless specifically stated otherwise.

2. In the interest of brevity, the explicit direction "to furnish and install" has sometimes been omitted in specifying materials and/or equipment herein. Unless specifically noted otherwise, it shall be understood that all equipment and/or materials specified or shown on the Drawings shall be furnished and installed under the Contract as designated on the Drawings.

1.02 MATERIALS AND EQUIPMENT

A. All equipment, materials, or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents. Equipment and materials to be incorporated into the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.

B. The Contractor shall protect all equipment and materials from deterioration and damage, including provisions for temporary storage buildings as needed and as specified in Section 01550 – Site Access and Storage. Storage of equipment and materials shall be in locations completely protected from flooding, standing water, excessive dust, falling rock, brush fire, etc. Storage areas shall be located sufficiently distant from all construction activities and the movement of construction vehicles to minimize the potential for accidental damage. Any equipment or materials of whatever kind which may have become damaged or deteriorated from any cause shall be removed and replaced by good and satisfactory items at the Contractor's expense for both labor and materials.

1.03 INSTALLATION OF MATERIALS AND EQUIPMENT

A. Materials and equipment shall be installed in accordance with the requirements of the General Conditions, Special Conditions, and the respective Specification Sections.

1.04 SUBSTITUTIONS

A. Requests for substitutions of equipment or materials shall conform to the requirements of the General Conditions, Special Conditions, and as hereinafter specified.
1. Contractor shall submit for each proposed substitution sufficient details, complete
descriptive literature and performance data together with samples of the materials,
where feasible, to enable the Owner and Engineer to determine if the proposed
substitution is equal.

2. Contractor shall submit certified tests, where applicable, by an independent
laboratory attesting that the proposed substitution is equal.

3. A list of installations where the proposed substitution is equal.

4. Requests for substitutions shall include full information concerning differences in
cost, and any savings in cost resulting from such substitutions shall be passed on to
the Owner.

B. Where the approval of a substitution requires revision or redesign of any part of the work,
including that of other Contracts, all such revision and redesign, and all new drawings and
details therefore, shall be provided by the Contractor at his own cost and expense, and shall
be subject to the approval of the Owner and Engineer.

C. In the event that the Engineer is required to provide additional engineering services, then
the Engineer's charges for such additional services shall be charged to the Contractor by
the Owner in accordance with the requirements of the General Conditions, and the Special
Conditions.

D. In all cases the Owner and Engineer shall be the judge as to whether a proposed
substitution is to be approved. The Contractor shall abide by their decision when proposed
substitute items are judged to be unacceptable and shall in such instances furnish the item
specified or indicated. No substitute items shall be used in the work without written approval
of the Owner and Engineer.

E. Contractor shall have and make no claim for an extension of time or for damages by reason
of the time taken by the Engineer in considering a substitution proposed by the Contractor
or by reason of the failure of the Engineer to approve a substitution proposed by the
Contractor.

F. Acceptance of any proposed substitution shall in no way release the Contractor from any of
the provisions of the Contract Documents.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

END OF SECTION -
SECTION 01700

CONTRACT CLOSEOUT

PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. Contractor's Responsibility for the Work
B. Closeout Procedures
C. Contract Completion
D. Contractor's Advertisement of Completion
E. Project Record Documents
F. Final Cleaning

1.02 RELATED SECTIONS

A. Section 01740 – Warranties

1.03 CONTRACTOR’S RESPONSIBILITY FOR THE WORK

A. Until Final Acceptance by the Engineer as provided for in these Specifications, the Work shall be under the charge and care of the Contractor, and he shall take every necessary precaution to prevent injury or damage to the Work or any part thereof by the action of the elements or from any other cause whatsoever, whether arising from the execution or from the non-execution of the Work. The Contractor shall rebuild, repair, restore, and make good, at his own expense, all injuries or damage to any portion of the Work occasioned by any of the causes previously named herein before acceptance.

1.04 CLOSEOUT PROCEDURES

A. The Contractor shall submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work has been completed in accordance with the Contract Documents and ready for the Engineer's review.

B. The Contractor shall provide submittals to the Engineer as required by governing or other authorities.

C. The Contractor shall submit a statement of final accounting of MBE/DBE participation for the completed project, in conformance with the Owner's MBE/DBE Program.

D. The Contractor shall submit final Application for Payment.
1.05 CONTRACT COMPLETION

A. The Contract will be considered fulfilled, except as provided in any bond or by law, and the warranty specified in individual sections when all the Work has been completed, the final inspection made, and Final Acceptance and final payment have been made by the Owner.

B. After final inspection and upon receipt of satisfactory evidence of payment for all labor and materials used in the Work, the Engineer will notify the Owner, in writing, of his acceptance of the Work performed under the Contract and of his recommendations in respect to final payment to the Contractor.

1.06 CONTRACTOR'S ADVERTISEMENT OF COMPLETION

A. The Contractor, immediately after being notified that all other requirements of his Contract have been completed, shall give notice of said completion by an advertisement for a period of four (4) successive weeks in some newspaper of general circulation published within Jefferson County. Proof of publication of said notice shall be made by the Contractor to the Owner by affidavit of the publisher and a printed copy of the published notice.

1.07 PROJECT RECORD DOCUMENTS

A. Refer to Section 01720 – Project Record Documents

1.08 FINAL CLEANING

A. Refer to Section 02910 – Final Grading and Landscaping.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. Maintenance of Documents
B. Marking Devices
C. Recording
D. Submittals

1.02 RELATED SECTIONS

A. Section 01300 – Submittals
B. Section 01700 – Contract Closeout

1.03 MAINTENANCE OF DOCUMENTS

A. The Contractor shall obtain from the Engineer one (1) full-size set of the Contract Drawings. These Drawings shall be kept and maintained in good condition at the project site, and a qualified representative of the Contractor shall enter upon these prints, from day-to-day, the actual “as-built” record of the construction progress. Entries and notations shall be made in a neat and legible manner, and these prints shall be delivered to the Engineer upon completion of the construction. Approval of each Application for Payment and approval for final payment will be contingent upon compliance with this provision.

B. The Contractor shall maintain a record copy of the following items at the site for the Engineer's review:

1. Drawings (modified to suit as-built conditions)
2. Specifications and schedules (with modifications noted)
3. Addenda
4. Change Orders and other documents which modify the original documents
5. Approved Shop Drawings, product data, and samples, including documentation of all submittal transmittals
6. Records of all changes made during construction
7. Field test records
8. Manufacturers’ certificates
9. Inspection certificates

C. The Contractor shall maintain documents in a clean, dry, and legible condition.
D. The Contractor shall not use record documents for construction purposes.
E. The Contractor shall make documents available at all times for inspection by the Engineer.

1.04 MARKING DEVICES
A. The Contractor shall provide a colored pencil or felt-tip marking pen for all marking.

1.05 RECORDING
A. The Contractor shall label each document “PR”.
B. The Contractor shall keep record information current with construction progress.
C. The Contractor shall not permanently conceal any work until required information has been recorded.
D. Contract Drawings and Shop Drawings shall have each item legibly marked to record actual construction including the following:
   1. Actual elevations
   2. Actual horizontal and vertical location of piping, utilities, corners, etc., both above-ground and below-ground. Reference to building exterior lines or other permanent objects. The Contractor shall show direction of flow in pipe and elevation.
   3. Field change of dimensions and detail
   4. Changes made by Contract modification
   5. Added details not on the original Contract
E. Each Section of the Specifications and Addenda shall be legibly marked to record the following:
   1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed
2. Other matters not originally specified

F. Shop Drawings shall be maintained as record documents and legibly annotated to record changes made after review.

1.06 SUBMITTALS

A. At Contract Closeout, the Contractor shall deliver Project Record Documents and Samples, including Record “As-Built” Drawings, to the Engineer.

B. Project Record Documents and Samples shall be accompanied by transmittal letter, in duplicate, containing the following:

1. Date
2. Project title and number
3. Contractor’s name and address
4. Title and number of each record document
5. Certification that each document as submitted is complete and accurate
6. Signature of Contractor or authorized representative
7. Other documents as directed by the Engineer

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

- END OF SECTION -
SECTION 01740

WARRANTIES

PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. One Year Warranty

B. Form of Submittals

C. Preparation of Submittals

D. Time of Submittals

1.02 RELATED SECTIONS

A. Section 01700 – Contract Closeout

B. Individual Specification Sections: Warranties required for specific products of Work

1.03 ONE-YEAR WARRANTY

A. Unless specified otherwise by individual Specification Sections, the Contractor shall warrant the fitness and soundness of all Work done and materials and equipment put in place under the Contract for a period of one (1) year after the completion of the Contract, and neither the payment of the final estimate nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of Work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy all defects in the Work and pay for any damage to other work resulting therefrom which shall appear within a period of one (1) year from the date of Final Acceptance of the Work, unless a longer period is specified in individual Sections. The Owner will give notice of observed defects with reasonable promptness. The accepted date of the beginning of the one (1)-year warranty shall be the date of final estimate payment to the Contractor by the Owner.

1.04 FORM OF SUBMITTALS

A. Warranties shall be bound in commercial quality 8-1/2-inch x 11-inch, three D side ring binders with durable plastic covers.

B. Identify each binder with typed title WARRANTIES; title of project; name, address, and telephone number of Contractor; name, address, and telephone number of equipment supplier; and name of responsible company principal.

C. Table of Contents shall be neatly typed with each item identified with the number and title of
the Specification Section in which the item is specified and the name of the product or Work item.

D. Each warranty shall be separated with index tab sheets keyed to the Table of Contents listing. The Contractor shall provide full information, using separate typed sheets as necessary. The Contractor shall list subcontractor, supplier, manufacturer, and name, address, and telephone number of responsible principal.

1.05 PREPARATION OF SUBMITTALS

A. The Contractor shall obtain warranties executed in duplicate by responsible subcontractors, suppliers, and manufacturers within ten (10) days after completion of the applicable item of Work. Except for items put into use with Owner’s permission, the Contractor shall leave date of beginning of time of warranty until the Date of Completion is determined.

B. The Contractor shall verify that documents are in proper form, contain full information, and are notarized.

C. The Contractor shall co-execute submittals when required.

D. The Contractor shall retain warranties until time specified for submittal.

1.06 TIME OF SUBMITTALS

A. For equipment or component parts of equipment put into service during construction with Owner’s permission, the Contractor shall submit documents within ten (10) days after acceptance.

B. The Contractor shall make other submittals within ten (10) days after date of Substantial Completion, prior to final Application for Payment.

C. For items of Work for which acceptance is delayed beyond date of Substantial Completion, the Contractor shall submit within ten (10) days after acceptance, listing the date of acceptance as the beginning of the warranty period.

D. Retainage withheld for this project will not be released until all specified warranties are received by the Owner.

PART 2 -- PRODUCTS

(NOT USED)

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, materials, and equipment in accordance with the requirements of Section 01540 – Demolition and Removal of Existing Structures and Equipment.

B. In addition, the Contractor shall demolish and remove all concrete and asphaltic paving, curbs, sidewalk, and miscellaneous yard structures as required and shown on the Contract Drawings during the construction Work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01090 – Reference Standards

B. Section 01540 – Demolition and Removal of Existing Structures and Equipment

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. References shall be in accordance with reference standards, codes, and specifications as set forth herein and in Section 02100 – Clearing, Grubbing, and Site Preparation.

PART 2 -- EXECUTION

2.01 DEMOLITION

A. Existing concrete and asphaltic paving, curbs, sidewalk, and miscellaneous yard structures within the areas designated for new construction work shall be completely demolished and all debris shall be removed from the site.

B. Excavation caused by demolition shall be backfilled with fill free from rubbish and debris.

C. Work shall be performed in such manner as not to endanger the safety of the workmen or the public or cause damage to nearby structures.

D. Provide all barriers and precautionary measures in accordance with Owner’s requirements and other authorities having jurisdiction.

E. Where parts of existing structures are to remain in service, demolish the portions to be removed, repair damage, and leave the structure in proper condition for the intended use. Remove concrete and masonry to the lines designated by drilling, chipping, or other suitable methods. Leave the resulting surfaces reasonably true and even, with sharp straight
corners that result in neat joints with new construction that are satisfactory for the purpose intended. Where existing reinforcing rods are to extend into new construction, remove the concrete so that the reinforcing is clean and undamaged. Cut off other reinforcing 1/2 inch below the surface and fill with epoxy resin binder flush with the surface.

F. Prior to the execution of the work, the Contractor, Owner, and Engineer shall jointly survey the condition of the adjoining and/or nearby structures. Photographs and records shall be made of any prior settlement or cracking of structures, pavements, and the like that may become the subject of possible damage claims.

2.02 DISPOSAL OF MATERIAL

A. All debris resulting from the demolition and removal work shall be disposed of by the Contractor as part of the work of this Contract. Material designated by the Engineer to be salvaged shall be stored on the construction site as directed. All other material shall be disposed of off site by the Contractor at his expense.

B. Burning of any debris resulting from the demolition will not be permitted at the site.

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Includes all labor, material, equipment, and appliances required for the complete execution of any additions, modifications, or alterations to existing structure(s) and new construction work as shown on the Drawings and specified herein.

B. Principal items of work include:

1. Notifying all authorities owning utility lines running to or on the property, protecting and maintaining all utility lines to remain, and capping those that are not required in accordance with instructions of the utility companies and all other authorities having jurisdiction

2. Clearing the site within the Contract limit lines, including removal of grass, brush, shrubs, trees, loose debris, and other encumbrances, except for trees marked to remain

3. Boxing and protecting all trees, shrubs, lawns, and the like within areas to be preserved, and relocating trees and shrubs, as indicated on the Drawings, to designated areas

4. All injury to trees, shrubs, and other plants caused by site preparation operations shall be repaired immediately. Work shall be done by qualified personnel in accordance with standard horticultural practice and as approved by the Engineer.

5. Removing topsoil to its full depth from designated areas and stockpiling on site where directed by the Engineer for future use

6. Disposing from the site all debris resulting from work under this Section

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200 – Earthwork

1.03 STREET AND ROAD BLOCKAGE

A. Closing of streets and roads during progress of the Work shall be in compliance with the requirements of the Owner and other authorities having jurisdiction. Access shall be provided to all facilities remaining in operation.
1.04 PROTECTION OF PERSONS AND PROPERTY

A. All work shall be performed in such a manner to protect all personnel, workmen, pedestrians, and adjacent property and structures from possible injury and damage.

B. All conduits, wires, cables, and appurtenances above or below ground shall be protected from damage.

C. Provide warning and barrier fence where shown on the Drawings and as specified herein.

PART 2 -- EXECUTION

2.01 CLEARING OF SITE

A. Before removal of topsoil and start of excavation and grading operations, the areas within the clearing limits shall be cleared and grubbed.

B. Clearing shall consist of cutting, removal, and satisfactory disposal of all trees, fallen timber, brush, bushes, rubbish, sanitary landfill material, fencing, and other perishable and objectionable material within the areas to be excavated or other designated areas. Prior to the start of construction, the Contractor shall survey the entire Contract site and shall prepare a plan which defines the areas to be cleared and grubbed, trees to be pruned, extent of tree pruning, and/or areas which are to be cleared but not grubbed. This plan shall be submitted to the Engineer for approval. Should it become necessary to remove a tree, bush, brush, or other plants adjacent to the area to be excavated, the Contractor shall do so only after permission has been granted by the Engineer.

C. Excavation resulting from the removal of trees, roots, and the like shall be filled with suitable material, as approved by the Engineer, and thoroughly compacted per the requirements contained in Section 02200 – Earthwork.

D. In temporary construction easement and permanent easement locations, only those trees and shrubs shall be removed which are in actual interference with excavation or grading work under this Contract, and removal shall be subject to approval by the Engineer. However, the Engineer reserves the right to order additional trees and shrubs removed at no additional cost to the Owner, if such, in his opinion, are too close to the work to be maintained or have become damaged due to the Contractor's operations.

2.02 STRIPPING AND STOCKPILING EXISTING TOPSOIL

A. Existing topsoil and sod on the site within areas designated on the Drawings shall be stripped to whatever depth it may occur and stored in locations directed by the Engineer.

B. The topsoil shall be free of stones, roots, brush, rubbish, or other unsuitable materials before stockpiling the topsoil.

C. Care shall be taken not to contaminate the stockpiled topsoil with any unsuitable materials.
2.03 GRUBBING

A. Grubbing shall consist of the removal and disposal of all stumps, roots, logs, sticks, and other perishable materials to a depth of at least 6 inches below ground surface.

B. Large stumps located in areas to be excavated may be removed during grading operations, subject to the approval of the Engineer.

2.04 DISPOSAL OF MATERIAL

A. All debris resulting from the clearing and grubbing work shall be disposed of by the Contractor as part of the work of this Contract. Material designated by the Engineer to be salvaged shall be stored on the construction site as directed by the Engineer for reuse in this project or removal by others.

B. Burning of any debris resulting from the clearing and grubbing work will not be permitted at the site.

2.05 TREE PROTECTION (WARNING AND BARRIER) FENCE

A. The fence shall be made of a visible, lightweight, flexible, high strength polyethylene material.

B. Physical Properties

- **Fence:**
  - Color: International Orange
  - Height: 4 feet
  - Weight: 7.46 oz/SY
  - Mesh Opening: 1-1/2-inch x 3-inch

- **Posts:**
  - ASTM Designation: ASTM A702
  - Length: 6 feet long (T-type)
  - Weight: 1.25 pounds per foot (minimum)
  - Area of Anchor Plate: 14 square inches

C. Drive posts 22 to 24 inches into ground every 6 feet. Wrap fence material around first terminal post, allowing overlap of one material opening. Use metal tie wire or plastic tie wrap to fasten material to itself at top, middle, and bottom. At final post, cut with utility knife or scissors at a point halfway across an opening. Wrap around and tie at final post in the same way as the first post.

D. Use tie wire or tie wrap at intermediate posts and splices as well. Thread ties around a vertical member of the fence material and the post, and bind tightly against the post. For the most secure fastening, tie at top, middle, and bottom. Overlap splices a minimum of 4
fence openings and tie as previously specified herein, fastening both edges of the fence material splice overlap.

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
SECTION 02200

EARTHWORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish all labor, equipment, and materials required to complete all work associated with excavation, including off-site borrow excavation, dewatering, backfill, drainage layers beneath and around structures, foundation and backfill stone, filter fabric, embankments, stockpiling topsoil and any excess suitable material in designated areas, in-place compaction of embankments, backfill and subgrades beneath foundations and roadways, excavation support, disposing from the site all unsuitable materials, providing erosion and sedimentation control grading, site grading, preparation of pavement and structure subgrade, and other related and incidental work as required to complete the Work shown on the Drawings and specified herein.

B. All excavations shall be in conformity with the lines, grades, and cross sections shown on the Drawings or established by the Engineer.

C. It is the intent of this Specification that the Contractor conduct the construction activities in such a manner that erosion of disturbed areas and off-site sedimentation be absolutely minimized.

D. All work under this Contract shall be done in conformance with and subject to the limitations of the latest editions of the Alabama Department of Transportation Standard Specifications for Highway Construction and the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Requirements of related work are included in Division 1 – General Requirements and Division 2 – Sitework of these Specifications.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. Alabama Department of Transportation Standard Specifications for Highway Construction

2. ASTM C127 Test for Specific Gravity and Absorption of Coarse Aggregate

3. ASTM C136 Test for Sieve Analysis of Fine and Coarse Aggregates
4. ASTM D422  Particle Size Analysis of Soils
5. ASTM D423  Test for Liquid Limit of Soils
6. ASTM D424  Test for Plastic Limit and Plasticity Index of Soils
7. ASTM C535  Test for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
8. ASTM D698  Standard Method of Test for the Moisture - Density Relations of Soils Using a 5.5 lb. (2.5 kg) Rammer and a 12-inch (305 mm) Drop
9. ASTM D1556  Test for Density of Soil in Place by the Sand-Cone Method
10. ASTM D1557  Test for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lbs. (4.5 kg) Rammer and 18-inch (457 mm) Drop
11. ASTM D2049  Test Method for Relative Density of Cohesionless Soils
12. ASTM D2167  Test for Density of Soil in Place by the Rubber-Balloon Method
13. ASTM D2216  Test for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures
14. ASTM D2487  Test for Classification of Soils for Engineering Purposes
15. ASTM D2922  Test for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.04  SUBSURFACE CONDITIONS

A. Information on subsurface conditions is referenced under Division 1 – General Requirements.

B. Attention is directed to the fact that there may be water pipes, storm drains, and other utilities located in the area of proposed excavation. Perform all repairs to same in the event that excavation activities disrupt service.

1.05  SUBMITTALS

A. In accordance with the procedures and requirements set forth in Section 01300 – Submittals, the Contractor shall submit the following:

1. Name and location of all material suppliers

2. Certificate of compliance with the standards previously specified herein for each source of each material
3. List of disposal sites for waste and unsuitable materials and all required permits for use of those sites

4. Plans and cross sections of open cut excavations showing side slopes and limits of the excavation at grade

5. Samples of synthetic filter fabric and reinforced plastic membrane with manufacturer's certificates or catalog cuts stating the mechanical and physical properties. Samples shall be at least one (1) foot wide and four (4) feet long taken across the roll with the warp direction appropriately marked.

6. Construction drawings and structural calculations for any types of excavation support required. Drawings and calculations shall be sealed by a currently registered Professional Engineer in the State of Alabama.

7. Monitoring plan and pre-construction condition inspection and documentation of all adjacent structures, utilities, and roadways near proposed installation of excavation support systems and near areas where dewatering is required to facilitate construction

8. Dewatering procedures

1.06 PRODUCT HANDLING

A. Soil and rock material shall be excavated, transported, placed, and stored in a manner so as to prevent contamination, segregation and excessive wetting. Materials which have become contaminated or segregated will not be permitted in the performance of the Work and shall be removed from the site.

PART 2 -- PRODUCTS

2.01 SELECT FILL

A. Soils from the excavations meeting requirements stipulated herein, with the exceptions of topsoil and organic material, may be used as select fill for backfilling, constructing embankments, reconstructing existing embankments, and as structural subgrade support.

B. Select fill used for embankment construction shall be a silty or clayey soil material with a Maximum Liquid Limit (LL) of 50 and a Plasticity Index (PI) between 7 and 20.

C. Select fill used for backfilling shall either be material as described in Article 2.01, Paragraph B herein or a granular soil material with a Maximum Plasticity Index (PI) of 6.

D. Regardless of material used as select fill, materials shall be compacted at a moisture content satisfactory to the Engineer, which shall be approximately that required to produce the maximum density, except that the moisture content shall not be more than 1% below nor more than 4% above the optimum moisture content for the particular material tested in accordance with ASTM D698.
E. Select fill used as subgrade support shall be a coarse aggregate material meeting the gradation requirements of No. 57 aggregate in accordance with ASTM C33 or Crushed Aggregate Base materials as defined in Section 02207 – Aggregate Materials.

F. Where excavated material does not meet requirements for select fill, Contractor shall furnish off-site borrow material meeting the specified requirements herein. Determination of whether the borrow material will be paid for as an extra cost will be made based on the General Conditions, as amended by the Supplementary Conditions. When the excavated material from required excavations is suitable for use as backfill, bedding, or embankments, but is replaced with off-site borrow material for the Contractor’s convenience, the costs associated with such work and material shall be borne by the Contractor.

2.02 TOPSOIL

A. Topsoil shall be considered the surface layer of soil and sod, suitable for use in seeding and planting. It shall contain no mixture of refuse or any material toxic to plant growth.

B. Topsoil for site restoration may not be available at Project site in sufficient quantity and shall be furnished as specified.

C. New topsoil shall be fertile; friable; natural loam; surface soil; reasonably free of subsoil, clay, lumps, brush, weeds, and other litter; and free of roots, stumps, stones, and other extraneous or toxic matter harmful to plant growth.

D. Contractor shall obtain topsoil from local sources or from areas having similar soil characteristics to that found at Project site. Contractor shall obtain topsoil only from naturally well-drained sites where topsoil occurs in a depth of not less than 4 inches. Topsoil obtained from bogs or marshes shall not be acceptable.

PART 3 -- EXECUTION

3.01 STRIPPING OF TOPSOIL

A. In all areas to be excavated, filled, paved, or graveled, the topsoil shall be stripped to its full depth and shall be deposited in storage piles on the site at locations designated by the Engineer for subsequent reuse. Topsoil shall be kept separated from other excavated materials and shall be piled free of roots and other undesirable materials.

3.02 EXCAVATION

A. All material excavated, regardless of its nature or composition, shall be classified as UNCLASSIFIED EXCAVATION. Excavation shall include the removal of all soil, rock, weathered rock, rocks of all types, boulders, conduits, pipe, and all other obstacles encountered and shown to be removed within the limits of excavation shown on the Drawings or specified herein. The cost of excavation shall be included in the Contractor’s unit prices bid for other various items of work provided in the Contract, and no additional payment will be made for the removal of obstacles encountered within the excavation limits shown on the Drawings and specified herein.
B. All suitable material removed in the excavation shall be used as far as practicable in the formation of embankments, subgrades, shoulders, and at such other places as may be indicated on the Drawings or indicated by the Engineer. No excavation shall be wasted except as may be permitted by the Engineer. Refer to the Drawings for specific location and placement of suitable excavated materials in the formation of embankments, backfill, and structural and roadway foundations. THE ENGINEER AND/OR MATERIALS TESTING CONSULTANT WILL DESIGNATE MATERIALS THAT ARE UNSUITABLE. The Contractor shall furnish off-site disposal areas for the unsuitable material. Where suitable materials containing excessive moisture are encountered above grade in cuts, the Contractor shall construct above grade ditch drains prior to the excavation of the cut material when in the opinion of the Engineer and/or materials testing consultant such measures are necessary to provide proper construction.

C. All excavations shall be made in the dry and in such a manner and to such widths as will give ample room for properly constructing and inspecting the structures and/or piping they are to contain and for such excavation support, pumping, and drainage as may be required. Excavation shall be made in accordance with the grades and details shown on the Drawings and as specified herein.

D. Excavation slopes shall be flat enough to avoid slides that will cause disturbance of the subgrade or damage of adjacent areas. Excavation requirements and slopes shall be as indicated in the Drawings. The Contractor shall intercept and collect surface runoff both at the top and bottom of cut slopes. The intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, shall be uniformly rounded as shown on the Drawings or indicated by the Engineer. Concurrent with the excavation of cuts, the Contractor shall construct intercepting berm ditches or earth berms along and on top of the cut slopes at locations shown on the Drawings or designated by the Engineer. All slopes shall be finished to reasonably uniform surfaces acceptable for seeding and mulching operations. No rock or boulders shall be left in place which protrude more than 1 foot within the typical section cut slope lines, and all rock cuts shall be cleaned of loose and overhanging material. All protruding roots and other objectionable vegetation shall be removed from slopes. The Contractor shall be required to submit plans of open-cut excavation for review by the Engineer before approval is given to proceed.

E. All structures shall bear on a crushed aggregate base, crushed stone, or screened gravel bedding placed to the thickness shown on the Drawings and/or specified in these Specifications, but not less than 6 inches. Bedding for process piping shall be as specified in Section 15000 – Basic Mechanical Requirements or as shown on the Drawings.

F. The bottom of all excavations for structures and pipes shall be examined by the Engineer and/or materials testing consultant for bearing value and the presence of unsuitable material. If, in the opinion of the Engineer and/or materials testing consultant, additional excavation is required due to the low bearing value of the subgrade material or if the in-place soils are soft, yielding, pumping, and wet, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted select fill and/or crushed stone or screened gravel as indicated by the Engineer. Payment for such additional work ordered by the Engineer shall be made as an extra by a Change Order in accordance with the General Conditions and Division 1 – General Requirements. No
payment will be made for subgrade disturbance caused by inadequate dewatering or improper construction methods.

G. All cuts shall be brought to the grade and cross section shown on the Drawings or established by the Engineer prior to final inspection and acceptance by the Engineer.

H. Slides and overbreaks which occur due to negligence, carelessness, or improper construction techniques on the part of the Contractor shall be removed and disposed of by the Contractor as indicated by the Engineer at no additional cost to the Owner. If grading operations are suspended for any reason whatsoever, partially completed cut and fill slopes shall be brought to the required slope and the work of seeding and mulching or other required erosion and sedimentation control operations shall be performed.

I. Where the excavation exposes sludge, sludge contaminated soil, or other odorous materials, the Contractor shall cover such material at the end of each workday with a minimum of 6 inches and a maximum of 24 inches of clean fill. The work shall be an odor abatement measure, and the material shall be placed to the depth deemed satisfactory by the Engineer for this purpose.

3.03 EXCAVATION SUPPORT

A. The Contractor shall furnish, place, and maintain such excavation support which may be required to support sides of excavation, protect pipes and structures from possible damage, and provide safe working conditions. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports put in at the expense of the Contractor. The Contractor shall be responsible for the adequacy of all supports used and for all damage resulting from failure of support system or from placing, maintaining, and removing it.

B. Selection of and design of any proposed excavation support systems is exclusively the responsibility of the Contractor. Contractor shall submit drawings and calculations on proposed systems sealed by a Professional Engineer currently registered in the State of Alabama.

C. The Contractor shall exercise caution in the installation and removal of supports to ensure that excessive or unusual loadings are not transmitted to any new or existing structure. The Contractor shall promptly repair, at his expense, any and all damage that can be reasonably attributed to installation or removal of excavation support system.

D. Contractor shall monitor movement in the excavation support systems as well as movement at adjacent structures, utilities, and roadways near excavation supports. Contractor shall submit a monitoring plan developed by the excavation support design engineer. All pre-construction condition assessment and documentation of adjacent structures on-site and off-site shall be performed by the Contractor. If any sign of distress, such as cracking or movement, occurs in any adjacent structure, utility, or roadway during installation of supports, subsequent excavation, service period of supports, subsequent backfill and construction, or removal of supports, Engineer shall be notified immediately. Contractor shall be exclusively responsible for repair of any damage to any roadway, structure, utility, pipes, etc., both on-site and off-site, as a result of his operations.
E. All excavation supports shall be removed upon completion of the Work, except as indicated herein. The Engineer may permit supports to be left in place at the request and expense of the Contractor. The Engineer may order certain supports left permanently in place in addition to that required by the Contract. The cost of the materials so ordered left in place, less a reasonable amount for the eliminated expense of the removal work omitted, will be paid as an extra by a Change Order in accordance with the General Conditions and Division 1 – General Requirements. Any excavation supports left in place shall be cut off at least 2 feet below the finished ground surface or as directed by the Engineer.

3.04 PROTECTION OF SUBGRADE

A. To minimize the disturbance of bearing materials and provide a firm foundation, the Contractor shall comply with the following requirements:

1. Use of heavy rubber-tired construction equipment shall not be permitted on the final subgrade unless it can be demonstrated that drawdown of groundwater throughout the entire area of the structure is at least 3 feet below the bottom of the excavation (subgrade). Even then, the use of such equipment shall be prohibited should subgrade disturbance result from concentrated wheel loads.

2. Subgrade soils disturbed through the operations of the Contractor shall be excavated and replaced with compacted select fill or crushed stone at the Contractor's expense as indicated by the Engineer.

3. The Contractor shall provide positive protection against penetration of frost into materials below the bearing level during work in winter months. This protection can consist of a temporary blanket of straw or salt hay covered with a plastic membrane or other acceptable means.

3.05 PROOFROLLING

A. The subgrade of all structures and all areas that will support pavements or select fill shall be proofrolled. After stripping of topsoil and excavation to subgrade but prior to placement of fills, the exposed subgrade shall be carefully inspected by probing and testing as needed. Any topsoil or other organic material still in place; frozen, wet, soft, or loose soil; and other undesirable materials shall be removed. The exposed subgrade shall be proofrolled with a heavily loaded tandem-wheeled dump truck to check for pockets of soft material hidden beneath a thin crust of better soil. Any unsuitable materials thus exposed shall be removed and replaced with an approved compacted material.

3.06 DEWATERING

A. The Contractor shall perform all dewatering as required for the completion of the Work. Procedures for dewatering proposed by the Contractor shall be submitted to the Engineer for review prior to any earthwork operations. All water removed by dewatering operations shall be disposed of in accordance with the Alabama Water Pollution Control Act.

B. The dewatering system shall be of sufficient size and capacity as required to control groundwater or seepage to permit proper excavation operations, embankment construction and reconstruction, subgrade preparation, pipe and manhole replacement, and to allow
concrete to be placed in a dry condition. The system shall include a sump system or other equipment, appurtenances, and other related earthwork necessary for the required control of water. The Contractor shall drawdown groundwater to at least 3 feet below the bottom of excavations (subgrade) at all times in order to maintain a dry and undisturbed condition.

C. The Contractor shall control, by acceptable means, all water regardless of source. Water shall be controlled and its disposal provided for at each berm, structure, etc. The entire periphery of the excavation areas shall be ditched and diked to prevent water from entering the excavation. The Contractor shall be fully responsible for disposal of the water and shall provide all necessary means at no additional expense to the Owner. The Contractor shall be solely responsible for proper design, installation, proper operation, maintenance, and any failure of any component of the system.

D. The Contractor shall be responsible for and shall repair without cost to the Owner, any damage to work in place and the excavation, including damage to the bottom due to heave and including removal of material and pumping out of the excavated area. The Contractor shall be responsible for damages to any other area or structure caused by his failure to maintain and operate the dewatering system proposed and installed by the Contractor.

E. The Contractor shall take all the steps that he considers necessary to familiarize himself with the surface and subsurface site conditions and shall obtain the data that is required to analyze the water and soil environment at the site and to assure that the materials used for the dewatering systems will not erode, deteriorate, or clog to the extent that the dewatering systems will not perform properly during the period of dewatering.

F. Prior to the execution of the work, the Contractor, Owner, and Engineer shall jointly survey the condition of adjoining structures. Photographs and records shall be made of any prior settlement or cracking of structures, pavements, and the like, that may become the subject of possible damage claims.

3.07 EMBANKMENTS

A. The Contractor shall perform the construction of embankments in such a manner that cut and fill slopes will be completed to final slopes and grade in a continuous operation. The operation of removing excavation material from any cut and the placement of embankment in any fill shall be a continuous operation to completion, unless otherwise permitted by the Engineer.

B. Surfaces upon which embankments are to be constructed shall be stripped of topsoil, organic material, rubbish, and other extraneous materials. After stripping and prior to placing embankment material, the Contractor shall compact the top 12 inches of in-place soil as specified under Article 3.09 – COMPACTION.

C. Any soft or unsuitable materials revealed before or during the in-place compaction shall be removed as indicated by the Engineer and/or materials testing consultant and replaced with select fill.

D. Ground surfaces on which embankment is to be placed shall be scarified or stepped in a manner which will permit bonding of the embankment with the existing surface. The embankment soils shall be as specified under PART 2 -- PRODUCTS and shall be
deposited and spread in successive, uniform, approximately horizontal layers not exceeding 8 inches in compacted depth for the full width of the cross section and shall be kept approximately level by the use of effective spreading equipment. Hauling shall be distributed over the full width of the embankment, and in no case will deep ruts be allowed to form during the construction of the embankment. The embankment shall be properly drained at all times. Each layer of the embankment shall be thoroughly compacted to the density specified under Article 3.09 – COMPACTION.

E. The embankment or fill material in the layers shall be of the proper moisture content before rolling to obtain the prescribed compaction. Wetting or drying of the material and manipulation when necessary to secure a uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work on all portions of the embankment thus affected shall be delayed until the material has dried to the required moisture content. Samples of all embankment materials for testing, both before and after placement and compaction, will be taken at frequent intervals. From these tests, corrections, adjustments, and modifications of methods, materials, and moisture content will be made to construct the embankment.

F. Where embankments are to be placed and compacted on hillsides, when new embankment is to be compacted against embankments, or when embankment is built in part widths, the slopes that are steeper than 4:1 shall be loosened or plowed to a minimum depth of 6 inches or, if in the opinion of the Engineer, the nature of the ground is such that greater precautions should be taken to bind the fill to the original ground, then benches shall be cut in the existing ground as indicated by Engineer.

G. When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portions of the embankments and the other material which meets the requirements for select fill shall be incorporated into the formation of the embankments. Stones or fragmentary rock larger than 4 inches in their greatest dimension will not be allowed within the top 6 inches of the ground nor within 6 inches of pipes. No stone or fragmentary rock larger than 12 inches in their greatest dimension will be allowed for any portion of backfill. Compaction shall be in accordance with the requirements of Article 3.09 – COMPACTION.

3.08 BACKFILLING

A. All structures and pipes shall be backfilled with the type of materials shown on the Drawings and specified herein. Select fill shall be deposited in successive, uniform, approximately horizontal layers not exceeding 8 inches in compacted depth for the full width. Stones or fragmentary rock larger than 4 inches in their greatest dimension will not be allowed within the top 6 inches of the ground nor within 6 inches of pipes. No stone or fragmentary rock larger than 12 inches in their greatest dimension will be allowed for any portion of backfill. Compaction shall be in accordance with the requirements of Article 3.09 – COMPACTION.

B. Where excavation support is used, the Contractor shall take all reasonable measures to prevent loss of support beneath and adjacent to pipes and existing structures when supports are removed. If significant volumes of soil cannot be prevented from clinging to the
extracted supports, the voids shall be continuously backfilled as rapidly as possible. The Contractor shall thereafter limit the depth below subgrade that supports will be installed in similar soil conditions or employ other appropriate means to prevent loss of support.

3.09 COMPACTION

A. The Contractor shall compact embankments, backfill, crushed stone, aggregate base, and in-place subgrade in accordance with the requirements of this Section. The densities specified herein refer to percentages of maximum density as determined by the noted test methods. Compaction of materials on the project shall be in accordance with the following schedule:

<table>
<thead>
<tr>
<th>Material</th>
<th>Density % Std. Proctor (D698)</th>
<th>Density % Mod. Proctor (D1557)</th>
<th>Max. Lift Thickness as Compacted (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embankments Beneath Structures*</td>
<td>98</td>
<td>95</td>
<td>8</td>
</tr>
<tr>
<td>Other Embankments</td>
<td>95</td>
<td>92</td>
<td>8</td>
</tr>
<tr>
<td>Backfill Around Structures</td>
<td>95</td>
<td>92</td>
<td>8</td>
</tr>
<tr>
<td>Backfill in Pipe Trenches</td>
<td>95</td>
<td>92</td>
<td>8</td>
</tr>
<tr>
<td>Crushed Stone Beneath Structures</td>
<td>**</td>
<td>**</td>
<td>12</td>
</tr>
<tr>
<td>Select Sand</td>
<td>--</td>
<td>98</td>
<td>8</td>
</tr>
<tr>
<td>Crushed Aggregate Base Materials Beneath Pavements and Structures</td>
<td>--</td>
<td>98</td>
<td>8</td>
</tr>
<tr>
<td>Crushed Stone Backfill</td>
<td>**</td>
<td>**</td>
<td>12</td>
</tr>
<tr>
<td>Crushed Stone Pipe Bedding</td>
<td>**</td>
<td>**</td>
<td>12</td>
</tr>
<tr>
<td>In-place Subgrade Beneath Structures</td>
<td>98</td>
<td>95</td>
<td>Top 12 inches</td>
</tr>
</tbody>
</table>

* Embankments beneath structures shall be considered to include a zone 10 feet out from the foundation of the structure extending down to the natural ground on a 45-degree slope.

** The aggregate shall be compacted to a degree acceptable to the Engineer by use of a vibratory compactor and/or crawler tractor.

B. Field density tests will be made by the materials testing consultant to determine if the specified densities have been achieved, and these tests shall be the basis for accepting or rejecting the compaction. In-place density tests will be performed in accordance with ASTM D1556, ASTM D2167, or ASTM D2922. The Engineer, in conjunction with the materials testing consultant, will be the judge as to which test method will be the most appropriate. Failure to achieve the specified densities shall require the Contractor to re-compact the material or remove it as required. The Contractor shall, if necessary, increase his compactive effort by increasing the number of passes, using heavier or more suitable
compaction equipment, or reducing the thickness of the layers. The Contractor shall adjust the moisture contents of the soils to bring them within the optimum range by drying them or adding water as required.

C. Testing will be performed as frequently as deemed necessary by the Engineer and/or materials testing consultant. At a minimum, one in-place density test shall be performed for each 1,000 cubic yards of embankment placed and 500 cubic yards of backfill placed, or one test performed each day for either.

3.10 REMOVAL OF EXCESS AND UNSUITABLE MATERIALS

A. The Contractor shall remove and dispose of off-site all unsuitable materials. Within thirty (30) consecutive days after Notice to Proceed, the Contractor shall submit to the Engineer for review all required permits and a list of disposal sites for the unsuitable materials. If the disposal site is located on private property, the submittal shall also include written permission from the owner of record.

B. All unsuitable materials shall be disposed of in locations and under conditions that comply with federal, state, and local laws and regulations.

C. The Contractor shall obtain an off-site disposal area prior to beginning demolition or excavation operations.

D. All excess and unsuitable materials shall be hauled in trucks of sufficient capacity and tight construction to prevent spillage. Trucks shall be covered to prevent the propagation of dust.

E. When all excess and unsuitable material disposal operations are completed, the Contractor shall leave the disposal sites in a condition acceptable to the Owner and owner(s) of the disposal site(s).

3.11 BORROW EXCAVATION

A. Description

The work covered by this Section consists of the excavation of approved material from borrow sources and the hauling and utilization of such material as required on the Drawings or directed by the Engineer. It shall also include the removing, stockpiling, and replacement of topsoil on the borrow source; the satisfactory disposition of material from the borrow source which is not suitable for use; and the satisfactory restoration of the borrow source and haul roads to an acceptable condition upon completion of the Work.

Borrow excavation shall not be used before all available suitable unclassified excavation has been used for backfill and incorporated into the embankments.

B. Coordination with Seeding Operations

The Contractor shall coordinate the work covered by this Section with the construction of embankments so that the requirements of Section 02200 – Earthwork are met.

C. Materials
All material shall meet the following requirements of Division 2 – Sitework:

Borrow Material .................................. Section 02200 – Earthwork, Article 2.01 – SELECT FILL

D. Construction Methods

1. General

The surface of the borrow area shall be thoroughly cleared and grubbed and cleaned of all unsuitable material including all organics, topsoil, etc., before beginning the excavation. Disposal of material resulting from clearing and grubbing shall be in accordance with Section 02100 – Clearing, Grubbing, and Site Preparation.

Each borrow operation shall not be allowed to accumulate exposed, erodible slope area in excess of 1 acre at any one given time without the Contractor beginning permanent seeding and mulching of the borrow source or other erosion control measures as may be approved by the Engineer.

The topsoil shall be removed and stockpiled at locations that will not interfere with the borrow operations and that meet the approval of the Engineer. Temporary erosion control measures shall be installed as may be necessary to prevent the erosion of the stockpile material. Once all borrow has been removed from the source or portion thereof, the stockpiled topsoil shall be spread uniformly over the source.

Where it is necessary to haul borrow material over existing roads, the Contractor shall use all necessary precautions to prevent damage to the existing roads. The Contractor shall also conduct his hauling operations in such a manner as to not interfere with the normal flow of traffic and keep the traffic lanes free from spillage at all times.

2. Owner Furnished Sources

Where borrow sources are furnished by the Owner, the location of such sources will be as designated on the Drawings or as directed by the Engineer.

The Owner will furnish the necessary haul road right-of-way at locations designated by the Engineer. All haul roads required shall be built, maintained, and, when directed by the Engineer, obliterated at no cost to the Owner. Where the haul road is to be reclaimed for cultivation, the Contractor shall plow or scarify the area to a minimum depth of 8 inches.

The borrow sources shall be left in a neat and presentable condition after use. All slopes shall be smoothed, rounded, and constructed not steeper than 3:1. Where the source is to be reclaimed for cultivation, the source shall be plowed or scarified to a minimum depth of 8 inches, disc harrowed, and terraces constructed.
source shall be graded to drain such that no water will collect or stand and a functioning drainage system shall be provided.

All sources shall be seeded and mulched in accordance with Section 02910 – Final Grading and Landscaping.

3. Contractor Furnished Sources

Prior to the approval of any off-site borrow source(s) developed for use on this project, the Contractor shall obtain certification from the State Historic Preservation Officer of the State Department of Cultural Resources certifying that the removal of the borrow material from the borrow source(s) will have no effect on any known district, site building, structure, or object that is included or eligible for inclusion in the National Register of Historic Places. A copy of this certification shall be furnished to the Engineer prior to performing any work on the proposed borrow source.

The approval of borrow sources furnished by the Contractor shall be subject to the following conditions:

a. The Contractor shall be responsible for acquiring the right to take the material and any rights of access that may be necessary, for locating and developing the source, and for any clearing and grubbing and drainage ditches necessary.

Such right shall be in writing and shall include an agreement with the Owner that the borrow source may be dressed, shaped, seeded, mulched, and drained as required by these Specifications after all borrow has been removed.

b. Except where borrow is to be obtained from a commercial source, the Contractor and the property owner shall jointly submit a borrow source development, use, and reclamation plan to the Engineer for his approval prior to engaging in any land disturbing activity on the proposed source other than material sampling that may be necessary. The Contractor's plan shall address the following:

(1) Drainage

The source shall be graded to drain such that no water will collect or stand and a functioning drainage system shall be provided. If drainage is not practical and the source is to serve as a pond, the minimum average depth below the water table shall be 4 feet, or the source shall be graded so as to create wetlands as appropriate.

(2) Slopes

The source shall be dressed and shaped in a continuous manner to contours which are comparable to and blend in with the adjacent
topography, but in no case will slopes steeper than 3:1 be permitted.

(3) Erosion Control

The plan shall address the temporary and permanent measures that the Contractor intends to employ during use of the source and as a part of the reclamation. The Contractor's plan shall provide for the use of staged permanent seeding and mulching on a continual basis while the source is in use and the immediate total reclamation of the source when no longer needed.

4. Maintenance

During construction and until Final Acceptance, the Contractor shall use any methods approved by the Engineer which are necessary to maintain the work covered by this Section so that the work will not contribute to excessive soil erosion.

- END OF SECTION -
PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, equipment, and materials required to complete all work associated with the installation of aggregate material as bedding, backfill, and roadway subgrades, and other related and incidental work as required to complete the work shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01090 – Reference Standards
B. Section 02200 – Earthwork
C. Section 02270 – Slope Protection and Erosion Control
D. Section 02575 – Pavement Repair
E. Section 02910 – Final Grading and Landscaping

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. Alabama Department of Transportation Standard Specifications for Highway Construction
2. ASTM C127 Test for Specific Gravity and Absorption of Coarse Aggregate
3. ASTM C136 Test for Sieve Analysis of Fine and Coarse Aggregates
4. ASTM C535 Test for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
5. ASTM D448 Standard Classification for Sizes of Aggregate for Road and Bridge Construction
1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:

1. Materials gradation and certification
2. ASTM C127, ASTM C136, and ASTM C535 test results

PART 2 -- PRODUCTS

2.01 CRUSHED STONE AND CRUSHED AGGREGATE BASE MATERIALS

A. Crushed stone shall meet the requirements of Aggregate Standard Size No. 57 as defined by Alabama Department of Transportation Standard Specifications for Highway Construction.

B. Crushed Aggregate Base shall meet the requirements of 825 Type B as defined by Alabama Department of Transportation Standard Specifications for Highway Construction.

2.02 SELECT SAND

A. Select sand shall meet the requirements of Sections 800 and 802 of the Alabama Department of Transportation Standard Specifications for Highway Construction for materials and gradation. The size used shall be Standard Size No. 100 as listed and defined in Table 802.09, “Table of ALDOT Fine Aggregate Sizes”, of the Alabama Department of Transportation Standard Specifications for Highway Construction.

PART 3 -- EXECUTION

3.01 CRUSHED STONE AND CRUSHED AGGREGATE BASE MATERIALS

A. Contractor shall install No. 57 crushed stone and 825 Type B Aggregate Base materials in accordance with the Alabama Department of Transportation Standard Specifications for Highway Construction, as shown on the Drawings, and as indicated in the Contract Documents.

1. Unless otherwise stated herein or shown on the Drawings, all mat foundations (bottom slabs) for new structures or manholes shall have a blanket of No. 57 crushed stone a minimum of 12 inches thick placed directly beneath the proposed foundation. The blanket shall cover the entire bottom of the excavation for the structure or manhole.

2. For ground under drains, pipe bedding, initial pipe backfill, and drainage layers beneath structures, the material shall be No. 57 crushed stone. The pipe bedding shall extend from a minimum of four (4) inches below the outside of the bottom of the
pipe barrel to the outside of the bottom of the pipe barrel, across the full width of the trench. The initial pipe backfill shall extend from the top of the pipe bedding to a minimum of twelve (12) inches above the outside of the pipe crown, across the full width of the trench.

3. For pipe trenches located under paved streets, alleys, roadways, or sidewalks, the material used for final pipe backfill shall be 825 Type B aggregate base or as otherwise directed by the Alabama Department of Transportation, the specific municipality having jurisdiction over the specific street, alley, roadway, or sidewalk under which the pipe is located, or the Owner or Engineer. Final pipe backfill under pavement shall extend, across the full width of the trench, from twelve (12) inches above the outside of the pipe crown to either the sub-base (bottom) of the existing adjacent pavement or as otherwise required to perform the specified repaving work.

4. Geotextile fabric may be installed between the No. 57 crushed stone initial pipe backfill layer and the 825 Type B aggregate base final pipe backfill layer in all trench locations where both types of aggregate are installed adjacent to each other.

3.02 SELECT SAND

A. Contractor shall install select sand in accordance with the Alabama Department of Transportation Standard Specifications for Highway Construction, as shown on the Drawings, and as indicated in the Contract Documents.

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PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, equipment, materials, and services, including pumping equipment and application, necessary for the manufacture, transportation, and placement of all cementitious flowable fill as shown on the Contract Drawings or as ordered by the Engineer, except for the work specifically included under other items.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03300 – Cast-in-Place Concrete

1.03 SUBMITTALS

A. In accordance with the procedures and requirements set forth in the General Conditions and Division 1, the Contractor shall submit the following:

1. Shop Drawings
2. Certifications of specification compliance for all sources of each material
3. Manufacturer’s data on all admixtures
4. Mix design and trial mix test results
5. Aggregate gradation

1.04 QUALITY CONTROL

A. The Contractor shall engage the services of a testing laboratory that possesses the qualifications required by Section 03300 – Cast-In-Place Concrete and is experienced in the design and testing of flowable fill materials and mixes to perform material evaluation tests and to design mixes for flowable fill. A trial mix shall be performed to verify the flowable fill mix design. The trial mix shall also report slump, air content, yield, cement content, and dry unit weight per ASTM C143 and ASTM D6023.

PART 2 – MATERIALS

2.01 CEMENTITIOUS FLOWABLE FILL

A. Flowable fill (controlled low strength material) shall be a uniform mixture of sand, Type II Portland cement, fly ash, admixtures, and water. The mix design shall produce a flowable material with little or no bleed water that has a minimum compressive strength
of 50 psi and a maximum compressive strength of 100 psi at 56 days. The cured material shall be excavatable and shall have a maximum dry weight of 100 pounds per cubic foot. Slump of mix at the point of application shall be 7 inches to 10 inches.

B. Admixtures specifically designed for flowable fill shall be used to improve flowability, reduce unit weight, control strength development, reduce settlement, and reduce bleed water. Admixtures shall be Rheocell-Rheofill by BASF Construction Chemicals, Darafill by Grace Construction Products, or Engineer-approved equal. Cement and all other materials shall be as specified in Section 03300 – Cast-In-Place Concrete.

C. Fine aggregate (sand) shall consist of natural or manufactured siliceous sand that is clean and free from deleterious substances and is graded within the following limits:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8-inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>95 to 100</td>
</tr>
<tr>
<td>No. 8</td>
<td>80 to 100</td>
</tr>
<tr>
<td>No. 16</td>
<td>50 to 85</td>
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<tr>
<td>No. 30</td>
<td>25 to 60</td>
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<tr>
<td>No. 50</td>
<td>10 to 30</td>
</tr>
<tr>
<td>No. 100*</td>
<td>2 to 10</td>
</tr>
</tbody>
</table>

*For manufactured sand, the percent passing the No. 100 Sieve may be increased up to 20 percent.

PART 3 – EXECUTION

3.01 PLACEMENT OF FLOWABLE FILL

A. Flowable fill shall be batched and premixed by an approved producer, dispensed from ready-mix trucks, and placed by approved methods and equipment.

B. Flowable fill shall be placed so as to completely fill the space to receive it with no trapped air pockets or other voids. Positive means of allowing the air to escape shall be provided where necessary and after approval by the Engineer. Where placed against, around, and inside existing structures, lift heights shall be limited so as not to overload the structure. The Engineer shall approve lift heights and procedures. Specific procedures and methods shall be included in the Contractor’s Shop Drawing submittals.

C. Where flowable fill is placed around piping and other elements subject to floating within the fill space, positive means shall be taken to provide temporary balancing loads to prevent uplift, or fill lift heights shall be limited to prevent uplift.

D. Application of loads or placement of other fill materials or concrete on top of flowable fill shall not occur until the flowable fill surface is determined to be suitable for loading per ASTM D6024, subject to the approval of the Engineer.

- END OF SECTION -
SECTION 02229

STEEL CASINGS

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The work covered by this Section includes furnishing all labor, materials, and equipment required to bore and jack casings and/or pipe and to properly complete pipeline construction as described herein and/or shown on the Drawings.

B. Supply all materials and perform all work in accordance with applicable ASTM, AWWA, ANSI, and other recognized standards. Latest revisions of all standards are applicable. If requested by the Engineer, submit evidence that manufacturer has consistently produced products of satisfactory quality and performance over a period of at least two years.

1.02 SUBMITTALS

A. Submit Shop Drawings, product data, and experience in accordance with the requirements of Section 01300 – Submittals of these Specifications.

B. Material Submittals: The Contractor shall provide Shop Drawings and other pertinent specifications and product data as follows:

1. Shop Drawings for casing pipe showing sizes and connection details
2. Design mixes for concrete and grout
3. Casing spacers
4. Casing end seals

C. Experience Submittals: Boring and jacking casings is deemed to be specialty contractor work. If the Contractor elects to perform the work, the Contractor shall provide evidence as required by the General Conditions. A minimum of five (5) continuous years of experience in bore and jack casing construction is required of the casing installer. Evidence of this experience must be provided with the Shop drawings for review.

1.03 STORAGE AND PROTECTION

A. All materials shall be stored and protected in accordance with the manufacturer's recommendations and as approved by the Engineer.
PART 2 – PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. Casing:

1. The casing shall be new and unused pipe. The casing shall be made from steel plate having a minimum yield strength of 35,000 psi. The steel plate shall also meet the chemical requirements of one of the following: ASTM A36; ASTM A139, Grade B, C, D, or E; ASTM A53, Type S or Type E, Grade A or B; or ASTM A252, Grade 2.

2. The thicknesses of casing shown in the following Paragraph B and shown on the Drawings are minimum thicknesses. Actual thicknesses shall be determined by the casing installer based on its evaluation of the required forces to be exerted on the casing when jacking. Any buckling of the casing due to jacking forces shall be repaired at no additional cost to the Owner.

3. The diameters of casing shown in the following Paragraph B and shown on the Drawings are minimum diameters. Larger casings, with the Engineer’s approval, may be provided at no additional cost to the Owner, for whatever reasons the Contractor may decide, whether casing size availability, line and grade tolerances, soil conditions, etc.

B. Casing Sizes:

<table>
<thead>
<tr>
<th>Pipe Diameter (inches)</th>
<th>BORE AND JACK</th>
<th>OPEN CUT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Casing Diameter (inches)</td>
<td>Wall Thickness (inches)</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
<td>0.375</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>0.375</td>
</tr>
<tr>
<td>16</td>
<td>30</td>
<td>0.500</td>
</tr>
<tr>
<td>18</td>
<td>36</td>
<td>0.500</td>
</tr>
</tbody>
</table>

C. Casing Spacers: Casing spacers shall meet the following requirements:

1. Casing spacer band shall be 12 inches wide, two-section flanged, bolt-on style and shall be composed of 14 gauge Type 304 stainless steel with a PVC liner, minimum 0.09-inch thick having a hardness of 85-90 durometer. Runners shall be 2-inch wide, glass-reinforced polymer attached to 10 gauge stainless steel risers that are MIG (GMAW) welded to the spacer band. Spacers shall have a minimum of four runners/risers per band with a length that centers the restrained carrier pipe in the
casing. The height of the runners/risers shall be manufactured such that the pipe does not float within the casing. All hardware used with casing spacers shall be stainless steel as applicable. Casing spacers shall be Model S by Pipeline Seal and Insulator, Inc. (PSI), Model SSI by Advance Products & Systems, Inc. (APS), or Engineer-approved equal.

D. End Seals: Casing pipe end seals shall be pull-on style and shall be composed of high-quality EPDM or synthetic rubber, 1/8-inch thick minimum. Wrap-around style end seals shall not be acceptable. End seals shall be custom-sized to appropriately fit the casing and carrier pipe at each installation. End seals shall be secured to the casing and carrier pipes using heavy duty Type 304 stainless steel banding clamps that are tightened via a worm gear mechanism. End seals shall be Model “C” or Model “S” by Pipeline Seal and Insulator, Inc. (PSI), Model AC or Model AM by Advance Products & Systems, Inc. (APS), or Engineer-approved equal.

E. Grout: Where shown on the Drawings, grout shall be used for filling the void between the casing pipe and the carrier pipe. Cement shall conform to ASTM C150, Type I or Type II. Grout shall have a minimum compressive strength of 100 psi attained within 24 hours.

F. Carrier Pipe: Carrier pipes shall be restrained joint ductile iron pipe and shall meet requirements as specified in Section 15006 – Ductile Iron Pipe. All carrier pipe joints located within the limits of the casing pipe shall be restrained.

1.02 EQUIPMENT

A. A cutting head shall be attached to a continuous auger mounted inside the casing pipe.

B. On casing pipe for gravity sewer over 60 feet in length, the installation equipment shall include a steering head and a grade indicator.

C. The steering head shall be manually controlled from the bore pit. The grade indicator shall consist of a water level attached to the casing which shall indicate the elevation of the front end of the casing or some other means for grade indication approved by the Engineer.

PART 3 – EXECUTION

3.01 GENERAL

A. Investigating the site and determination of the site soil conditions prior to bidding is the sole responsibility of the Contractor. Any subsurface investigation by the Bidder or Contractor must be approved by the appropriate authority having jurisdiction over the site.

B. Casing construction shall be performed so as not to interfere with, interrupt, or endanger roadway surface and activity thereon, and minimize subsidence of the surface, structures, and utilities above and in the vicinity of the casing. Support the ground continuously in a manner that will prevent loss of ground and keep the perimeters and face of the casing, passages, and shafts stable. The Contractor shall be responsible for all settlement
resulting from casing operations and shall repair and restore damaged property to its original or better condition.

C. **Face Protection:** The face of the excavation shall be protected from the collapse of the soil into the casing.

D. **Casing Design:** Design of the bore pit and required bearing to resist jacking forces shall be the responsibility of the Contractor. The excavation method selected shall be compatible with expected ground conditions. The lengths of the casing shown on the Drawings shall be the minimum lengths required. The length of the casing may be extended for the convenience of the Contractor, at no additional cost to the Owner. Due to restrictive right-of-way and construction easements, casing lengths less than the nominal 20-foot length may be necessary.

E. **Highway Crossings:**

1. The Contractor shall be held responsible and accountable for the coordinating and scheduling of all construction work within the highway right-of-way.

2. Work along or across a highway department's right-of-way shall be subject to inspection by such highway department.

3. All installations shall be performed to leave free flows in drainage ditches, pipes, culverts, or other surface drainage facilities of the highway, street, or its connections.

4. No excavated material or equipment shall be placed on the pavement or shoulders of the highway without the express approval of the highway department.

5. In no instance will the Contractor be permitted to leave equipment (trucks, backhoes, etc.) on the pavement or shoulder overnight. Construction materials to be installed which are placed on the right-of-way in advance of construction shall be placed in such a manner as not to interfere with the safe operation of the highway.

3.02 **GROUNDWATER CONTROL**

A. The Contractor shall control the groundwater throughout the construction of the casing.

B. Methods of dewatering shall be at the option and responsibility of the Contractor. Maintain close observation to detect settlement or displacement of surface facilities due to dewatering. Should settlement or displacement be detected, notify the Engineer immediately and take such action as necessary to maintain safe conditions and prevent damage.

C. When water is encountered, provide and maintain a dewatering system of sufficient capacity to remove water on a 24-hour basis keeping excavations free of water until the backfill operation is in progress. Dewatering shall be performed in such a manner that removal of soil particles is held to a minimum. Dewater into a sediment trap and comply
with requirements specified in Section 02270 – Slope Protection and Erosion Control.

3.03 SAFETY

A. Provide all necessary bracing, bulkheads, and shields to ensure complete safety to all traffic, persons, and property at all times during the work. Perform the work in such a manner as to not permanently damage the roadbed or interfere with normal traffic over it.

B. Observe all applicable requirements of the regulations of the authorities having jurisdiction over this site. Conduct the operations in such a manner that all work will be performed below the level of the ground surface or roadbed.

C. Perform all activities in accordance with the Occupational Safety and Health Act of 1970 (PL-596), as amended, applicable regulations of the Federal Government, OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-81 “Safety Requirements for Construction of Tunnel Shafts and Caissons”.

D. Bore pits shall not be left unattended unless proper safety barriers are in place.

E. Construction activities adjacent to roadways, including traffic control, shall meet the requirements of Section 01525 – Working Within the Rights-of-Way of Highways, Railways, or Streets, Section 01570 – Traffic Regulation, and site-specific requirements as shown on the Drawings.

3.04 SURFACE SETTLEMENT MONITORING

A. Provide surface settlement markers for casings 24 inches in diameter and larger. Place marker as specified and as directed by the Engineer. The Contractor shall place settlement markers outside of pavement area, along the centerline of the casing at 20-foot intervals and offset 10 feet each way from the centerline of the tunnel. Markers shall also be placed at each shoulder of the roadway, at each edge of pavement, at the centerline of the pavement, and at 10 and 25 feet in each direction from the centerline of the casing. Tie settlement markers to benchmarks and indices sufficiently removed as not to be affected by the casing operations.

B. Make observations of surface settlement markers, placed as required herein, at regular time intervals acceptable to the Engineer. In the event settlement or heave on any marker exceeds 1 inch, the Contractor shall immediately cease work and using a method approved by the Engineer and the authority having jurisdiction over the project site, take immediate action to restore surface elevations to that existing prior to start of casing operations.

C. Take readings and permanently record surface elevations prior to start of dewatering operations and/or shaft excavation. The following schedule shall be used for obtaining and recording elevation readings: all settlement markers, once a week; all settlement markers within 50 feet of the casing heading, at the beginning of each day; more frequently at the Engineer’s direction if settlement is identified. Make all elevation measurements to the
D. The Contractor shall cooperate fully with jurisdictional personnel. Any settlement shall be corrected by, and at the expense of, the Contractor.

E. Promptly report any settlement and horizontal movement immediately to the Engineer and take immediate remedial action.

3.05 CASING INSTALLATION

A. **Shaft:**

1. Conduct boring and jacking operations from a shaft excavated at one end of the section to be bored. Where conditions and accessibility are suitable, place the shaft on the downstream end of the bore.

2. The shaft shall be rectangular and excavated to a width and length required for ample working space. If necessary, sheet and shore shaft properly on all sides. Shaft sheeting shall be timber or steel piling of ample strength to safely withstand all structural loadings of whatever nature due to site and soil conditions. Keep preparations dry during all operations. Perform pumping operations as necessary.

3. The bottom of the shaft shall be firm and unyielding to form an adequate foundation upon which to work. In the event the shaft bottom is not stable, excavate to such additional depth as required and place a gravel sub-base or a concrete sub-base if directed by the Engineer due to soil conditions.

B. **Jacking Rails and Frame:**

1. Set jacking rails to proper line and grade within the shaft. Secure rails in place to prevent settlement or movement during operations. The jacking rails shall cradle and hold the casing pipe on true line and grade during the progress of installing the casing.

2. Place backing between the heels of jacking rails and the rear of the shaft. The backing shall be adequate to withstand all jacking forces and loads.

3. The jacking frame shall be of adequate design for the magnitude of the job. Apply thrust to the end of the pipe in such a manner to impart a uniformly balanced load to the pipe barrel without damaging the joint ends of the pipe.

C. Boring and jacking of casing pipes shall be accomplished by the dry auger boring method without jetting, sluicing, or wet boring.

D. Auger the hole and jack the casing through the soil simultaneously.

E. Bored installations shall have a bored-hole diameter essentially the same as the outside diameter of the casing pipe to be installed.
F. Execute boring ahead of the casing pipe with extreme care, commensurate with the rate of casing pipe penetration. Boring may proceed slightly in advance of the penetrating pipe and shall be made in such a manner to prevent any voids in the earth around the outside perimeter of the pipe. Make all investigations and determine if the soil conditions are such as to require the use of a shield.

G. As the casing is installed, check the horizontal and vertical alignment frequently. Make corrections prior to continuing operation. For casing pipe installations over 100 feet in length, the auger shall be removed and the alignment and grade checked at minimum intervals of 60 feet.

H. Any casing pipe damaged in jacking operations shall be repaired, if approved by the Engineer, or removed and replaced at Contractor's own expense.

I. Lengths of casing pipe, as long as practical, shall be used except as restricted otherwise. Joints between casing pipe sections shall be butt joints with complete joint penetration, single groove welds, for the entire joint circumference, in accordance with AWS recommended procedures. Prior to welding the joints, the Contractor shall ensure that both ends of the casing sections being welded are square.

J. The Contractor shall prepare a contingency plan which will allow the use of a casing lubricant, such as bentonite, in the event excessive frictional forces jeopardize the successful completion of the casing installation.

K. Once the jacking procedure has begun, it should be continued without stopping until completed, subject to weather and conditions beyond the control of the Contractor.

L. Care shall be taken to ensure that casing pipe installed by boring and jacking method will be at the proper alignment and grade. Contractor shall verify proper alignment and grade after installation to the satisfaction of the Owner and Engineer.

M. The Contractor shall maintain and operate pumps and other necessary drainage system equipment to keep work dewatered at all times.

N. Adequate sheeting, shoring, and bracing for embankments, operating pits, and other appurtenances shall be placed and maintained to ensure that work proceeds safely and expeditiously. Upon completion of the required work, the sheeting, shoring, and bracing shall be left in place, cut off, or removed, as designated by the Engineer.

O. Trench excavation, all classes and type of excavation, the removal of rock, muck, debris, the excavation of all working pits, and backfill requirements of Section 02200 – Earthwork are included under this Section.

P. All surplus material shall be removed from the right-of-way, and the excavation finished flush with the surrounding ground.

Q. Grout backfill shall be used for unused holes or abandoned pipes.
3.06 VENTILATION AND AIR QUALITY

A. Provide, operate, and maintain for the duration of casing installation a ventilation system to meet safety and OSHA requirements.

3.07 ROCK EXCAVATION

A. In the event that rock is encountered during the installation of the casing pipe which, in the opinion of the Engineer, cannot be removed through the casing, the Engineer may authorize the Contractor to complete the crossing by another method.

B. At the Contractor's option, the Contractor may continue to install the casing and remove the rock through the casing.

3.08 INSTALLATION OF PIPE

A. After construction of the casing is complete and has been accepted by the Engineer, install the pipeline in accordance with the Drawings and Specifications.

B. Check the alignment and grade of the casing and prepare a plan to set the pipe at proper alignment, grade, and elevation, without any sags or high spots.

C. The carrier pipe shall be supported within the casing by use of casing spacers sized to limit radial movement to a maximum of 1 inch. In all instances, a spacer shall be placed within 2 feet of the end of each pipe joint to support the carrier pipe. Provide a minimum of two casing spacers per nominal length of pipe. Casing spacers shall be attached to the pipe at maximum 9-foot to 10-foot intervals. All placement of spacers and spacer interval width and/or additional placement intervals shall be in accordance with the spacer manufacturer’s recommendations.

D. Close the ends of the casing with end seals.

3.09 SHEETING REMOVAL

A. Remove sheeting used for shoring from the shaft and off the job site. The removal of sheeting, shoring, and bracing shall be done in such a manner as not to endanger or damage either new or existing structures, private or public properties, and also to avoid cave-ins or sliding in the banks.

-END OF SECTION-
PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor is responsible for implementing best management practices (BMPs) to prevent and minimize erosion and resultant sedimentation in all cleared and grubbed areas during and after construction. This Specification Section covers the work necessary for the installation of structures and measures for the prevention and control of soil erosion. The Contractor shall furnish all material, labor, and equipment necessary for the proper installation, maintenance, inspection, monitoring, reporting, and removal (where applicable) of erosion prevention and control measures in conformance with and subject to the limitations of the latest edition of the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas and as required by the State NPDES General Permit.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02100 – Clearing, Grubbing, and Site Preparation
B. Section 02207 – Aggregate Materials
C. Section 02910 – Final Grading and Landscaping

PART 2 -- PRODUCTS

2.01 GENERAL

A. The requirements specified herein and shown in the Contract Documents are minimum requirements for the preventing or minimizing soil erosion and sediment transport. Contractor shall install and maintain soil erosion and sediment control measures in accordance with the following criteria. Requirements set forth in the latest edition of the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas shall govern in case of conflicting information, unless clearly identified as a deviation from the Manual.

2.02 CONSTRUCTION EXITS

A. Construction exits are stone-stabilized pads underlain with geotextile fabric located at any point where traffic will be leaving a construction site to a public right-of-way, street, alley, sidewalk, or parking area.

2.03 SEDIMENT STRUCTURES
A. Sediment basins, ponds, and traps, are prepared storage areas constructed to trap and store sediment from erodible areas in order to protect properties and stream channels below the construction areas from excessive siltation.

2.04 CHECK DAMS

A. Check dams are barriers composed of logs and poles, large stones, or other materials placed across a natural or constructed drain way.

2.05 TEMPORARY SEEDING AND MULCHING

A. Temporary seeding and mulching are measures consisting of seeding, mulching, fertilizing, and matting utilized to reduce erosion. All cut and fill slopes, including waste sites and borrow pits, shall be seeded when and where necessary to control erosion.

2.06 BALED HAY OR STRAW CHECKS

A. Baled hay or straw erosion checks are temporary measures to control erosion and prevent siltation. Bales shall be either hay or straw, containing five (5) cubic feet or more of material.

B. Baled hay or straw checks shall be used where the existing ground slopes toward or away from the embankment along the toe of slopes, in ditches, or other areas where siltation erosion or water run-off is a problem.

2.07 TEMPORARY SILT FENCES

A. Silt fences are temporary measures utilizing woven wire or other approved material attached to posts with filter cloth composed of burlap, plastic filter fabric, etc., attached to the upstream side of the fence to retain the suspended silt particles in the run-off water.

2.08 RIPRAP

A. Stone for riprap shall be of the size and weight designated on Detail E – Slope Protection Details located on Drawing D03. In addition, the stones shall be durable and of a suitable quality to ensure permanence in the structure and in the climate in which they are to be used. It shall be free of cracks, seams, and other defects that would intend to increase unduly its deterioration from natural causes. Not more than five percent of the stones shall have shale seams, which would tend to separate when exposed to weathering. The inclusion of objectionable quantities of dirt, sand, clay, or rock fines will not be permitted.

B. Precast concrete grids "Monoslabs" or Engineer-approved equal, may be used in lieu of riprap stone for slope protection. The Contractor shall submit in writing to the Engineer, for approval, what materials he desires to use for slope protection.

2.09 ROLLED EROSION CONTROL MAT (RECM)

A. Rolled erosion control mat (RECM) is a protective covering (blanket) or soil stabilization mat used to establish permanent vegetation on steep slopes, channels, or shorelines.

B. RECM shall be composed of either clean wheat straw, curled wood, or coconut fiber
PART 3 -- EXECUTION

3.01 GENERAL

A. The Contractor shall obtain an NPDES permit in accordance with requirements of this section and in compliance with regulations established by the EPA and the ADEM.

B. It is a condition of this Contract that the Contractor exercise planning and forethought in coordinating the Work of protecting the project and adjoining properties from soil erosion by effective and continuous erosion control methods of either a temporary or a permanent nature.

C. Prior to construction, the Contractor shall meet with the Owner and/or Engineer and go over in detail the expected problem areas in regard to the erosion control work. Different solutions shall be discussed so that the best method might be determined. It is the basic responsibility of the Contractor to develop an erosion control plan acceptable to the Owner and Engineer.

D. Before beginning work on the site, the Contractor shall submit to the Engineer, for his review and approval, a plan for control of soil erosion.

E. The Contractor shall plan his clearing work and his entire construction operations in such a manner as to effectively control soil erosion and prevent pollution of streams, ponds, and/or drains as would result from silt or soil runoff or as would result from any materials used in the construction operations such as oil, grease, paints, chemicals, or any construction debris.

F. The Contractor shall intercept and block drainage from the construction site by means of silt fences, silt barriers, and sedimentation pools as required.

G. Silt fences, wherever used on the site, shall consist of hay bales securely fastened in place or of approved permeable-barrier fabric designed to filter water and retain silt. Fabric shall be set securely in the ground and firmly held in place.

H. The erosion control work shall cover all disturbed areas within the sewer right-of-way and/or easement along which the sewer has been installed. Erosion control work shall not be limited to the easement but shall include all disturbed areas as necessary.

I. Areas to receive riprap, or special slope protection materials, shall be graded to the lines and slopes shown on the Drawings, or as directed by the Owner or Engineer. Any loose material shall be compacted by the use of hand or mechanical tampers.

3.02 METHODS OF CONSTRUCTION

A. The Contractor shall use any of the acceptable methods necessary to control soil erosion and prevent the flow of sediment to the maximum extent possible. These methods shall include, but not be limited to, the use of water diversion structures, diversion ditches, and settling basins.
B. Construction operations shall be restricted to the areas of work indicated on the Drawings and to the area which must be entered for the construction of temporary or permanent facilities. The Owner and Engineer have the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of the wetlands and adjacent watercourses. Such work may involve the construction of temporary dikes, dams, sediment basins, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.

C. Excavated soil material shall not be placed adjacent to wetlands or watercourses in a manner that will cause it to be washed away by high water or runoff. Earth berms or diversions shall be constructed to intercept and divert runoff water away from critical areas. Diversion outlets shall be stable or shall be stabilized by means acceptable to the Owner and Engineer. If for any reason construction materials are washed away during the course of construction, the Contractor shall remove those materials from the fouled areas as directed by the Owner or Engineer at no cost to the Owner.

D. For work within easements, all materials used in construction such as excavation, backfill, roadway, and equipment shall be kept within the limits of the easements.

E. The Contractor shall not pump silt-laden water from trenches or other excavations into wetlands or adjacent watercourses. Instead, silt-laden water from excavations shall be discharged within areas surrounded by baled hay or into sediment traps to ensure that only sediment-free water is returned to the watercourses. Damage to vegetation by excessive watering or silt accumulation in the discharge area shall be avoided.

F. Prohibited construction procedures include, but are not limited to, the following:

1. Dumping of spoil material into any streams, wetlands, surface waters, or unspecified locations.

2. Indiscriminate, arbitrary, or capricious operation of equipment in wetlands or surface waters.

3. Pumping of silt-laden water from trenches or excavations into surface waters or wetlands.

4. Damaging vegetation adjacent to or outside of the construction area limits.

5. Disposal of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in wetlands, surface waters, or unspecified locations.

6. Permanent or unauthorized alteration of the flow line of any stream.

7. Open burning of debris at the construction work.
G. Any temporary working roadways required shall be clean fill approved by the Owner and/or
Engineer. In the event fill is used, the Contractor shall take every precaution to prevent the
fill from mixing with native materials of the site. All such foreign fill materials shall be
removed from the site following construction.

3.03 EROSION CHECKS

A. The Contractor shall furnish and install baled hay or straw erosion checks in all locations as
indicated on the Drawings, surrounding the base of all deposits of stored excavated
materials outside of the disturbed area, and where indicated by the Owner or Engineer.
Checks, where indicated on the Drawings, shall be installed immediately after the site is
cleared and before trench excavation is begun at the locations indicated. Checks around
stored material shall be located approximately six (6) feet from the material. Bales shall be
held in place with two (2) inch by two (2) inch by three (3) foot wooden stakes. Each bale
shall be butted tightly against the adjoining bale to preclude short circuiting of the erosion
check.

3.04 MAINTENANCE OF EROSION CONTROL FEATURES

A. The temporary erosion control features installed by the Contractor shall be acceptably
maintained by the Contractor until no longer needed or permanent erosion control methods
are installed. Any materials removed shall become the property of the Contractor.

B. In the event that temporary erosion and pollution control measures are required due to the
Contractor’s negligence, carelessness, or failure to install permanent controls as a part of
Work as scheduled, and are ordered by the Owner or Engineer, such work shall be
performed by the Contractor at his own expense.

3.05 SPECIAL SLOPE PROTECTION

A. The work covered by this section consists of furnishing all materials, equipment, and labor
and performing all necessary operations in connection with the installation of riprap, or other
special slope protection, as called for on the Drawings, or as directed by the Owner or
Engineer.

B. Areas to receive riprap, or special slope protection materials, shall be graded to the lines
and slopes shown on the Drawings, or as directed by the Owner or Engineer. Any loose
material shall be compacted by the use of hand or mechanical tampers.

C. Just prior to placing riprap, or other slope protection material, the Contractor shall install a
Type II separator geotextile. Type II separator geotextile shall be a woven slit film or
monofilament synthetic fabric consisting of polyester or polypropylene. The geotextile shall
be treated to resist degradation due to exposure to ultraviolet light and shall have a
Survivability Class of Class 1 in accordance with AASHTO M288. Minimum overlap of
adjacent rolls of geotextile shall be 18 inches, and minimum transverse end overlap of
geotextile shall be 24 inches. Type II separator geotextile shall meet the following
properties:

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<tr>
<th>PROPERTY</th>
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The geotextile shall be approved by the Owner and/or Engineer for installation and shall then be installed in strict accordance with the manufacturer's specifications for installation and use. Only then, and with the approval of the Owner and/or Engineer, shall the slope protection material be installed on the geotextile.

### 3.06 CONSTRUCTION RUNOFF PERMITTING

A. It shall be the responsibility of the Contractor to determine if a State NPDES General Permit ALR100000 for construction site runoff is required as part of this project. Application for coverage is made by submittal of a Notice of Intent (NOI) and a permit fee to:

ADEM -Water Division Industrial Branch  
1400 Coliseum Blvd.  
Montgomery, Alabama 36110  
Telephone (334) 271-7700

B. The construction general permit requires the Contractor to use BMPs to control storm water runoff. The general permit requires inspections on monthly basis to ensure compliance with State water quality standards. On site precipitation must also be recorded.

- END OF SECTION -
SECTION 02275

RIPRAPH

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. General
B. Construction Methods
C. Cleanup

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02270 – Slope Protection and Erosion Control

1.03 REFERENCES

A. Alabama Department of Transportation Standard Specifications for Highway Construction, latest edition

1.04 DEFINITIONS

A. Class A Erosion Control: A type of anchor system designed for use with solid sod and mulch, normally with an open weave netting.

PART 2 -- PRODUCTS

2.01 STONE FOR RIPRAPH

A. Stone for riprap shall be of the size and weight designated on Detail E – Slope Protection Details located on Drawing D03. In addition, the stones shall be durable and of a suitable quality to ensure permanence in the structure and in the climate in which they are to be used. It shall be free of cracks, seams, and other defects that would intend to increase unduly its deterioration from natural causes. Not more than five percent of the stones shall have shale seams, which would tend to separate when exposed to weathering. The inclusion of objectionable quantities of dirt, sand, clay, or rock fines will not be permitted.

B. Stones which will be used with mortar shall be sound, clean, and newly crushed, and shall be free from dirt, oil, or other material that might prevent good adhesion with the mortar. Stones with a laminated structure shall be avoided. Field stones shall not be used as a source of rock for mortared riprap. Only rock that has been approved by the Engineer shall be used for riprap.

C. All stone for riprap shall consist of field stone or rough unhewn quarry stone as nearly
rectangular in section as practical.

D. When tested as specified in AASHTO T-104, the stone shall show a soundness of not less than 85 percent for 5 cycles, using sodium sulphate. It shall have a percentage wear not over 60 percent by the Los Angeles Test, AASHTO T-96, and shall meet the requirements of Section 02200 – Earthwork for deleterious substances unless otherwise approved by the Engineer.

E. Control of the gradation of the various classes of riprap will be by visual inspection either at the source or the project site by the Engineer.

F. Riprap will be classified in accordance with the guidelines established in Section 814 (Riprap Materials) of the Alabama Department of Transportation Standard Specifications for Highway Construction, latest edition.

G. If a geotextile filter is required, it shall meet the requirements of AASHTO M-288 for Class A Erosion Control and Section 810 of the Alabama Department of Transportation Standard Specifications for Highway Construction, latest edition.

PART 3 -- EXECUTION

3.01 GENERAL

A. All slopes to be treated with riprap shall be trimmed to the lines and grades indicated on the Drawings or as directed by the Engineer. Loose material shall be removed or compacted by methods approved by the Engineer.

B. Unless otherwise indicated on the Drawings or directed by the Engineer, stone riprap shall not be placed on slopes steeper than the natural angle of repose of the riprap material.

3.02 CONSTRUCTION METHODS

A. All riprap construction shall begin at the bottom of the slope and progress upward.

B. The Contractor shall place stones by methods and equipment approved by the Engineer. The methods and equipment used to place stones shall be suitable for the class or type of riprap involved. If the finished riprap implantation installed using the Contractor’s method is not satisfactory, the Engineer reserves the right to have it removed and replaced using hand placement methods and fresh stone.

C. The rock shall be placed as nearly as practical in final position with a minimum of further repositioning. If necessary, larger rocks shall be worked up to the surface when the material on the surface does not meet the weight specification or when the voids next to the foundation material are too large.

D. The quantity of small stones shall be kept as low as possible, sufficient only to fill the voids between the larger stones. Care shall be taken that this small material is well distributed throughout the mass and not allowed to segregate or form pockets of small stone. All bridging shall be broken down. Large interstices, or open channels, or voids shall be filled
by chinking or otherwise manipulating the stones.

E. When riprap is to be built on existing riprap, special care shall be taken to provide positive anchorage of the new riprap to the existing riprap.

F. The finished riprap surface shall in general conform to the slope lines indicated on the Drawings. No objectionable, hazardous, or unsightly projections above the general plane surface will be permitted.

G. The main stones shall be thoroughly chinked and filled with smaller stones by throwing them over the surface in any manner that is practical for the smaller stones to fill the voids. This work shall continue with the progress of the construction. Tamping or vibration of the stones may be required if the stones are loose, or are easily displaced.

3.03 CLEANUP

A. After completion of riprap construction, the Contractor shall remove all debris and construction materials and equipment from the site of the work and leave the entire construction area clean, neat, and in serviceable condition. The Contractor shall restore the site to the original or better condition in accordance with the requirements of Section 02910 – Final Grading and Landscaping.

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SECTION 02500
SURFACE RESTORATION

PART 1 -- GENERAL

1.01 THE REQUIREMENT
A. Provide all labor, equipment, and materials necessary for final grading, topsoil placement, and miscellaneous sitework not included under other Sections but required to complete the work, as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE
A. Section 02200 – Earthwork
B. Section 02276 – Erosion and Sedimentation Control
C. Section 02910 – Final Grading and Landscaping

PART 2 -- MATERIALS

2.01 TOPSOIL
A. Topsoil shall meet the requirements of Section 02200 – Earthwork.

PART 3 -- EXECUTION

3.01 FINAL GRADING
A. Following approval of rough grading, the subgrade shall be prepared as follows:
   1. For riprap, bare soil 24 inches below finish grade or as directed by Engineer.
   2. For topsoil, scarify 2 inches deep at 4 inches below finish grade.

3.02 TOPSOIL PLACEMENT
A. Topsoil shall be placed over all areas disturbed during construction, except those areas which will be paved, graveled, or rip rapped.
B. Topsoil shall be spread in place for lawn and road shoulder seed areas at a 4-inch consolidated depth and at a sufficient quantity for plant beds and backfill for shrubs and trees.
C. Topsoil shall not be placed in a frozen or muddy condition.
D. Final surface shall be hand or mechanically raked to an evenly finished surface to finish grade as shown on Drawings.

E. All stones and roots over 4 inches and rubbish and other deleterious materials shall be removed and disposed of.

- END OF SECTION -
PART 1 -- GENERAL

1.01 REQUIREMENTS

A. Pave width shown on the Drawings and as required for restoration damaged during completion of the Work detailed.

1.02 DEFINITIONS

A. Combined Aggregate: All mineral constituents of asphalt concrete mix, including mineral filler and separately sized aggregates.

B. RAP: Reclaimed asphalt pavement


1.03 DESIGN REQUIREMENTS

A. Prepare asphalt concrete mix design, meeting the following design criteria, tolerances, and other requirements of Section 410, of the Standard Specifications, Asphalt Pavements.

1.04 SUBMITTALS

1. Informational Submittals

1. Asphalt Concrete Mix Formula:

   a. Submit minimum of 15 days prior to start of production.

   b. Submittal to include the following information:

      i. Gradation and portion for each aggregate constituent used in mixture to produce a single gradation of aggregate within specified limits.

      ii. Bulk specific gravity for each aggregate constituent.

      iii. Measured maximum specific gravity of mix at optimum asphalt content determined in accordance with ASTM D2041.

      iv. Properties as stated in Section 410 of the Standard Specifications, for at least four different asphalt contents other than optimum, two below optimum, and two above optimum.

      v. Percent of asphalt lost due to absorption by aggregate.

      vi. Index of Retained Strength (TSR) at optimum asphalt content as determined by AASHTO T283.
vii. Percentage of asphalt cement, to nearest 0.1 percent, to be added to mixture.
viii. Optimum mixing temperature.
ix. Optimum compaction temperature.
x. Temperature-viscosity curve of asphalt cement to be used.
xi. Brand name of any additive to be used and percentage added to mixture.

2. Test Report for Asphalt Cement:
   a. Submit minimum 10 days prior to start of production.
   b. Show appropriate test method(s) for each material and the test results.

3. Manufacturer’s Certificate of Compliance for the following materials:
   a. Aggregate: Gradation, source test results as defined in Section 410 of the Standard Specifications.
   b. Asphalt for Binder: Type, grade, and viscosity-temperature curve.
   c. Prime Coat: Type and grade of asphalt.
   d. Tack Coat: Type and grade of asphalt.
   e. Additives
   f. Mix: Conforms to job-mix formula

4. Statement of qualification for independent testing laboratory.

5. Test Results:
   a. Mix design.
   b. Asphalt concrete core.
   c. Gradation and asphalt content of uncompacted mix.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Independent Testing Laboratory: In accordance with ASTM E329.

2. Asphalt concrete mix formula shall be prepared by approved certified independent laboratory under the supervision of a certified asphalt technician.
1.06 ENVIRONMENTAL REQUIREMENTS

A. Temperature: Do not apply asphalt materials or place asphalt mixes when ground temperature is lower than 10 degrees C (50 degrees F) or air temperature is lower than 4 degrees C (40 degrees F). Measure ground and air temperature in shaded areas away from heat sources or wet surfaces.

B. Moisture: Do not apply asphalt materials or place asphalt mixes when application is wet.

1.07 TEMPORARY ROADWAY PAVING REPAIRS

A. Temporary hot asphalt patching shall be required for both transverse and longitudinal roadway cuts upon completion of backfilling requirements at the end of each day’s work if the road is to be opened for local traffic while work has stopped.

B. Temporary cold patch will only be allowed when approved by the Engineer. Temporary cold patch must be removed and replaced by hot asphalt patching within twenty-four hours of installation.

C. Temporary hot asphalt patching shall be a minimum of 2 inches in depth or as deemed suitable by the Engineer. Temporary paving shall be free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, frozen, deleterious, or objectionable materials, and the decision regarding the suitability of a particular material for use as cold or hot asphalt patching will be at the sole discretion of the Engineer.

D. It shall be the Contractor’s responsibility to maintain the temporary paving in such a condition as to prevent hindrance or hazard to traffic. When final paving is undertaken, the temporary surfacing materials shall be removed to accommodate final paving of types and thicknesses as previously specified herein, the edges of the existing paving shall be neatly and uniformly trimmed, and the permanent pavement shall be placed. No extra compensation will be allowed for provision and maintenance of temporary paving.

E. Steel Plate Bridging

1. At the Engineer’s discretion, steel plate bridging may be used. The Contractor shall adhere to the following chart with respect to trench width and minimum plate thickness.

<table>
<thead>
<tr>
<th>Trench Width (inches)</th>
<th>Minimum Plate Thickness (inches)</th>
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<tbody>
<tr>
<td>10</td>
<td>1/2</td>
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<tr>
<td>23</td>
<td>3/4</td>
</tr>
<tr>
<td>31</td>
<td>7/8</td>
</tr>
<tr>
<td>41</td>
<td>1</td>
</tr>
<tr>
<td>63*</td>
<td>1-1/4*</td>
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</table>

* For trench widths greater than 63 inches, the Engineer will determine plate thickness.

2. Steel plates used for bridging shall extend a minimum of 12 inches beyond all edges of the trench.
3. **For Traffic Speeds Less than 45 mph**: The surrounding pavement shall be cold planed to a depth equal to that of the steel plate selected.

4. **For Traffic Speeds Greater than 45 mph**: Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of two (2) dowels pre-drilled into the corners of the plate and drilled 2 inches (50 mm) into the pavement. Subsequent plates shall be butted to each other. Fine graded asphalt concrete shall be compacted to form ramps, maximum slope 8.5 percent with a minimum 12-inch (305 mm) taper to cover all edges of the steel plates. When steel plates are removed, the dowel holes in the pavement shall be backfilled with either graded fines of asphalt concrete mix, concrete slurry, or an equivalent slurry that is satisfactory to the Owner and/or Engineer.

F. **Crusher Run Aggregate**

1. Temporary patch paving using crusher run aggregate shall be placed only as approved and directed by the Engineer. All compacted material shall conform closely enough to the existing road surface so as to permit safe travel.

2. Crusher run aggregate shall consist of one hundred percent crushed stone conforming to the requirements of the ALDOT Standard Specifications for Highway Construction, Section 825 – Crushed Aggregate Base Materials.

**PART 2 -- PRODUCTS**

2.01 **MATERIALS**

A. **General**:

1. Mix formula shall not be modified except with written approval of Engineer.

2. **Source Changes**:

   a. Should material source(s) change, establish new asphalt concrete mix formula before new material(s) is used.

   b. Perform check tests of properties of plant-mix bituminous materials on first day of production as requested by Engineer to confirm that properties are in compliance with design criteria.

   c. Make adjustments in gradation or asphalt content as necessary to meet design criteria.

B. **Asphalt Concrete**: As specified in Section 410 of the Standard Specifications.

C. **Composition**: Hot-plant mix of aggregate, mineral filler if required, and paving grade asphalt cement. The several aggregate fractions shall be sized, uniformly grades, and combined in such proportions that resulting mixture meets grading requirements of mix formula.

E. Mineral Filler: In accordance with Section 410 of the Standard Specifications.

F. Asphalt Cement: Paving Grade as specified in Section 410 of the Standard Specifications.

2.02 FLEXIBLE PAVEMENT

A. The bituminous material furnished shall be of approved quality and shall meet the requirements of the ALDOT Standard Specifications for Highway Construction, latest edition, for the kind of material furnished.

B. Sampling of tank cars, tank trucks, distributor trucks, or recirculating storage tanks shall be by the use of a sampling valve as prescribed in Figure 3 of AASHTO Designation T-40.

C. Asphalt cement supplied under this Section shall be prepared by the refining of asphaltic petroleum of the four basic viscosity grades of asphalt cement used in pavement construction. The refined asphalt cement shall be homogeneous, shall be free of water, shall not foam when heated at 347 degrees Fahrenheit (175 degrees Celsius), and shall conform to the requirements of the ALDOT Standard Specifications for Highway Construction, Section 804 – Asphalt Materials.

D. Shipping temperature of the asphalt from the refinery shall not exceed 356 degrees Fahrenheit. The material shall be maintained within the specific temperature range during application. The temperature ranges shall meet the requirements of the ALDOT Standard Specifications for Highway Construction, Section 400 – Surfacing and Paving. Specific temperature requirements are listed in ALDOT Standard Specifications for Highway Construction, Section 401.03(d) – Application of Bituminous Material.

E. Cutback asphalt supplied under this Section shall be made from liquid asphalt binder and naphtha solvent, so proportioned and mixed that the finished product shall be homogeneous and shall conform to the requirements of AASHTO Designation M 81 for rapid curing cutback and AASHTO M 82 for medium curing cutback.

F. Emulsified asphalt supplied under this Section shall be a homogeneous emulsification of asphalt and shall show no separation of asphalt or objectional change in viscosity within 3 months after delivery. Separation at any time caused by freezing or contamination shall be cause for rejection. Emulsified asphalt shall conform to the requirements of the ALDOT Standard Specifications for Highway Construction, Section 804.07, and Table number 5.

G. Emulsified petroleum resin shall conform to the ALDOT Standard Specifications for Highway Construction, Section 804.05.

2.03 RIGID PAVEMENT

A. Concrete and reinforcing bars (where required) for rigid pavement shall be Class A conforming to the requirements of Section 03300 – Cast-In-Place Concrete.
2.04 CURB AND GUTTER

A. Concrete for curb, curb and gutter, or valley gutter shall be Class A conforming to the requirements of Section 03300 – Cast-In-Place Concrete.

2.05 SIDEWALKS

A. Concrete for sidewalks shall be Class A conforming to the requirements of Section 03300 – Cast-In-Place Concrete.

2.06 DRIVEWAYS

A. Concrete for driveways shall be Class A conforming to the requirements of Section 03300 – Cast-In-Place Concrete.

PART 3 -- EXECUTION

3.01 GENERAL

A. Traffic Control:

1. In accordance with Section 01570, Traffic Regulation.

2. Minimize inconvenience to traffic, but keep vehicles off freshly treated or paved surfaces to avoid pickup and track of asphalt.

B. Driveways: Repave driveways from which pavement was removed. Leave driveways in as good or better condition than before start of construction.

3.02 PAVEMENT REPLACEMENT

A. The Contractor shall saw cut all paved work areas prior to beginning construction. All saw cuts shall be clean and straight.

B. The Contractor shall replace all pavements following the guidelines established by the ALDOT Standard Specifications for Highway Construction, latest edition, and other authorities having jurisdiction. Contractor shall comply with all asphalt paving requirements of the local municipality having jurisdiction over the specific street to be repaved in accordance with Detail CD – Replacement of Roadway Structure (Trenched Crossing) on Drawing D01 and as follows:

1. City of Birmingham:


c. All material sources shall be on the ALDOT "List of Qualified Materials, Sources, and Devices".

d. The maximum percentage of Recycled Asphalt Pavement (RAP) allowed in asphalt binder and seal shall be the current maximum allowed by ALDOT Standard Specifications for Highway Construction, 2012 edition.

2. **Other Cities:** In accordance with the requirements of the City of Birmingham or as directed by an authorized representative of the specific City.

C. Where paved streets, sidewalks, driveways, and gutters are removed within the construction limits as specified, such pavements shall be replaced in accordance with these Specifications at the Contractor's expense.

D. Final paving at a specific location where a pipeline or manhole has been replaced shall not occur until a minimum of 30 days has passed after the specific replacement has been completed, and all final paving at the specific location shall be finished a maximum of 45 days after the specific replacement has been completed.

E. If multiple pipeline or manhole replacements occur on a single roadway, all final paving over the multiple trenches resulting from the replacements shall be performed at the same time.

F. Where chert, gravel, slag, or other unpaved street or driveway surfaces are removed or damaged, they shall be replaced with the same type of materials that were removed as an incidental part of the Work.

G. Unpaved drives shall be topped with gravel at no additional cost to the Owner.

H. In replacing pavements and unpaved surfaces, the materials used and the construction methods shall comply with the applicable requirements of the ALDOT Standard Specifications for Highway Construction, latest edition.

I. All concrete pavement replaced shall not be less than 4 inches thick or equal to the original if greater than 4 inches.

J. Pavements replaced shall be of the same type of construction as was removed, except that no asphalt surface replaced shall be less than 3 inches thick consisting of a binder and wearing surface.

3.03 **PAVEMENT MILLING**

A. In street areas where pavement replacement occurs, pavement milling shall be performed by the Contractor to eliminate excessive buildup of pavement at the edge of each valley gutter, curb and gutter, or shoulder.
3.04 LINE AND GRADE

A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness.

B. Shoulders: Construct to line, grade, and cross-section shown.

3.05 APPLICATION EQUIPMENT

A. In accordance with Section 410 of the Standard Specifications.

3.06 PREPARATION

A. Prepare subgrade as specified.

B. Existing Roadway:

1. Modify profile by grinding, milling, or overlay methods as approved, to provide meet lines and surfaces and to produce smooth riding connection to existing facility.

2. Remove existing material to a minimum depth of 1-inch.

3. Paint edges of meet line with tack coat prior to placing new pavement.

C. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.07 PAVEMENT APPLICATION

A. General: Place asphalt concrete mixture on approved, prepared base in conformance with Section 410 of the Standard Specifications.

B. Tack Coat:

1. Prepare material, as specified in Section 410 of the Standard Specifications, prior to application.

2. Apply uniformly to clean, dry surface avoiding overlapping of applications.

3. Do not apply more tack coat than necessary for the day’s paving operation.

4. Touch up missed or lightly coated surfaces and remove excess material.

5. Application Rate Minimum 0.05 to 0.15 gallon per square yard of surface area.

C. Pavement Mix:

1. Prior to paving:
a. Sweep primed surface free of dirt, dust, or other foreign matter.

b. Patch holes in primed surface with asphalt concrete pavement mix.

c. Blot excess prime material with sand.

2. Place asphalt concrete pavement mix in two equal lifts.

3. Compacted Lift Thickness:
   
a. Minimum: Twice maximum aggregate size, but in no case less than 1 inch.

b. Maximum: 4 inches.

4. Total Compacted Thickness: as shown

5. Apply such that meet lines are straight and edges are vertical.

6. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.

7. Joints:
   
a. Offset edge of each layer a minimum of 6 inches so joints are not directly over those in underlying layer.

b. Offset longitudinal joints in roadway pavements so longitudinal joints in wearing layer coincide with pavement centerlines and lane divider lines.

c. Form transverse joints by cutting back on previous day’s run to expose full vertical depth of layer.

8. Succeeding Lifts: Apply tack coat to pavement surface between each lift.

9. After placement of pavement, seal meet line by painting a minimum of 6 inches on each side of joint with cut-back or emulsified asphalt. Cover immediately with sand.

D. Compaction: Roll until roller marks are eliminated and minimum percent compaction as stated in the Standard Specifications.

E. Tolerances:

1. General: Conduct measurements for conformity with crown and grade immediately after initial compression. Correct variations immediately by removal or addition of materials and by continuous rolling.

2. Completed Surface or Wearing Layer Smoothness:
a. Uniform texture, smooth, and uniform to crown and grade.

b. Maximum Deviation: 1/8 inch from lower edge of a 12-foot straightedge, measured continuously parallel and at right angle to centerline.

c. If surface of completed pavement deviates by more than twice specified tolerances, remove and replace wearing surface.

3. Transverse Slope Maximum Deviation: ¼ inch in 12 feet from rate of slope shown

4. Finished Grade:
   a. Perform field differential level survey on maximum 50-foot meter grid and along grade breaks.
   b. Maximum Deviation: 0.02 foot from grade shown.

F. Seal Coat:

1. General: Apply seal coat of paving grade or emulsified asphalt to finished surface at longitudinal and transverse joints, joints at abutting pavements, areas where asphalt concrete was placed by hand, patched surfaces, and other areas as directed by Engineer.

2. Preparation:
   a. Surfaces that are to be sealed shall be maintained free of holes, dry, and clean of dust and loose material.
   b. Seal in dry weather and when temperature is above 2 degrees C (35 degrees F).

3. Application:
   a. Fill cracks over 1/16-inch in width with asphalt-sand slurry or approved crack sealer prior to sealing.
   b. When sealing patched surfaces and joints with existing pavements, extend minimum 6 inches beyond edges of patches.

3.08 PAVEMENT OVERLAY

A. Preparation:

1. Remove fatty asphalt, grease drippings, dust, and other deleterious matter.

2. Surface Depressions: Fill with asphalt concrete mix, and thoroughly compact.
3. Damaged Areas: Remove broken or deteriorated asphalt concrete and patch as specified in Article Patching.

B. Application:

1. Tack Coat: As specified in this section.
2. Place and compact asphalt concrete as specified in Article Pavement Application.
3. Place first layer to include widening of pavement and leveling of irregularities in surface of existing pavement.
4. When leveling to irregular surfaces and raising low areas, the actual compacted thickness of any one life shall not exceed 2 inches.
5. Actual compacted thickness of intermittent areas of 120 square yards or less may exceed 2 inches, but not 4 inches.
6. Final wearing layer shall be of uniform thickness, and meet grade and cross-section as shown.

3.09 PATCHING

A. Preparation:

1. Remove damaged, broken, or unsound asphalt concrete adjacent to patches. Trim to straight lines exposing smooth, sound, vertical edges.
2. Prepare patch subgrade as specified in Section 410 of the Standard Specifications.

B. Application:

1. Patch Thickness: 3 inches or thickness of adjacent asphalt concrete, whichever is greater.
2. Place asphalt concrete mix across full width of patch in layers of equal thickness.
3. Spread and grade asphalt concrete with hand tools or mechanical spreader, depending on size of area to be patched.

C. Compaction:

1. Roll patches with power rollers capable of providing compression of 200 to 300 pounds per linear inch. Use hand tampers where rolling is impractical.
2. Begin rolling top course at edges of patches, lapping adjacent asphalt surface at least ½ the roller width. Progress toward center of patch overlapping each preceding track by at least ½ width of roller.
3. Make sufficient passes over entire area to remove roller marks and to produce desired finished surface.

D. Tolerances:

1. Finished surface shall be flush with and match grade, slope, and crown of adjacent surface.

2. Tolerance: Surface smoothness shall not deviate more than plus ¼-inch or minus 0 millimeter when straightedge is laid across patched area between edges of new pavement and surface of old surfacing.

3.10 FIELD QUALITY CONTROL

A. General: Provide services of approved certified independent testing laboratory to conduct tests.

B. Field Density Tests:

1. Perform tests from cores or sawed samples in accordance with AASHTO T230 and AASHTO T166.

2. Measure with properly operating and calibrated nuclear density gauge in accordance with ASTM D2041.

3. Maximum Density: In accordance with ASTM D2041, using sample of mix taken prior to compaction from same location as density test sample.

C. Testing Frequency:

1. Quality Control Tests:
   a. Asphalt Content, Aggregate Gradation: Once per every 500 tons of mix or once every 4 hours, whichever is greater.
   b. Mix Design Properties, Measured Maximum (Rice’s) Specific Gravity: Once every 1,000 tons or once every 8 hours, whichever is greater.

2. Density Tests: Once every 500 tons of mix or once every 4 hours, whichever is greater.

- END OF SECTION -
SECTION 02600

WASTEWATER FLOW CONTROL

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall design and provide all materials, labor, supervision, maintenance, equipment, fuel, fuel storage, etc. required to implement temporary bypass pumping for the purpose of diverting existing wastewater flows around portions of the work area for the entire duration of the project, or portions thereof, when his activities interfere with normal functioning of the sanitary sewer system and associated facilities in any way.

B. The design, installation, and operation of each temporary bypass pumping system shall be the Contractor's responsibility throughout the duration of the project. The Contractor shall employ the services of a vendor who can demonstrate to the Owner and/or Engineer that he specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five references of projects of a similar size and complexity as this Project performed by his firm within the past three years. All components of the temporary bypass pumping system shall be provided to the Contractor by a single vendor.

C. The bypass system shall meet the requirements of all local, state, and/or federal codes and regulatory agencies having jurisdiction.

D. In the event, during the performance of any form of wastewater flow control, that raw wastewater or other liquids/solids being bypassed are spilled, discharged, leaked, or otherwise deposited into the open environment, including, but not limited to, on the ground, on roadways, into creeks, and/or into storm sewers, due to the Contractor's work, the Contractor shall be responsible for the cleanup of these liquids/solids and stabilization of the area affected, all in compliance with any and all regulatory requirements. The Contractor shall immediately notify the Owner and/or Engineer of the spill/discharge/leak/deposit after it occurs and shall immediately correct the violation. The cleanup and stabilization work shall be performed at the Contractor's expense with no additional cost to the Owner. If the Owner and/or Engineer is required to alleviate any prohibited spill/discharge/leak/deposit, the Contractor shall be charged the Owner's cost times two, which shall be deducted from the Contract Amount. The Contractor shall also be responsible for any fines imposed by local, state, and/or federal agencies for failure to maintain flows or contain spills and/or overflows due to the Contractor's work.

E. If, at any time, the Contractor is unable to properly bypass pump the wastewater, construction will be stopped until the Contractor is able to continue work in an acceptable manner. The Contractor will not receive extra Contract Time for delays caused by improper equipment, labor, or breakdowns.

F. When the Contractor is actively performing work on a specific sanitary sewer interceptor, Contractor shall be responsible for maintaining the specific sanitary sewer interceptor in service without wastewater spills during the entirety of the construction period when the bypass pumping system is NOT in operation.
G. The Contractor shall implement best management practices to prevent and minimize erosion and resultant sedimentation during all bypass pumping activities in accordance with Section 02270 – Slope Protection and Erosion Control.

H. Contractor shall be responsible for any and all damages caused to any and all portions of the existing sanitary sewer system where the Contractor is actively working as a result of surge during the entirety of each bypass pumping operation.

J. Contractor shall not be allowed to let active main line sewers empty or spill into open trenches during execution of the work. All main line sewers connecting upstream from a line being repaired or replaced shall be plugged and bypassed. The bypassed flow shall be routed to the existing sewer downstream from the work in a manner that does not allow flow to backup into the work area. Some leakage may be allowable only if (in the opinion of the on-site inspector) it is unavoidable.

K. Contractor shall dispose of sewage contaminated soil in the trench by removing the containing soil (generally below the crown of the pipe), dewatering the soil, and spreading and or dumping the soil at a State approved disposal site.

L. Contractor shall immediately cleanup the area of an SSO, remove and dispose of debris, then place lime over the contaminated area.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01010 – Summary of Work
B. Section 01015 – Prosecution and Progress
C. Section 01300 – Submittals
D. Section 01510 – Temporary Utilities
E. Section 01530 – Protection of Existing Facilities
F. Section 01570 – Traffic Regulation
G. Section 02270 – Slope Protection and Erosion Control
H. Section 15006 – Ductile Iron Pipe
I. Section 15009 – High Density Polyethylene (HDPE) Pipe

1.03 SUBMITTALS

A. **Bypass Pumping Plan**: The Contractor shall submit to the Owner and/or Engineer, for review and approval, detailed drawings and descriptions outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing wastewater flows for each bypass pumping operation that will be performed. The plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials, and all other incidental items necessary and/or required to ensure
proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these Contract Documents. Bypass pumping equipment and materials shall not be installed until all equipment, materials, provisions, and requirements have been reviewed and approved by the Owner and/or Engineer. The Bypass Pumping Plan shall include, but shall not be limited to, the following:

1. Staging areas for pumps
2. Plugging methods and types of plugs
3. Number, size, material, method of installation, and location of suction piping
4. Number, size, material, method of installation, and location of discharge piping
5. Bypass pump sizes, capacities, number of each size to be on site, basis of selection, and power requirements
6. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range)
7. Standby diesel engine size and location
8. Thrust and restraint block sizes and locations
9. Sections showing suction and discharge pipe depth, embedment, select fill, and special backfill
10. Method of noise control for each pump and diesel engine
11. Any temporary pipe supports and anchoring required
12. Design for access to bypass pumping locations indicated on the Drawings or in the Specifications
13. Selection of bypass pumping pipe size(s) and material(s) (include method of connections to pump(s) and other piping)
14. Schedule for installation of and maintenance of bypass pumping lines
15. Description of how bypass pumping system will be manned and monitored during all times it is in operation
16. Demonstration that upstream pipelines, structures, etc. will not overflow from surcharging
17. Demonstration that force main discharge will not overflow downstream pipelines, structures, etc.
18. Show 100% standby for pumps.
19. Show force main pipe material and thickness can withstand all normal operating and surge pressures with a safety factor of 2.0.
20. Denote any conditions that will cause pumps to lose suction lift (prime) and describe procedures to rectify.

21. Show that the emergency switchover from primary to secondary pumping will be automatic should equipment fail.

22. Show emergency plan to be used if flooding occurs at work site.

23. Show suction and discharge piping is protected from possible damage from construction activities.

24. Show any planned shifting of bypass equipment during construction.

25. The start date, duration, and end date of the temporary bypass pumping operations

B. Shutdown Plan: Submit a Shutdown Plan for each bypass pumping operation to be performed in accordance with Section 01300 – Submittals.

PART 2 -- PRODUCTS

2.01 PUMPING EQUIPMENT

A. Contractor shall provide the bypass pumping system from one of the following vendors:

1. Godwin Pumps by Xylem Corporation

2. Rain for Rent

3. Sunbelt Rentals

B. General:

1. The sanitary sewer interceptors to be replaced under this Project are an integral part of the Owner’s wastewater system that must be kept in service at all times. It is essential to the operation of the existing wastewater system that there shall be no interruption in the conveyance of wastewater to, through, and from the sanitary sewer interceptors to be replaced throughout the duration of the project. The Contractor shall provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and backup units as required), piping, and all other labor and equipment necessary to intercept the wastewater flow before it reaches the point where it would interfere with the Work or a portion thereof, carry it past the Work or the portion thereof, and return it to the existing system downstream of the Work or portion of the Work.

2. It shall be the Contractor’s responsibility to provide pumping equipment that is adequate for the performance of the Work or portions thereof under this Contract within the time specified. All pumping equipment shall be kept in satisfactory operating condition, shall be capable of safely and efficiently performing the required bypass pumping work, and shall be subject to review by the Owner and/or Engineer at any time within the duration of the Contract. All bypass pumping work hereunder
shall be performed in strict accordance with all applicable requirements of OSHA and local agencies.

3. Sanitary sewer system operational requirements take precedence over Contractor activities. Therefore, interruption of operations must be coordinated with and are subject to the operational requirements of the Owner and/or Engineer in accordance with Section 01530 – Protection of Existing Facilities.

4. The Contractor shall provide any and all temporary utilities and services required for operation of the bypass pumping equipment, shall maintain these utilities and services during the Contract period, and shall remove them upon completion of the Work, all in accordance with Section 01510 – Temporary Utilities.

5. Pumps shall be fully-automatic, self-priming units that do not require the use of foot valves, vacuum pumps, or diaphragm pumps in the priming system.

6. The duty pump(s) and the backup pump(s) shall be diesel-powered.
   a. Contractor shall be responsible for providing and storing a sufficient quantity of diesel fuel on-site to operate the duty pump(s) for a minimum of 24 hours at all times during performance of the Work.
   b. Contractor shall check the level in the diesel fuel tank(s) and shall re-fill the tank(s) to full capacity on a daily basis.

7. All pumps used shall be constructed to allow dry running for long periods of time to accommodate the cyclical nature of the flows.

8. Each pump and driver shall be rated for continuous duty operation over the specified range of conditions without cavitating or overheating and without excessive vibration or noise. In addition, each pump and driver shall be rated to intermittently operate at shut-off head against a closed discharge valve for periods of not less than five (5) minutes without excessive cavitation, overheating, or vibration.

9. All pumps shall be equipped with sound attenuation measures which reduce noise levels to a maximum of 75 decibels at a distance of 50 feet from the equipment during all periods of operation. If equipment is operated between the hours of 8:00 p.m. and 6:00 a.m., the equipment shall also be provided with a sound attenuation enclosure consisting of a three-sided enclosure with a roof constructed of a 2-inch x 4-inch lumber frame with 1/2-inch plywood sheathing and 2-inch styrofoam panels attached to the inside of the entire enclosure. The enclosure shall be portable to allow the enclosure to be moved when bypass pumping equipment is moved.

10. Contractor shall provide the necessary stop/start controls for each pump.

11. Contractor will not be permitted to stop or impede any flows to, through, or from the sanitary sewer interceptors under any circumstances, except as approved by the Owner and/or Engineer.

B. Temporary Bypass Pumping Requirements: The Contractor shall be responsible for providing the temporary bypass pumping facilities as described herein. Requirements for
the bypass pumping system are as follows:

1. Bypass pumping system shall be continuously operated while modifications are being made to the specific sanitary sewer interceptor around which flow is being bypassed. Bypass pumping system shall be manned and monitored onsite at all times the system is in operation.

2. At a specific bypass pumping operation, the bypass pumping equipment shall be capable of pumping raw wastewater at a rate approved by the Owner and/or Engineer. Prior to starting any specific bypass pumping operation, Contractor shall confirm with the Owner and Engineer that the flows stated therein are acceptable. If instructed by the Owner and/or Engineer, Contractor shall increase the capacity of a specific bypass pumping operation to also handle additional flows that may occur during periods of rainstorms.

3. For each bypass pumping operation, Contractor shall determine the number of pumps required to convey the approved bypass pumping flow. Contractor shall provide a backup pump for the bypass pumping system. The backup pump shall be piped into the suction and discharge headers for the primary bypass pumping system and shall be online and isolated from the primary system by a valve.

4. The Contractor shall provide all pipeline plugs, pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow for the specific sanitary sewer interceptor to be bypassed can be safely diverted around the work area while the sanitary sewer interceptor is being modified. No leakage from valves, piping, and connections will be allowed during operation.

5. The Contractor shall make all arrangements for bypass pumping during the time periods when a specific sanitary sewer interceptor or portion thereof is shut down for any reason. The bypass system must be capable of overcoming any pressure in the Owner’s existing force main, if applicable, into which it discharges.

6. Discharge location for each bypass pumping operation shall be an appropriate manhole, structure, pipeline, vehicle, or container, provided that the Contractor demonstrates that the existing manhole, structure, pipeline, vehicle, or container has the capacity to accept or transfer the flow. All discharge locations shall be approved by the Owner and/or Engineer. Under no circumstances shall the fluid or solids being bypassed be discharged, stored, or deposited into the open environment, including, but not limited to, on the ground, on roadways, into creeks, and/or into storm sewers.

7. Discharge piping shall be constructed of ductile iron, polyethylene, or Acrylonitrile-Butadiene-Styrene (ABS) pipe with positive, restrained joints. All pipe materials utilized in temporary bypass pumping during construction shall be in good condition and shall be free of defects and leaks; any defective material shall be replaced by the Contractor at no cost to the Owner and Engineer. Under no circumstances will aluminum “irrigation” type piping or glued PVC pipe be allowed. Discharge hose shall only be allowed in short sections if specifically approved by the Owner and/or Engineer.

a. Ductile iron pipe shall be in accordance with Section 15006 – Ductile Iron Pipe.
b. Polyethylene pipe shall be in accordance with Section 15009 – High Density Polyethylene (HDPE) Pipe.

c. ABS pipe shall comply with the requirements of ASTM D2751.

8. Contractor shall provide a separate control panel for each pump.

9. Contractor shall provide pressure and vacuum gauges on the bypass pumping system suction and discharge headers.

10. Contractor shall provide pressure switches to start and stop the pumps.

PART 3 -- EXECUTION

3.01 PREPARATION

A. The Contractor shall be responsible for locating all existing utilities in the area where the Contractor selects to locate the bypass pumps and pipelines, including locating the Owner’s existing discharge force main, if applicable, for connection to the bypass piping. The Contractor shall locate his bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the Owner and/or Engineer.

B. During all bypass pumping operations, the Contractor shall protect the bypass pumps, bypass pipelines, discharge pipeline or structure, and influent pipeline or structure from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to the temporary pumping system or sanitary sewer interceptors caused by human or mechanical failure.

C. Contractor shall keep spare parts for pumps and piping onsite as required. Contractor shall maintain adequate hoisting equipment for each pump and accessories on-site.

3.02 INSTALLATION AND REMOVAL

A. The Contractor shall pipe sections or make connections to the existing pipelines or structures and construct temporary bypass pumping structures only at the access location and as may be required to provide an adequate suction conduit.

B. Each temporary bypass pumping system shall be tested before placing the system in operation. Testing periods shall occur only between the hours of 8:30 a.m. and 3:00 p.m., Monday through Wednesday. Testing of bypass pumping system shall NOT be allowed Thursday through Sunday, on the Owner or Engineer’s scheduled Holidays, or on the day immediately prior to an Owner or Engineer’s scheduled Holiday. In addition, testing of bypass pumping system shall only be performed during the Owner and Engineer’s normally scheduled work days. Testing shall include leakage testing, pressure testing, and operational testing.

1. **Leakage and Pressure Test:** Contractor shall perform leakage and pressure testing for a minimum of two (2) hours on the pump suction piping and discharge piping in accordance with Article 3.03, Paragraph A.
2. **Operational Test:** Contractor shall operate the temporary bypass pumping system for as long as necessary to demonstrate reliable operation of the entire system, including but not limited to pumps, controls, and alarms, to the satisfaction of the Owner and/or Engineer prior to beginning any work in the area which is being bypassed.

C. Plugging or blocking of wastewater flows shall incorporate primary and secondary plugging devices. Plugging devices shall be designed so that all or any portion of the plugged flow can be released. When plugging or blocking is no longer needed for performance of the Work or portions thereof, the plugs shall be removed in a manner that permits the wastewater flow to slowly return to normal without surge, surcharging, or causing other major disturbances downstream.

D. The installation of the bypass pipelines is prohibited in all saltmarsh/wetland areas. The temporary bypass pumps and pipeline must be located off existing roadways as much as practicable. If the bypass pipelines cross a roadway, the Contractor shall place the bypass pipelines in trenches and cover them with temporary pavement. Contractor shall take appropriate steps to ensure that all pumps, piping, and hoses that carry raw wastewater are protected from traffic, and all required traffic control shall be performed in accordance with the requirements of Section 01570 – Traffic Regulation. At all times during all bypass pumping operations, Contractor shall maintain access for Owner’s personnel to the entirety of the sanitary sewer system and portions thereof, in accordance with Section 01530 – Protection of Existing Facilities.

E. At the conclusion of a specific bypass pumping operation and when all of the modifications to the specific sanitary sewer interceptor are complete, tested, and ready for operation, Contractor shall demonstrate the new equipment or system for a duration of time as approved by the Owner and/or Engineer. At the completion of the demonstration period and once written permission is granted by the Owner and/or Engineer, Contractor shall remove all temporary bypass components, restore all pavement, and restore the area around the specific sanitary sewer interceptor and temporary bypass pumping system to original pre-construction conditions to the satisfaction of the Owner and Engineer.

1. At a specific bypass pumping operation, Contractor may stop operation of the bypass pumping system during times and days that are not included in the normal time of work as specified in Section 01015 – Prosecution and Progress. Prior to stopping operation of the bypass pumping system, Contractor shall demonstrate to the satisfaction of the Owner or Engineer that the connections between the existing sanitary sewer interceptor and/or manholes and newly-installed sanitary sewer interceptor and/or manholes are watertight with no leakage and that there is no debris in the sanitary sewer interceptor and manholes that would impede wastewater flow prior to de-energizing the bypass pumping system.

3.03 QUALITY CONTROL AND MAINTENANCE

A. **Testing:** Contractor shall perform leakage and pressure tests on the bypass pump suction and discharge piping using clean water prior to actual operation. Pressure tests shall be conducted at a test pressure equivalent to 150 percent of the design pressure. The Owner and/or Engineer shall be given 24 hours notice prior to testing.

B. **Inspection:** After installation, the bypass piping shall be inspected and approved by the Owner and/or Engineer prior to beginning any work on the sewer section which is being bypassed. For the entire duration that any specific bypass pumping system is in operation,
Contractor shall continuously monitor onsite the bypass pumping system to ensure that the system is correctly working and shall keep a written log of the pump inspection results.

C. Maintenance/Monitoring: Contractor shall ensure that the bypass pumping system is properly maintained. Bypass pumping system shall be continuously manned and monitored by a responsible and competent mechanic/operator who is capable of starting, stopping, refueling, and maintaining the pumps at all times that the system is in operation.

-END OF SECTION-
SECTION 02604

UTILITY STRUCTURES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish all materials, labor, equipment, and tools required for the design, fabrication, delivery, and installation of utility structures and appurtenances in accordance with the Drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals
B. Section 02200 – Earthwork
C. Section 02575 – Pavement Repair
D. Section 02910 – Final Grading and Landscaping
E. Section 03200 – Reinforcing Steel
F. Section 03250 – Concrete Accessories
G. Section 03300 – Cast-in-Place Concrete
H. Section 03400 – Precast Concrete
I. Section 03600 – Grout
J. Section 05540 – Castings
K. Section 15008 – PVC Pipe

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ASTM C139 Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes

2. ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections
3. **ASTM C857** Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

4. **ASTM C923** Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

5. **ASTM D149** Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies


7. **ASTM D638** Standard Test Method for Tensile Properties of Plastics

8. **ASTM D1000** Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications

9. **ASTM D1002** Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)

10. **ASTM D1044** Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion


12. **ASTM D2671** Standard Test Methods for Heat-Shrinkable Tubing for Electrical Use

13. **ASTM E28** Standard Test Methods for Softening Point of Resins Derived from Naval Stores by Ring-and-Ball Apparatus

14. **ASTM G17** Standard Test Method for Penetration Resistance of Pipeline Coatings (Blunt Rod)

**1.04 SUBMITTALS**

A. Submit samples and/or Shop Drawings in accordance with Section 01300 – Submittals.

B. In addition to items listed in Section 03400 – Precast Concrete, Shop Drawings shall include, but not be limited to:

1. Design and construction details of all precast concrete manhole components, including materials, reinforcement, and details of joints between base, riser, and top cone sections, all with clearly marked dimensions

2. Design and construction details of all manhole grade rings, including details of joints

3. Material certificates on all piping materials
4. Structural design calculations sealed by a Professional Engineer registered in the State of Alabama. Design calculations for precast manholes and vaults shall include confirmation structures adequately resist flotation when they are totally empty and subjected to groundwater full height of structure.

5. Manufacturer’s installation instructions, procedures, and materials for external manhole sleeves

6. Manufacturer’s certification indicating external manhole sleeves are manufactured in an ISO 9002 registered facility

7. Results of leakage test

1.05 QUALITY ASSURANCE

A. External Manhole Sleeve Manufacturer Qualifications:

1. External manhole heat-shrink sleeves shall be manufactured in an ISO 9002 registered facility.

2. Manufacturer shall have the capability of producing irradiated and cross-linked polyethylene coating to allow shrinking of coating material in circumferential direction under influence of heat.

3. Manufacturer shall have the capability of providing manufacturer-employed field service personnel for onsite assistance as required.

B. External Manhole Sleeve Installer Qualifications:

1. Installer shall be experienced with installation techniques.

2. Installer shall have attended a minimum of one (1) day of training at the external manhole sleeve manufacturer’s facility or onsite with the external manhole sleeve manufacturer’s representative.

C. Pre-Installation Meeting: External manhole sleeve manufacturer’s representative and external manhole sleeve installer shall attend a pre-installation meeting with the Contractor and Engineer one (1) week prior to the start of installation of the initial external manhole sleeve. At the meeting, the attendees shall review surface preparation, installation, field quality control, backfilling, protection, and coordination with other work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. External Manhole Sleeve Delivery:

1. Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, batch or lot number, and date of manufacture.

2. Protect individual sleeves to prevent adherence to other sleeves, packing material,
and containers in accordance with manufacturer’s instructions.

B. **External Manhole Sleeve Storage:**

1. Store materials in accordance with manufacturer’s instructions.
2. Keep containers sealed until ready for use.
3. Do not store at temperatures above 95 degrees Fahrenheit (35 degrees Celsius) or below -4 degrees Fahrenheit (-20 degrees Celsius).
4. Protect materials and containers from exposure to direct sunlight, rain, snow, dirt, and dust.
5. Store materials off ground or floor in ventilated area.

C. **External Manhole Sleeve Handling:** Protect materials during handling and installation to prevent damage or contamination in accordance with manufacturer’s instructions.

D. Delivery, storage, and handling of all other materials specified herein, other than the external manhole sleeves, shall be in accordance with the manufacturer’s requirements.

**1.07 WARRANTY**

A. External manhole sleeves shall be warranted by the applicator and/or manufacturer against failure for a minimum of two (2) years after acceptance by the Owner; in no case shall the warranty be less than the manufacturer’s published standard warranty period.

1. Failure of the manhole sleeves will be deemed to have occurred if they fail to prevent groundwater infiltration or prevent the internal deterioration or corrosion of the manhole. If any such failure occurs within the warranty period, the damage shall be repaired by the Contractor in a manner satisfactory to the Owner at no cost to the Owner within 60 days after written notification of the failure.

**PART 2 -- PRODUCTS**

**2.01 PRECAST MANHOLES**

A. Precast utility structures shall be furnished with waterstops, sleeves, and openings as noted on the Drawings. Box out for wall pipes shall accurately conform to the sizes and elevations of the adjoining pipes. Precast utility structures shall be watertight and shall conform to the requirements of ASTM C478 and ASTM C857 with the following modifications thereto:

1. Materials shall conform to Section 03400 – Precast Concrete.
2. Manholes shall meet the following:
a. Manhole section shall have an internal diameter of 4 feet unless noted otherwise on the Drawings.

b. Minimum manhole wall thicknesses shall be 5 inches for 4-foot and 5-foot diameter manholes, 6 inches for 6-foot diameter manholes, and 7 inches for 7-foot diameter manholes.

c. Manholes with 5-foot diameter base sections shall be provided with 4-foot diameter riser section(s) and a transition section in between the base section and riser section(s) to account for the change in manhole diameter.

d. Top cone sections shall have a minimum 8-inch thick upper wall and shall not exceed 3 feet in height. Cones shall be the concentric type; flat slab and eccentric conical sections are prohibited.

e. Manholes and utility structures shall include ballast concrete and/or other means necessary to ensure manholes resist flotation when empty and subjected to groundwater full height of structure.

f. Precast manholes shall be as manufactured by Oldcastle Precast Inc. or Tindall Corporation.

3. The inside of each precast section shall be marked with date of manufacture and name or trademark of manufacturer.

4. The interior and exterior surfaces of the utility structure shall have a smooth, hard finish and shall be free from cracks, chips, spalls, loose dirt, or any other defects.

5. No more than two lift holes may be cast or drilled in each section.

6. Dimensions shall be as shown on the Drawings.

7. Covers and frames shall be as specified in Article 2.09 herein.

8. Mechanical details such as piping, electrical, and other details shall be as shown on the Drawings.

B. Joints between manhole and utility structure components (base, risers, top cones, etc.) shall be tongue and groove-type. The circumferential and longitudinal steel reinforcement shall extend into the tongue and groove ends of the joint without breaking the continuity of the steel.

C. Polypropylene Steps:

1. Fabricate from minimum 1/2 inch, Grade 60, steel bar meeting ASTM A615/A615M.

2. Polypropylene encasement shall conform to ASTM D4101.

4. Embedment: 3 1/2 inch minimum and 4 1/2 inch minimum projection from face of concrete at point of embedment to center of step.

5. Cast in manhole sections by manufacturer. Installed at maximum 16 inch intervals.


7. Model PS1 PF, as manufactured by M.A. Industries, Inc.

2.02 CONCRETE

A. Concrete shall conform to Section 03300 – Cast-in-Place Concrete. Except where otherwise specified or indicated, concrete shall have a 28-day minimum compressive strength of 4,000 psi. All concrete shall be air-entrained.

2.03 REINFORCING STEEL

A. Manhole sections shall be provided with internal reinforcing steel in conformance with Section 03200 – Reinforcing Steel.

2.04 PRECAST CONCRETE

A. Precast concrete shall conform to Section 03400 – Precast Concrete.

2.05 CASTINGS

A. Castings shall conform to Section 05540 – Castings. Casting shall be of the type and size indicated on the Drawings.

2.06 JOINT GASKET AND WATERSTOP

A. Joints shall be sealed with a pre-lubricated profile gasket and a ring of hydrophilic waterstop.

1. Gaskets shall be one-piece construction and shall be suitable for use in systems with up to 13 psig of water pressure. Gaskets shall be Tylox® SuperSeal™ by Hamilton Kent or Engineer-approved equal.

2. Waterstop shall be a rubber-based product formulated with hydrophilic material that expands when exposed to moisture. Waterstop shall be ConSeal CS-231 Controlled Expansion Waterstop Sealant by Concrete Sealants, Inc. or Engineer-approved equal.

3. Precast component joints shall be constructed with necessary bevels to accommodate the one-piece gasket and the hydrophilic waterstop.

2.07 FLEXIBLE RUBBER SLEEVE
A. The spring set type shall have a stainless steel interior power sleeve or expander and shall be the PSX assembly by Press Seal Gasket Corporation, the NPC Kor-N-Seal assembly by Trelleborg Pipe Seals Milford, Inc., or Lock Joint Flexible Manhole Sleeve by Interpace Corporation.

B. The cast-in-place type shall conform to ASTM C923 and shall include stainless steel take-up clamps.

C. Flexible seal assemblies shall permit at least an eight (8) degree deflection from the center line of the opening in any direction while maintaining a watertight connection.

2.08 RUBBER BLADDER

A. The rubber bladder seal shall conform to ASTM C923, shall be suitable for pressure testing at a minimum of 10 psi, and shall have a 3/8-inch minimum wall thickness.

B. The rubber bladder seal shall contain an environmentally safe, anti-bacterial compound which turns into a high viscosity gel when in contact with pressurized water.

C. The rubber bladder seal shall be NPC Contour Seal by Trelleborg Pipe Seals Milford, Inc. or Engineer-approved equal.

2.09 COVERS AND FRAMES

A. Covers and frames shall comply with Section 05540 – Castings and shall be provided by the utility structure manufacturer.

B. Manhole covers and frames shall meet the following requirements:

1. Clear opening shall be a minimum of 22 inches, unless otherwise indicated on the Drawings.

2. Covers and frames shall be “Heavy Duty” type.

3. Non-watertight manhole covers and frames shall be in accordance with Detail C – Standard Manhole Frame & Cover Details located on Drawing D01. Non-watertight manhole covers and frames shall be provided on manholes located in unpaved areas, unless they are located within the 100-year floodplain, located in ditches, located in areas subject to ponding water, or subject to surcharging.

4. Watertight manhole covers and frames shall be suitable for a 20 psi internal pressure and shall be in accordance with Detail D – Bolt Down Cover Manhole Frame & Cover Details located on Drawing D01. Watertight manhole covers and frames shall be provided on manholes located in pavement, manholes located within the 100-year floodplain, manholes located in ditches, manholes located in areas subject to ponding water, manholes subject to surcharging, and on specific manholes located in unpaved areas as directed by the Engineer and/or Owner.
5. Covers and frames shall bear the emblem of Jefferson County as illustrated on the two previously-referenced Details on Drawing D01.

C. All covers and frames shall be given one shop coat of asphalt or coal tar varnish, unless otherwise specified.

D. For manholes in unpaved areas, frames shall be cast into the precast utility structure top cone at the place of manufacture of the precast utility structure component.

E. Gaskets: A gasket shall be provided between the cover and frame in accordance with the cover and frame manufacturer’s requirements. Cover and frame shall be shipped from the factory with gaskets already installed in the seating surface of the frame. Gaskets shall be flat, 1/8-inch thick, black neoprene with a minimum tensile strength of 2,000 psi.

F. Covers and frames shall be identical throughout the Contract.

G. Covers and frames shall be made in the United States and shall be made of materials from the United States.

2.10 CONCRETE BALLAST

A. Concrete ballast shall be Class B concrete in conformance with Section 03300 – Cast-in-Place Concrete. Ballast shall be provided as necessary to ensure manhole resists flotation when empty and subjected to full height groundwater conditions.

2.11 FLEXIBLE JOINT SEALER

A. Flexible joint sealer shall be a rubber ring waterstop as manufactured by Fernco Inc. or Engineer-approved equal.

2.12 EPOXY BONDING AGENT

A. Epoxy bonding agent shall conform to Section 03250 – Concrete Accessories.

2.13 INSIDE DROP CONNECTIONS

A. All drop connections for connecting new pipe to new manholes and reconnecting existing pipe with existing drop connections to new manholes shall be inside drops consisting of a drop bowl, adjustable clamping brackets, and PVC pipe and fittings in accordance with Detail F – Sanitary Sewer Interior Drop Manhole on Drawing D01.

1. Drop bowl shall be constructed from marine-grade fiberglass. All adjustable clamping brackets shall be Type 304 stainless steel, and all bracket hardware shall be 18/8 series stainless steel. Drop bowl and adjustable clamping brackets shall be RELINER® INSIDE DROP SYSTEM as manufactured by RELINER®/Duran Inc. or Engineer-approved equal.
a. RELINER® drop bowl shall be “B-8” or “B-10” and shall be provided with the optional hood.

b. Drop bowl shall be sized by the manufacturer based on the incoming pipe diameter and flow rate and shall be installed in strict accordance with the manufacturer’s installation instructions and guidelines. Drop bowl shall be connected to the inside of the manhole wall using four (4) 3/8-inch diameter stainless steel bolts installed in lead expansion anchors.

c. Clamping brackets shall be installed at a maximum vertical interval of four (4) feet, and a minimum of two (2) clamping brackets shall be provided per inside drop connection.

d. Connections between the incoming pipe and the drop bowl and between the drop bowl and the drop pipe shall be in accordance with the manufacturer’s guidelines.

2. Pipe and fittings for inside drop connection shall be Schedule 40 PVC in accordance with Specification Section 15008 – PVC Pipe.

2.14 GRADE RINGS

A. Manhole grade rings shall be round and shall be composed of either precast concrete or cast iron.

1. Manhole grade rings from 6 inches through 10 inches high shall be composed of precast concrete in accordance with ASTM C478 and Section 03400 – Precast Concrete.

2. Manhole grade rings from 2 inches through 4 inches high shall be composed of cast iron. Cast iron grade rings shall be sized to fit the frames provided.

B. Using brick and mortar or concrete masonry units to adjust the top elevation of the manhole frame to grade shall not be acceptable.

2.15 EXTERNAL MANHOLE SLEEVES

A. Heat-shrinkable, wrap around sleeves shall be provided on the exterior of manholes installed in unpaved areas that have their frames installed flush with the surrounding ground surface and all manholes installed in pavement to create a barrier to water infiltration and effectively protect the manholes’ support structures and frames from ground moisture, thus preventing corrosion and freeze-thaw damage. Sleeves shall accommodate ground movement and resist soil stress. External manhole sleeves shall be WrapidSeal Manhole Encapsulation System by Canusa-CPS (a division of ShawCor Inc.), Riser-Wrap Sealing System by Pipeline Seal and Insulator, Inc. of Houston, TX, or Engineer-approved equal.

1. Material: Irradiated and cross-linked polyethylene impermeable backing, coated with a protective heat-activated adhesive
2. **Bonding**: Bond to primed concrete, metal, and fiberglass surfaces

3. **Compatibility**: Compatible with concrete, steel, iron, and fiberglass

4. **Closure**: Separate closure seal to secure sleeve in place during installation and seal overlap area

5. **Functional Performance of Heat-Shrinkable Sleeves**:
   a. Minimum Peel Strength per ASTM D1000: 9 pounds/linear inch (15 N/cm)
   b. Lap Shear per ASTM D1002: 1.5 psi (1.0 N/cm²)
   c. Maximum Water Absorption per ASTM D570: 0.05 percent
   d. Low Temperature Flexibility per ASTM D2671: -40 degrees Fahrenheit (-40 degrees Celsius)
   e. Penetration Resistance per ASTM G17: Pass

6. **Physical Properties of Heat-Shrinkable Sleeves**:
   a. **Type**: High shrink
   b. **Supplied Thickness**: 101 mils (2.5 mm)
   c. **Fully Recovered Thickness**: 125 mils (3.2 mm)
   d. **Minimum Shrink Factor**: 40 percent

7. **Sleeve Adhesive**:
   a. Minimum Softening Point per ASTM E28: 212 degrees Fahrenheit (100 degrees Celsius)
   b. Minimum Lap Shear Strength per ASTM D1002: 12 psi (8 N/cm²)

8. **Sleeve Backing**:
   a. Minimum Tensile Strength per ASTM D638: 2,900 psi (20 MPa)
   b. Minimum Elongation per ASTM D638: 600 percent
   c. Minimum Hardness per ASTM D2240: 46 Shore D
   d. Abrasion Resistance per ASTM D1044: 45 mg
   e. Shrink Force per ASTM D638: 38 psi (26 N/cm²)
f.  Dielectric Strength per ASTM D149: 500 KV/inch (20 KV/mm)

9. Primer shall be suitable for priming steel, concrete, and fiberglass surfaces for installation of sleeve, shall be compatible with common substrates and sleeve adhesive, and shall be the WrapidSeal Manhole Encapsulation System primer, Polyken #1027 or #1039 liquid adhesive primers for Riser-Wrap Sealing System, or as recommended by the equivalent external manhole sleeve manufacturer.

PART 3 -- EXECUTION

3.01 DESIGN CRITERIA

A. All precast manhole components shall be of approved design and of sufficient strength to withstand the loads imposed upon them. Minimum structural design loading for underground precast concrete manholes shall be as indicated in ASTM C857, unless otherwise noted herein. Precast items subjected to vehicular traffic shall be designed for AASHTO HS-20 traffic loading. Other precast items shall be designed for a vertical live load of 300 psf.

B. Walls of precast items shall be designed for a vertical surcharge of 100 psf.

C. Precast manholes shall be designed to resist flotation when totally empty and subjected to groundwater full height of the manhole.

3.02 FABRICATION AND CASTING

A. Fabrication and casting shall conform to Section 03300 – Cast-in-Place Concrete and Section 03400 – Precast Concrete.

B. All base sections designated to receive concrete ballast shall extend monolithically a minimum of 6 inches beyond the outside face of the wall for the entire periphery. All other utility structures shall have a standard base.

C. Manholes built around existing pipe shall have a cast-in-place base slab.

3.03 HANDLING, TRANSPORTING, AND STORING

A. Handling, transporting, and storing of precast items shall comply with Section 03400 – Precast Concrete.

3.04 INSTALLATION

A. Installation shall conform to Section 03400 – Precast Concrete and to the manufacturer's recommendations or to Section 03300 – Cast-in-Place Concrete.

B. Covers and frames shall be set so that tops are at elevations indicated on the Drawings or flush with finished grade where no elevation is indicated.
C. Joints between base, riser, and top cone sections shall be sealed with gaskets and waterstops.

D. All openings in manholes shall have flexible rubber sleeves sized to fit the connecting pipe and installed to provide watertight joints in accordance with the manufacturer's recommendations.

E. Openings that are too large for flexible rubber sleeves shall utilize rubber bladder seals which are expanded by water injected using a pressure pump.

F. All units shall be installed plumb and level.

G. All lift holes and joints shall be filled with non-shrink grout conforming to Section 03600 – Grout, inside and out.

H. Concrete ballast shall be placed so that it bears directly on the utility structure base against the outer wall monolithically encircling the structure for the full height indicated on the Drawings. Additional ballast may be required where the depth or elevation of the structure varies from the Drawings.

I. **Connection to Existing Pipe:**
   1. Verify the diameter and invert elevation of existing pipe to be connected to new utility structures prior to beginning work on the structures.
   2. Provide adequate protection to prevent damage to the existing pipe.
   3. Provide adequate means for plugging and/or transferring the existing flow in the pipe to allow for the construction of inverts.
   4. Cut off the existing pipe sufficiently for connection to the new structure and remove. Provide a minimum of ten (10) feet of new pipe between the cut-off end of the existing pipe and the new structure in accordance with Detail A – Standard New Manhole on Drawing D01. Connect the existing pipe remaining and the new pipe using an appropriately-sized flexible coupling with Type 304 stainless steel clamps and shear rings as manufactured by Fernco, Mission, or Engineer-approved equal.
   5. Thoroughly clean all foreign matter and coat the pipe surface with epoxy adhesive where the pipe joins the new structure.
   6. Install a flexible joint sealer around the new pipe segment where it connects to the manhole.

J. Clean all structures of any accumulation of silt, debris, or foreign matter, and keep clean until Final Acceptance of the Work.

K. Excavation shall conform to Section 02200 – Earthwork.

M. Structure bases shall bear on a minimum of 12 inches of compacted No. 57 stone unless otherwise indicated on the Drawings.
N. Channel Inverts

1. Inverts shall be placed using Class B concrete with forms sufficient to provide a smooth half-round shape as shown on the Drawings. Manhole bases employing full depth precast inverts are acceptable.

2. Where the slope of the line does not change through a manhole, a constant slope shall be maintained in the invert. Where slope changes occur within a given manhole, the transition shall be smooth and shall occur at the approximate center of the manhole.

3. Inverts shown on the Drawings are taken at the center of the manhole unless otherwise noted.

3.05 JOINT GASKET AND WATERSTOP

A. Gasket shall not be lubricated. Gasket shall be installed per manufacturer’s guidelines.

B. Waterstop shall be installed per manufacturer’s guidelines and overlapped by 2 inches to 4 inches.

C. Waterstop shall be installed on the bearing surface within the annular space on the inside of the gasket.

3.06 FINAL ADJUSTMENTS

A. All manhole frames shall be set to their required final elevations without the use of grade rings if possible. If grade rings must be installed on manholes in pavement to adjust the frames to their required elevations, provide grade rings on the top cones or frames of manholes as specified herein. Grade rings shall not be installed on manholes in unpaved areas.

1. Individual grade rings shall be a maximum of 10 inches in height.

2. Cast iron rings shall be used for grade adjustment from 2 inches to a maximum of 6 inches in height.

3. One-piece precast concrete rings shall be used for grade adjustment greater than 6 inches to a maximum of 10 inches in height.

4. For individual manholes requiring grade adjustment greater than 10 inches but less than 16 inches, Contractor shall utilize multiple precast concrete rings.

5. All adjustments measuring 16 inches and greater shall be performed using only precast manhole components.

6. Precast concrete rings shall be set concentrically on top of the top cone, and cast iron rings shall be set on top of the frame.
7. Joints between top cones, precast concrete grade rings, and frames shall be sealed using waterstops in accordance with Article 2.06 herein.

8. Manhole grade rings and precast concrete manhole components shall be installed in accordance with the manufacturer’s recommendations.

B. For manholes located in unpaved areas (lawns, wooded areas, other inaccessible areas, etc.), the final elevation of their frames shall be two (2) feet above the surrounding ground surface or as shown on the Drawings or as otherwise approved by the Owner and/or Engineer. For manholes located in pavement (roads, parking lots, sidewalks, etc.), the final elevation of their frames shall be smooth and flush with the finished grade of the adjacent pavement, and sloping grade rings shall be provided as required to match the surrounding road grade if necessary.

C. Contractor shall be solely responsible for the proper height of all manholes necessary to reach the final grade at all locations. Contractor is cautioned that Engineer’s review of shop drawings for manhole grade rings and precast manhole components will be general in nature, and Contractor shall provide an adequate supply of random length manhole grade rings and precast manhole components to adjust any manhole to meet field conditions for final grading.

D. After final adjustment of a manhole is completed, Contractor shall backfill the area around the manhole in accordance with Section 02200 – Earthwork.

1. Manholes Located in Unpaved Areas: After backfilling, the portion of the surrounding ground surface that is disturbed during manhole installation shall be graded at a 1:5 (1 vertical to 5 horizontal) slope to provide surface drainage away from the manhole and subsequently grassed in accordance with Section 02910 – Final Grading and Landscaping.

2. Manholes Located in Pavement: After backfilling, the portion of the surrounding ground surface that is disturbed during manhole installation shall be repaved in accordance with Section 02575 – Pavement Repair.

3.07 EXTERNAL MANHOLE SLEEVES

A. Contractor shall also install an external manhole sleeve as specified herein for manholes installed in unpaved areas that have their frames installed flush with the surrounding ground surface and all manholes installed in pavement. External manhole sleeve shall cover the exterior of the manhole frame, the grade rings (if installed), the upper portion of the manhole top cone, and all joints as recommended by the manufacturer. Size and width of external manhole sleeve shall be as recommended by the manufacturer; external manhole sleeve shall overlap both the frame and the top cone by a minimum of four (4) inches.

B. Examination: Examine surfaces to receive external manhole sleeve. Notify the Engineer if surfaces are not acceptable. Do not begin surface preparation until unacceptable conditions have been corrected.

C. Surface Preparation:
1. Prepare surfaces in accordance with manufacturer’s instructions.

2. Brush exterior of manhole using broom or hand wire tools to ensure surfaces are clean, dry, and free of loose cement, dust, small rock particles, frost, surface rust, foreign objects, sharp edges, and projections that could damage external manhole sleeve.

3. Cleaned surfaces of precast manhole components and grade rings shall not remain overnight or for extended periods under wet or humid conditions prior to the application of the external manhole sleeve.

4. Inspection by Owner and/or Engineer:
   a. Give the Owner and/or Engineer a minimum of twenty-four (24) hours advance notice of start of installation of external manhole sleeve at any specific manhole.
   b. Before installation, surfaces to be covered by the external manhole sleeve will be inspected by the Owner and/or Engineer.
   c. Do not begin installation until defects or deficiencies identified by the Owner and/or Engineer have been corrected.

D. Installation:
   1. Install external manhole sleeve in accordance with manufacturer’s instructions.
   2. Install sleeve to create barrier to water infiltration and protect manhole support structure and frame from ground moisture, preventing corrosion and freeze-thaw damage.

E. Field Quality Control:
   1. Sleeve Inspection: Visually inspect installed sleeve to ensure:
      a. Sleeve is in full contact with substrate, including top cone, grade rings (if installed), and manhole frame
      b. There are no cracks or holes in polyethylene backing
      c. There are no voids below sleeve
      d. Adhesive has flowed beyond sleeve edges
   2. Site Adhesion Testing: Peel tests
      a. Frequency of Test: 1 in every 10 sleeves
      b. Surface Temperature at Time of Test: 77 degrees Fahrenheit +/- 10 degrees Fahrenheit (25 degrees Celsius +/- 5 degrees Celsius), unless
environmental conditions will not allow and continuation of test is approved by the Engineer

c. **Peel Rate:** 4 inches/minute (100 mm/minute)
d. Perform testing using hand peel gauge on 1-inch (25-mm) wide strip.
e. Cut strip and induce initial failure by undercutting and peeling back strip until 2-inch (50-mm) flap is created.
f. Attach clamp to strip and hand peel gauge to clamp and peel back at a 90 degree angle to surface at specified peel rate.
g. **Passing Minimum Peel Strength:** 8.6 pounds/linear inch (15 N/cm) with cohesive failure of adhesive

3. Contractor shall be responsible for verifying the integrity of the installed external manhole sleeve prior to proceeding with backfilling. Damaged sleeves shall be repaired in accordance with the manufacturer’s recommendations at the Contractor’s expense.

F. **Backfilling and Protection:**

1. Allow sleeve to cool before backfilling manhole. Water quenching shall be permissible to expedite backfilling.

2. Prevent damage to sleeve by backfilling with select backfill or material with no sharp stones or large particles, or protect sleeve with extruded polyethylene mesh or other suitable protective shield as approved by the Engineer.


3.08 FLUSHING AND TESTING

A. **Obstruction:** After backfilling, all sewers shall be inspected for obstructions and shall be flushed with water. Flushing shall be a minimum velocity of 2.5 feet per second for a duration acceptable to the Engineer. Flushing shall remove all dirt, stones, pieces of wood, and other debris which accumulated in the sewer during construction. The Contractor shall provide a means acceptable to the Engineer for removal of debris flushed from each section of sewer. If after flushing, any obstructions remain, they shall be removed at the Contractor’s expense.

B. **Visual Inspection:** Sewer lines shall be visually inspected from every manhole by use of mirrors, television cameras, or other devices for visual inspection, and the lines shall all exhibit a fully circular pattern when viewed from one manhole to the next. Lines which do not exhibit a true line and grade or have structural defects shall be corrected to meet these qualifications.

C. **Low Pressure Compressed Air Test:** The pipeline shall be considered acceptable, when tested at an average pressure of 3.0 psi greater than the average back pressure of any
groundwater that may submerge the pipe, if the section under test does not lose air at a rate greater than 0.0030 cfm per sq. ft. of internal pipe surface.

D. **Cost of Testing and Repairs:** Any and all work necessary to bring the line into conformance with the infiltration specification shall be performed by the Contractor at no extra cost to the Owner. All apparent sources of infiltration shall be repaired by the Contractor.

The Contractor shall provide all water, plugs, hoses, pumps, equipment, etc. necessary for the proper flushing and testing of the sewers.

### 3.09 TESTING AND INSPECTION

**A.** All new manholes shall be tested and inspected. The following provides a summary of construction and inspection sequencing and requirements:

1. **Prior to Inspection and Testing of manholes all utilities (gas, power, cable, fiber, telephone, etc.) that will cross the main sewer and/or be located within 8 feet of manholes shall be complete.** Timely acceptance of the main sewer by the **Owner/Owners Representative** in some situations due to scheduling/delays associated with other utilities, may require installation of casings where other utilities will be required to cross the main sewer or be located in close proximity to manholes. This will allow early, conditional acceptance of the sewer, upon completion of required CCTV Inspection and Leak Testing. Where utilities are installed that cross the main sewer or in close proximity to manholes by open cut or trenchless methods, after its inspection and testing, the contractor shall be required to repeat the Testing to confirm that the manhole was not damaged by the work. The specific testing methods shall be determined by the Owner/Owners Representative on a case by case basis.

2. **Manhole Location:**
   
   a. **Outside of Road or Area to Receive Asphalt or Concrete Pavement:** Upon completion of installation of main sewer and manhole and backfilling to grade Contractor shall Manhole Test.

   b. **Within Road or Area to Receive Asphalt or Concrete Pavement:**
      
      1) Upon completion of installation of main sewer and manhole and backfilling to grade Contractor shall perform Manhole Inspection.

      2) Upon completion of final paving repeat Manhole Test.

**B.** All testing/inspection shall be witnessed by Owner/Owners Representative. Contractor shall provide minimum 3-days’ notice of testing/inspection.

**C.** **Manhole Testing:**

1. Conduct negative air pressure (vacuum) test on all manholes in accordance with ASTM C1244, following the manufacturer’s recommendations for proper and safe procedures. Conduct tests in presence of the Owner/Owners Representative.
2. All pipe openings shall be sealed by installing suitable plugs that completely isolate the manhole structure. Any other openings such as lifting holes shall be permanently sealed.

3. Procedure:
   a. A suitable vacuum pump shall be connected at the top access point of the manhole.
   b. A vacuum of 10 inches of mercury (Hg) (5.0 psi) shall be drawn on the manhole.
   c. The time shall be measured for the vacuum to drop to 9 inches of mercury (Hg) (4.5 psi).
   d. Manholes will be considered to have failed if the time to drop 1 inch of mercury is less than what is shown in the following table:

<table>
<thead>
<tr>
<th>Vacuum Test Timetable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth (ft)</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>16</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>+ Each 2’</td>
</tr>
</tbody>
</table>

   e. Manhole depths shall be rounded to the nearest foot.
   f. Intermediate values shall be interpolated.
   g. For depths above 20 feet, add appropriate values from table for each additional 2 feet of depth.

4. All manholes that fail the test or that have visible leakage in the manhole, even if passing the test, shall be repaired or replaced until the manhole passes the test, to the complete satisfaction of the Owner/Owners Representative. Manholes with visible leaks will not be accepted under any circumstances.

- END OF SECTION -
PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. Furnish all materials, labor, equipment, tools, and incidentals required to adjust the height of manholes in accordance with the Drawings and as specified herein.

1.02 RELATED SECTIONS

A. Section 01300 – Submittals
B. Section 02200 – Earthwork
C. Section 02575 – Pavement Repair
D. Section 02604 – Utility Structures
E. Section 02910 – Final Grading and Landscaping
F. Section 03400 – Precast Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections
2. ASTM D149 Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
5. ASTM D638 Standard Test Method for Tensile Properties of Plastics
8. ASTM D955  Standard Test Method of Measuring Shrinkage from Mold Dimensions of Thermoplastics
9. ASTM D1000  Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
10. ASTM D1002  Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)
11. ASTM D1044  Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion
15. ASTM E28  Standard Test Methods for Softening Point of Resins Derived from Naval Stores by Ring-and-Ball Apparatus
16. ASTM G17  Standard Test Method for Penetration Resistance of Pipeline Coatings (Blunt Rod)

1.04 SUBMITTALS

A. The Contractor shall submit the following shop drawings and product data in accordance with requirements of Section 01300 – Submittals:

1. Proposed method of height adjustment for each manhole to be adjusted in height
2. Design and construction details of all manhole grade rings, including details of joints between grade rings and existing manhole top cone/slab and between grade rings and existing cover and frame, all with clearly marked dimensions
3. Design and construction details of all precast concrete manhole components (riser sections and top cones), including materials, reinforcement, and details of joints between manhole components and existing manhole components, all with clearly marked dimensions
4. Manufacturer’s installation instructions, procedures, and materials for external manhole sleeves
5. Manufacturer’s certification indicating external manhole sleeves are
1.05 QUALITY ASSURANCE

A. External Manhole Sleeve Manufacturer Qualifications:

1. External manhole heat-shrink sleeves shall be manufactured in an ISO 9002 registered facility.

2. Manufacturer shall have the capability of producing irradiated and cross-linked polyethylene coating to allow shrinking of coating material in circumferential direction under influence of heat.

3. Manufacturer shall have the capability of providing manufacturer-employed field service personnel for onsite assistance as required.

B. External Manhole Sleeve Installer Qualifications:

1. Installer shall be experienced with installation techniques.

2. Installer shall have attended a minimum of one (1) day of training at the external manhole sleeve manufacturer’s facility or onsite with the external manhole sleeve manufacturer’s representative.

C. Pre-Installation Meeting: External manhole sleeve manufacturer’s representative and external manhole sleeve installer shall attend a pre-installation meeting with the Contractor and Engineer one (1) week prior to the start of installation of the initial external manhole sleeve. At the meeting, the attendees shall review surface preparation, installation, field quality control, backfilling, protection, and coordination with other work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. External Manhole Sleeve Delivery:

1. Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, batch or lot number, and date of manufacture.

2. Protect individual sleeves to prevent adherence to other sleeves, packing material, and containers in accordance with manufacturer’s instructions.

B. External Manhole Sleeve Storage:

1. Store materials in accordance with manufacturer’s instructions.

2. Keep containers sealed until ready for use.

3. Do not store at temperatures above 95 degrees Fahrenheit (35 degrees Celsius) or below -4 degrees Fahrenheit (-20 degrees Celsius).
4. Protect materials and containers from exposure to direct sunlight, rain, snow, dirt, and dust.

5. Store materials off ground or floor in ventilated area.

C. External Manhole Sleeve Handling: Protect materials during handling and installation to prevent damage or contamination in accordance with manufacturer’s instructions.

D. Delivery, storage, and handling of all other materials specified herein, other than the external manhole sleeves, shall be in accordance with the manufacturer’s requirements.

1.07 WARRANTY

A. Warranty period for high density polyethylene (HDPE) grade rings shall be for five (5) years from the date of installation.

PART 2 -- PRODUCTS

2.01 MANHOLE GRADE RINGS

A. Round manhole grade rings shall be used to set manhole frames to their required elevations by methods approved by the Owner and/or Engineer. Manhole grade rings shall be composed of either precast concrete or high density polyethylene (HDPE).

1. Manhole grade rings from 10 inches through 12 inches high shall be composed of precast concrete in accordance with ASTM C478 and Section 03400 – Precast Concrete.

2. Manhole grade rings from 2 inches through 4 inches high shall be composed of injection-molded HDPE. HDPE manhole grade rings shall be as manufactured by Ladtech, Inc. or Engineer-approved equal. The HDPE material used to mold the grade rings shall be in accordance with ASTM D4976 and shall conform to the following requirements:

<table>
<thead>
<tr>
<th>Property</th>
<th>Units</th>
<th>Value</th>
<th>ASTM Test Procedure Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>g/cm³</td>
<td>0.94 to 0.96</td>
<td>-</td>
</tr>
<tr>
<td>Melt Flow Rate</td>
<td>g/10 min</td>
<td>0.49</td>
<td>D4976</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>psi</td>
<td>3,453</td>
<td>D638</td>
</tr>
<tr>
<td>Elongation</td>
<td>percent</td>
<td>122</td>
<td>D638</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>psi</td>
<td>147,771</td>
<td>D790</td>
</tr>
<tr>
<td>Izod Impact Strength</td>
<td>ft-lb/in</td>
<td>7.12</td>
<td>D256</td>
</tr>
<tr>
<td>Hardness (Shore D)</td>
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<td>63.1</td>
<td>D2240</td>
</tr>
<tr>
<td>Head Deflection Temperature (@ 66 psi)</td>
<td>degrees Fahrenheit</td>
<td>174</td>
<td>D648</td>
</tr>
<tr>
<td>Shrinkage</td>
<td>in/in</td>
<td>0.032</td>
<td>D955</td>
</tr>
</tbody>
</table>

B. All manhole grade rings shall be of approved design and of sufficient strength to
withstand the typical loads that will be imposed upon them after installation. For manholes located in pavement that are adjusted in height, manhole grade ring shall be rated for an AASHTO live HS-20 traffic load at a minimum.

C. Prior to reinstallation of an existing manhole cover and frame, Contractor shall clean cover and frame of all foreign material and shall paint cover and frame with one (1) coat of coal tar epoxy.

D. Using brick and mortar or concrete masonry units to adjust the top elevation of the manhole frame to grade shall not be acceptable.

2.02 PRECAST CONCRETE MANHOLE COMPONENTS

A. Precast concrete manhole components (riser sections or top cones) shall be used to set manhole frames to their required elevations by methods approved by the Owner and/or Engineer in accordance with Section 02604 – Utility Structures.

2.03 JOINT GASKET AND WATERSTOP

A. Joints between manhole components, grade rings, and covers and frames shall be sealed as follows:

1. Existing Top Cone/Slab and New Precast Concrete Manhole Grade Ring: Waterstop

2. Adjacent New Precast Concrete Manhole Grade Rings: Waterstop

3. New Precast Concrete Manhole Grade Ring and Existing (Reinstalled) Manhole Cover and Frame: Waterstop

4. Existing Top Cone/Slab and New HDPE Manhole Grade Ring: As recommended by the HDPE manhole grade ring manufacturer

5. Adjacent New HDPE Manhole Grade Rings: As recommended by the HDPE manhole grade ring manufacturer

6. New HDPE Manhole Grade Ring and Existing (Reinstalled) Manhole Cover and Frame: As recommended by the HDPE manhole grade ring manufacturer

7. Existing Precast Manhole Component (Riser Section or Top Cone) and New Precast Manhole Component (Riser Section or Top Cone): Gasket and waterstop

8. Pre-lubricated profile gaskets and hydrophilic waterstop rings shall be as specified in Section 02604 – Utility Structures.

2.04 GASKETS

A. Gaskets between covers and frames shall be in accordance with the requirements of Section 02604 – Utility Structures.
1. Prior to reinstalling an existing manhole cover and frame, Contractor shall install a new gasket between the cover and frame in accordance with the gasket manufacturer’s recommendations. Gaskets shall be secured to the seating surface of the frame with a non-degrading glue as recommended by the gasket manufacturer.

2. New manhole covers and frames shall be shipped from the factory with gaskets already installed in the seating surface of the frame.

2.05 EXTERNAL MANHOLE SLEEVES

A. Heat-shrinkable, wrap around sleeves shall be provided on the exterior of manholes to create a barrier to water infiltration and effectively protect the manholes’ support structures and frames from ground moisture, thus preventing corrosion and freeze-thaw damage. Sleeves shall accommodate ground movement and resist soil stress. External manhole sleeves shall be WrapidSeal Manhole Encapsulation System by Canusa-CPS (a division of ShawCor Inc.), Riser-Wrap Sealing System by Pipeline Seal and Insulator, Inc. of Houston, TX, or Engineer-approved equal.

1. **Material:** Irradiated and cross-linked polyethylene impermeable backing, coated with a protective heat-activated adhesive

2. **Bonding:** Bond to primed concrete, metal, and fiberglass surfaces

3. **Compatibility:** Compatible with concrete, steel, iron, and fiberglass

4. **Closure:** Separate closure seal to secure sleeve in place during installation and seal overlap area

5. **Functional Performance of Heat-Shrinkable Sleeves:**
   a. Minimum Peel Strength per ASTM D1000: 9 pounds/linear inch (15 N/cm)
   b. Lap Shear per ASTM D1002: 1.5 psi (1.0 N/cm²)
   c. Maximum Water Absorption per ASTM D570: 0.05 percent
   d. Low Temperature Flexibility per ASTM D2671: -40 degrees Fahrenheit (-40 degrees Celsius)
   e. Penetration Resistance per ASTM G17: Pass

6. **Physical Properties of Heat-Shrinkable Sleeves:**
   a. **Type:** High shrink
   b. **Supplied Thickness:** 101 mils (2.5 mm)
c. **Fully Recovered Thickness:** 125 mils (3.2 mm)

d. **Minimum Shrink Factor:** 40 percent

7. **Sleeve Adhesive:**
   a. Minimum Softening Point per ASTM E28: 212 degrees Fahrenheit (100 degrees Celsius)
   b. Minimum Lap Shear Strength per ASTM D1002: 12 psi (8 N/cm²)

8. **Sleeve Backing:**
   a. Minimum Tensile Strength per ASTM D638: 2,900 psi (20 MPa)
   b. Minimum Elongation per ASTM D638: 600 percent
   c. Minimum Hardness per ASTM D2240: 46 Shore D
   d. Abrasion Resistance per ASTM D1044: 45 mg
   e. Shrink Force per ASTM D638: 38 psi (26 N/cm²)
   f. Dielectric Strength per ASTM D149: 500 KV/inch (20 KV/mm)

9. Primer shall be suitable for priming steel, concrete, and fiberglass surfaces for installation of sleeve, shall be compatible with common substrates and sleeve adhesive, and shall be the WrapidSeal Manhole Encapsulation System primer, Polyken #1027 or #1039 liquid adhesive primers for Riser-Wrap Sealing System, or as recommended by the equivalent external manhole sleeve manufacturer.

**PART 3 -- EXECUTION**

3.01 **MANHOLE ENTRY**

A. The Contractor shall exercise extreme caution during any manhole entry operations on live sewer lines. Particular attention shall be paid while working on larger diameter sewers. The Contractor shall implement all necessary safety precautions, in accordance with OSHA regulations, to give maximum protection at all times to persons or property at or near the work area.

3.02 **MANHOLE GRADE RINGS AND PRECAST MANHOLE COMPONENTS**

A. Manhole grade rings or precast manhole components shall be used for all precast concrete manholes to adjust the height of the manhole frame casting where required. If the Contractor locates and uncovers an existing manhole composed of masonry/brick, Contractor shall notify the Engineer, who shall instruct the Contractor how to proceed with adjusting the height of the masonry/brick manhole.

1. Individual grade rings shall be a maximum of 10 inches in height and shall be
installed on the existing top cone/slab of the manhole to be adjusted in height after removal of the existing manhole cover and frame. The existing manhole cover and frame shall subsequently be reinstalled on top of the grade rings.

2. The height of the grade ring(s) shall be such as is necessary to bring the manhole frame to the proper grade.

3. HDPE rings shall be used for grade adjustment from 2 inches to a maximum of 6 inches in height.

4. Precast concrete rings shall be used for grade adjustments 4 inches to a maximum of 12 inches in height.

5. Precast concrete manhole components (riser sections or top cones) with joints in accordance with Article 2.03 herein and Section 02604 – Utility Structures shall be used for grade adjustment measuring 16 inches and greater.

6. For all grade adjustments using a precast concrete riser section, the existing top cone/slab with cover and frame shall be removed and then reinstalled after installation of the new riser section.

7. For all grade adjustments using a precast concrete top cone, the existing top cone/slab with cover and frame shall be removed and properly disposed of and a new top cone with new cover and frame shall be installed. New frames shall be attached to the new top cone using four (4) 5/8-inch diameter stainless steel bolts in accordance with Paragraph B of Article 3.02 herein and a waterstop in accordance with Article 2.03 herein.

8. Rings shall be set concentrically on top of the existing top cone/slab.

9. The joints of all precast concrete manhole grade rings, HDPE grade rings, and precast concrete manhole components (riser sections or top cones) shall be sealed in accordance with Article 2.03 herein.

10. Manhole grade rings and precast concrete manhole components shall be installed in accordance with the manufacturer’s recommendations.

B. Existing casting frames shall be reinstalled on the new grade ring(s) using four (4) 5/8-inch diameter stainless steel bolts. Bolts shall extend through the new grade ring(s) and into the existing top cone/slab.

1. The new grade ring(s) may also be drilled with four (4) equally-spaced 5/8-inch diameter holes and four (4) No. 5 steel reinforcement bars installed into the existing top cone/slab. Bars shall be left flush with the top of the new grade ring(s) to prevent lateral movement, and the existing casting frame shall be bolted to the new grade ring(s) as previously described.

3.03 PROCEDURES FOR MANHOLE HEIGHT ADJUSTMENT

A. Height adjustment of manholes shall conform to the Owner’s standards as noted herein
and as shown on the Manhole Height Adjustment detail on Drawing D04.

B. The Contractor shall utilize maps, surveys, sounding instruments, or information from local residents to determine approximate location of buried manholes. Manholes shall be exposed utilizing hand techniques or by carefully probing with mechanical equipment. Manhole exposure in pavement shall be accomplished by making a square cut in the surface with sufficient width to allow for the excavation of the material around the manhole to expose it to a depth necessary for adequate adjustments.

C. The Contractor shall adjust the top of the manhole frame to its required elevation as directed by the Owner or Engineer using manhole grade rings or precast manhole components (riser sections or top cones) conforming to the requirements of this Section. For manholes located in unpaved areas (lawns, wooded areas, other inaccessible areas, etc.), their frames and covers shall be adjusted to be either two (2) feet above the surrounding ground surface or as otherwise directed by the Owner and/or Engineer. For manholes located in pavement (roads, parking lots, sidewalks, etc.), their frames and covers shall be adjusted to be smooth and flush with the finished grade of the adjacent pavement, and sloping grade rings shall be provided as required to match the surrounding road grade if necessary.

1. Both reinstalled covers and frames and new covers and frames shall be positioned so the existing manhole steps can be readily and easily accessed.

D. Existing Concrete Manholes Located in Pavement: All adjustments measuring less than 12 inches shall be performed using manhole grade rings. All adjustments measuring 12 inches and greater shall be performed using only precast manhole components by one of the following methods:

1. Removing the existing top cone/slab with cover and frame, installing a new appropriate precast manhole riser section, and reinstalling the existing top cone/slab with cover and frame

2. Removing and properly disposing of the existing top cone/slab with cover and frame and installing a new appropriate precast manhole top cone with new cover and frame

E. Existing Concrete Manholes Located in Unpaved Areas: All adjustments shall be performed using only precast manhole components by one of the previous methods.

F. Contractor shall be solely responsible for the proper height of all manholes necessary to reach the final grade at all locations. Contractor is cautioned that Engineer’s review of shop drawings for manhole grade rings and precast manhole components will be general in nature, and Contractor shall provide an adequate supply of random length manhole grade rings and precast manhole components to adjust any manhole to meet field conditions for final grading.

G. Contractor shall also install an external manhole sleeve as specified herein for the following existing manholes that are adjusted in height by the Contractor:

1. Manholes adjusted in height under this Project using either precast concrete
grade rings or HDPE grade rings

2. Manholes that have been previously rehabilitated prior to this Project

3. Manholes adjusted in height under this Project using new precast concrete top cones and new covers and frames.

External manhole sleeve shall cover the exterior of the existing manhole frame (after re-installation) or new manhole frame (after installation), the new grade rings (if installed), and the upper portion of the existing or new manhole top cone/slab as recommended by the manufacturer. Size and width of external manhole sleeve shall be as recommended by the manufacturer.

H. For all existing manholes that are adjusted in height by the Contractor using HDPE grade rings, Contractor shall cut off and grind the lip of the HDPE grade ring as directed by the Owner and/or Engineer in the field.

I. After a manhole is adjusted in height as specified herein, Contractor shall backfill the area around the existing manhole in accordance with Section 02200 – Earthwork.

1. **Manholes Located in Unpaved Areas:** After backfilling, the portion of the surrounding ground surface that is disturbed during height adjustment shall be graded at a 1:5 (1 vertical to 5 horizontal) slope to provide surface drainage away from the manhole and subsequently grassed in accordance with Section 02910 – Final Grading and Landscaping.

2. **Manholes Located in Pavement:** After backfilling, the portion of the surrounding ground surface that is disturbed during height adjustment shall be repaved in accordance with Section 02575 – Pavement Repair.

### 3.04 EXTERNAL MANHOLE SLEEVES

A. **Examination:** Examine surfaces to receive external manhole sleeve. Notify the Engineer if surfaces are not acceptable. Do not begin surface preparation until unacceptable conditions have been corrected.

B. **Surface Preparation:**

1. Prepare surfaces in accordance with manufacturer’s instructions.

2. Brush exterior of manhole using broom or hand wire tools to ensure surfaces are clean, dry, and free of loose cement, dust, small rock particles, frost, surface rust, foreign objects, sharp edges, and projections that could damage external manhole sleeve.

3. Cleaned surfaces of precast manhole components and grade rings shall not remain overnight or for extended periods under wet or humid conditions prior to the application of the external manhole sleeve.

4. **Inspection by Owner and/or Engineer:**
a. Give the Owner and/or Engineer a minimum of twenty-four (24) hours advance notice of start of installation of external manhole sleeve at any specific manhole.

b. Before installation, surfaces to be covered by the external manhole sleeve will be inspected by the Owner and/or Engineer.

c. Do not begin installation until defects or deficiencies identified by the Owner and/or Engineer have been corrected.

C. Installation:

1. Install external manhole sleeve in accordance with manufacturer’s instructions.

2. Install sleeve to create barrier to water infiltration and protect manhole support structure and frame from ground moisture, preventing corrosion and freeze-thaw damage.

D. Field Quality Control:

1. **Sleeve Inspection**: Visually inspect installed sleeve to ensure:
   a. Sleeve is in full contact with substrate, including top cone/slab, grade rings (if installed), and manhole frame
   b. There are no cracks or holes in polyethylene backing
   c. There are no voids below sleeve
   d. Adhesive has flowed beyond sleeve edges

2. **Site Adhesion Testing**: Peel tests
   a. **Frequency of Test**: 1 in every 10 sleeves
   b. **Surface Temperature at Time of Test**: 77 degrees Fahrenheit +/- 10 degrees Fahrenheit (25 degrees Celsius +/- 5 degrees Celsius), unless environmental conditions will not allow and continuation of test is approved by the Engineer
   c. **Peel Rate**: 4 inches/minute (100 mm/minute)
   d. Perform testing using hand peel gauge on 1-inch (25-mm) wide strip.
   e. Cut strip and induce initial failure by undercutting and peeling back strip until 2-inch (50-mm) flap is created.
   f. Attach clamp to strip and hand peel gauge to clamp and peel back at a 90 degree angle to surface at specified peel rate.
g. **Passing Minimum Peel Strength**: 8.6 pounds/linear inch (15 N/cm) with cohesive failure of adhesive

3. Contractor shall be responsible for verifying the integrity of the installed external manhole sleeve prior to proceeding with backfilling. Damaged sleeves shall be repaired in accordance with the manufacturer’s recommendations at the Contractor’s expense.

E. **Backfilling and Protection**:

1. Allow sleeve to cool before backfilling manhole. Water quenching shall be permissible to expedite backfilling.

2. Prevent damage to sleeve by backfilling with select backfill or material with no sharp stones or large particles, or protect sleeve with extruded polyethylene mesh or other suitable protective shield as approved by the Engineer.


- END OF SECTION -
PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to clean all sewer pipe as shown on the Drawings and as specified herein.

B. Cleaning shall include the proper high pressure water jetting, rodding, bucketing, brushing, and flushing of sewers and manholes prior to inspection by closed-circuit television (CCTV), pipeline rehabilitation or replacement, point repairs, manhole preparation, and testing operations.

C. The goal of the cleaning is to remove all debris, roots, intruding services, deposits, and other blockages to a minimum of 95 percent open area. On all sewers, Contractor shall perform sewer cleaning work to an acceptable level as necessary to perform a thorough television inspection of the sewer. However, Contractor must adequately record and code impactful operation and maintenance (O&M) defects prior to cleaning and removal. Removal of such defects via cleaning either during or after inspection shall be recorded in the comments section. An initial single-pass only jetter cleaning shall be conducted prior to CCTV to remove very loose debris, minor obstructions, etc. If the pipe condition is such that cleaning may cause a potential collapse, then the pipe shall be televised without attempting to clean it to the 95 percent condition, pending approval by Engineer.

D. Cleaning may involve preparatory or light sewer cleaning (small amounts of debris and/or very light root growth existing within the sewer line) or heavy sewer cleaning (large amounts of debris, grease, large size stones and bricks, and/or heavy root growth existing within the sewer line). Cleaning shall dislodge, transport, and remove all sludge, mud, sand, gravel, rocks, bricks, grease, roots, sticks, and all other debris from the interior of the sewer pipe and manholes.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01570 – Traffic Regulation

B. Section 02600 – Wastewater Flow Control

C. Section 02731 – Sanitary Sewer Television Inspection
PART 2 -- PRODUCTS

2.01 MATERIALS

A. Hydraulically-propelled Sewer Cleaning Equipment:
   1. Contractor shall take precautions against flooding prior to using sewer cleaning balls or other such equipment that cannot be instantly collapsed.

B. High Velocity Hydro-Cleaning Equipment shall have the following:
   1. A minimum of 600 feet of high pressure hose
   2. Two or more high velocity nozzles capable of producing a scouring action from 15 to 45 degrees in all size lines to be cleaned
   3. A high velocity gun for washing and scouring manhole walls and floor
   4. Capability of producing flows from a fine spray to a long distance solid stream
   5. A water tank, auxiliary engines and pumps, and a hydraulically driven hose reel
   6. Equipment operating controls located aboveground

C. Mechanical cleaning equipment shall be either power buckets or power rodders by the Flexible Tool Division of Rockwell Manufacturing Co. or Engineer-approved equal. Mechanical equipment shall only be utilized with prior approval of Owner or Engineer and after structural condition of the pipe has been verified and Contractor has indicated that jetting will not be sufficient to perform the cleaning and mechanical cleaning will not further damage the pipe.
   1. Power bucket machines shall:
      a. Be furnished with buckets in pairs and with sufficient dragging power to efficiently perform the work.
      b. Either use V-belts for power transmission or have an overload device. Direct drive machines will not be permitted.
      c. Be equipped with a take-up drum and a minimum of 500 feet of cable.
   2. Power rodding machines shall:
      a. Be either sectional or continuous.
      b. Hold a minimum of 750 feet of rod.
      c. Have rods composed of treated steel.
d. Be fully-enclosed and have an automatic safety throw out clutch.

PART 3 -- EXECUTION

3.01 PERFORMANCE

A. Cleaning Precautions: During sewer cleaning operations, satisfactory precautions shall be taken by the Contractor in the use of cleaning equipment. When hydraulically-propelled cleaning tools, which depend upon water pressure to provide their cleaning force, or tools which retard the flow in the sewer line are used, precautions shall be taken by the Contractor to ensure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer being cleaned. Whenever possible, the Contractor shall utilize the flow of sewage in the sewer line to provide the necessary pressure for hydraulic cleaning devices. When additional water from fire hydrants is necessary to avoid delay in normal work procedures, the water shall be conserved and not unnecessarily used. No fire hydrant shall be obstructed in case of a fire in the area served by the hydrant.

B. Sewer Cleaning: The designated sewer sections between manholes shall be cleaned using hydraulically-propelled, high velocity jet, or mechanically-powered equipment. Selection of the equipment used shall be based on the conditions of the sewer lines at the time the work commences. The equipment and methods selected shall be satisfactory to the Owner and Engineer. The equipment, as properly selected by the Contractor, shall be capable of removing dirt, grease, rocks, sand, and other deleterious materials and obstructions from the sewer lines and manholes. If cleaning of an entire section of sewer cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning shall be attempted again. If successful cleaning cannot be subsequently performed from the other manhole or if the equipment fails to traverse the entire sewer section, it will be assumed that a major blockage exists and the cleaning effort shall be repeated with other types of equipment.

1. Contractor shall fully complete the CCTV Inspection Form attached to the end of this Specification Section for all sewer cleaning/inspection performed. Contractor shall indicate the pipe size, identify the type of material encountered/removed, and estimate the debris amount as none, minor, moderate, or heavy. The entire Form shall be completed and submitted electronically using a Contractor-furnished laptop computer or tablet. The Form(s) shall be submitted every week at a minimum.

C. Selection of cleaning equipment shall be based on the conditions of the manholes and sewer lines at the time the work commences based on the CCTV inspection to be performed by the Contractor. Contractor shall exercise special attention in selecting cleaning equipment and precautions during cleaning to ensure complete removal of visible roots from pipe joints.

1. Light cleaning (small amounts of debris and/or very light root growth existing
within the sewer line): Use balls, scooters, high pressure water jetting equipment, brushes, and swabs. A sewer reach will have undergone “Light Cleaning” if it requires three or fewer passes (including the single pass already conducted prior to CCTV inspection) of high pressure water jetting to sufficiently remove the debris. If, after three passes of high pressure water jetting, the sewer is still not clean, the Contractor shall inform the Engineer of the condition and the reason(s) for the failure to fully clear the line. The Engineer may then direct the Contractor to perform heavy cleaning of the problem section of sewer. Costs related to the cleaning of such sewers in three or fewer passes shall be included in Contractor’s unit prices bid for Light Cleaning, depending on pipe diameter. Costs related to the televising of such sewers following light cleaning shall be included in Contractor’s unit prices bid for Sanitary Sewer Television Inspection, depending on pipe diameter. In no case shall the high pressure water jetting equipment be pulled at a speed greater than 25 feet per minute.

2. Heavy cleaning (large amounts of debris and/or heavy root growth existing within the sewer line): Use bucket machines, scrapers, and augers. A sewer reach will have undergone “Heavy Cleaning” if it requires debris removal at depths up to 25 percent of the pipe height, requires four or more passes (including the single pass already conducted prior to CCTV inspection) of hydraulic cleaning equipment to sufficiently remove the debris, and meets the other requirements, as specified as follows. Heavy cleaning shall be conducted only upon the prior approval and direction of the Engineer. Costs related to the fourth pass and any additional passes required to clean such sewers shall be included in Contractor’s unit prices bid for Heavy Cleaning, depending on pipe diameter, to supplement the separate costs related to the initial three passes in the same pipeline that were already included in the Contractor’s unit prices bid for Light Cleaning, depending on pipe diameter. Costs related to the televising of such sewers following heavy cleaning shall be included in Contractor’s unit prices bid for Sanitary Sewer Television Inspection, depending on pipe diameter. Payment for heavy cleaning of a particular line will only be made if:

a. The heavy cleaning was authorized by the Owner or Engineer prior to Contractor’s performance of the work. The Contractor shall obtain a written signature from the Owner or Engineer agreeing to the terms, prices, and lengths of the heavy cleaning.

b. Contractor must document debris removed by heavy cleaning in the presence of the Owner or the Engineer with either a video or a physical measurement prior to vacting and/or disposal of the debris. Documentation of the debris removed by heavy cleaning shall include the type of material and its volume, measured either in gallons or using physical dimensions. Contractor shall complete the CCTV Inspection Form attached to the end of this Specification Section to document the debris removed.

c. Contractor proves that both significant time and effort were necessary
to clean the line. The time required to clean and inspect the line must have been at least twice the average time required to previously clean and inspect other sewer segments of comparable length and diameter located in the Project area, and adequate video proof of the blockage, debris, grit, or grease build-up or other condition shall be provided by the Contractor. Video proof of heavy cleaning must be obtained by acquiring a “before” video of all accessible portions of the obstructed reach and submitting this video to Engineer along with the completed inspection. A submerged camera does not justify a need for heavy cleaning; proof that the submergence was due to a blockage and/or heavy debris and not due to a sag in the sewer line will be required.

d. Contractor shall clean these pipes to the standards previously listed. Upon completion of the cleaning, each sewer line shall be televised to assess its condition and to confirm that it meets the standards of cleanliness previously listed. Heavy cleaning will be paid for on a linear foot basis, depending on pipe diameter, only for the length required to be cleaned, unless otherwise agreed upon.

3. **Specialty Cleaning for Roots**: Use high pressure water jetting equipment, rodding machines, bucket machines, and winches using expanding root cutters and porcupines. A sewer reach will have undergone “Specialty Cleaning for Roots” if it requires four or more passes (including the single pass already conducted prior to CCTV inspection) of root removal equipment to sufficiently remove excessively heavy root growth, and meets the other requirements, as specified as follows. Specialty cleaning for roots shall be conducted only upon the prior approval and direction of the Engineer. Costs related to the fourth pass and any additional passes required to clean such sewers shall be included in Contractor’s unit prices bid for Specialty Cleaning for Roots, depending on pipe diameter, to supplement the separate costs related to the initial three passes in the same pipeline that were already included in the Contractor’s unit prices bid for Light Cleaning, depending on pipe diameter. Costs related to the televising of such sewers following specialty cleaning for roots shall be included in Contractor’s unit prices bid for Sanitary Sewer Television Inspection, depending on pipe diameter. Payment for specialty cleaning for roots in a particular line will only be made if:

a. The specialty cleaning for roots was authorized by the Owner or Engineer prior to Contractor’s performance of the work. The Contractor shall obtain a written signature from the Owner or Engineer agreeing to the terms, prices, and lengths of the specialty cleaning for roots.

b. Contractor must document roots removed by specialty cleaning in the presence of the Owner or the Engineer with a video prior to disposal of the roots. Contractor shall complete the CCTV Inspection Form attached to the end of this Specification Section to document the roots removed.

c. Adequate video proof of the roots shall be provided by the Contractor.
Video proof of specialty cleaning for roots must be obtained by acquiring a “before” video of all accessible portions of the obstructed reach and submitting this video to Engineer along with the completed inspection. A submerged camera does not justify a need for specialty cleaning for roots; proof that the submergence was due to roots and not due to a sag in the sewer line will be required.

d. Contractor shall clean these pipes to the standards previously listed. Upon completion of the cleaning, each sewer line shall be televised to assess its condition and to confirm that it meets the standards of cleanliness previously listed. Specialty cleaning for roots will be paid for on a linear foot basis, depending on pipe diameter, only for the length required to be cleaned, unless otherwise agreed upon.

4. **Time and Material Cleaning:** Pipes that contain excessively heavy amounts of accumulated debris, grease, and large stones and bricks at depths greater than 25 percent of the pipe height may be paid on a time and material basis, upon approval by Owner or Engineer. Owner or Engineer may determine if any individual pipe should be cleaned on a time and material basis. Payment will be made according to the Contractor’s price bid for Excessive Heavy Cleaning.

D. Contractor shall protect existing sewer lines from damage caused by improper use of cleaning equipment.

E. **Removal of Materials:** Contractor shall provide appropriate screening to prevent passage of materials into downstream sewers. All solid and semi-solid materials dislodged during cleaning operations shall be captured and removed from the sewer by Contractor at the downstream manhole of the sewer section being cleaned. These materials shall become the property of the Contractor, shall be removed from the site at the end of each workday by the Contractor, and shall be disposed of in a lawful manner by the Contractor. The passage of dislodged materials from the sewer segment being cleaned to the sewer segment located immediately downstream will not be permitted. In such an event, as observed or detected by the Owner, Engineer, or any third party, Contractor shall be responsible for cleaning the affected downstream sewers in their entirety at no additional cost to Owner or Engineer.

F. **Disposal of Material:** Contractor shall remove from the site and properly dispose of all solids and semi-solids recovered during the cleaning operation. The Contractor shall be responsible for the proper disposal of all collected material. Organic waste material/debris removed from the sewer during the cleaning process may be disposed of by hauling it to the Owner’s two lagoons at Five Mile Creek Wastewater Treatment Plant located at 3410 Happy Hollow Lane, Fultondale, Alabama 35068. Construction material may not be disposed of in the lagoons. Specifics regarding the scheduling, monitoring, disposal fees (if any), and approved methods, procedures, and types of material for disposal must be obtained from and coordinated with the Owner and/ or Engineer prior to the start of cleaning operations.

G. No sewer cleaning shall take place in a particular sewer segment until all upstream pipe
segments have been cleaned. If cleaning is done in a downstream pipe segment in order to facilitate overall cleaning operations, the segment shall be re-cleaned at no additional cost after all pipes upstream of that segment have been cleaned.

3.02 FIELD QUALITY CONTROL

A. Acceptance of this portion of the Work shall be dependent upon the results of the television inspection. The goal of the cleaning is to sufficiently remove debris, roots, and deposits to inspect the pipeline and provide at least 95 percent capacity of the pipeline. Sewers that are not sufficiently cleaned to permit television inspection shall be re-cleaned and re-inspected at no additional cost to the Owner.
CCTV INSPECTION FORM

<table>
<thead>
<tr>
<th>Date</th>
<th>Footage Inspected</th>
</tr>
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<tbody>
<tr>
<td>1/15/2014</td>
<td>100</td>
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<table>
<thead>
<tr>
<th>Upstream MH ID</th>
<th>Pipe Size (inches)</th>
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<tr>
<td>12</td>
<td>10</td>
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<table>
<thead>
<tr>
<th>Downstream MH ID</th>
<th>Estimated Debris Amount in Line</th>
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<tbody>
<tr>
<td>13</td>
<td>Minor</td>
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<table>
<thead>
<tr>
<th>Start Time</th>
<th>End Time</th>
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</thead>
<tbody>
<tr>
<td>8:00 AM</td>
<td>10:12 AM</td>
</tr>
</tbody>
</table>

Hours Spent = 2.2

Material (Check all that apply):
- [x] Mud
- [x] Debris
- [ ] Rocks
- [x] Roots
- [x] Liner Tape
- [ ] Silt
- [ ] Gravel
- [x] Grease
- [ ] Broken Pipe
- [ ] Rags

Comments

Comments
<table>
<thead>
<tr>
<th></th>
<th>Minor</th>
<th>Moderate</th>
<th>Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roots</td>
<td><strong>Visual</strong>: No evidence of roots or small bits of hair/curtain roots in the trap or on the sewer cleaning hose without large clumps.</td>
<td><strong>Visual</strong>: Moderate clumps of roots in trap. 1/8&quot; to 3/8&quot; thick roots. <strong>Feel</strong>: Hose does not bind or hydraulic pressure does not jump when roots encountered.</td>
<td><strong>Visual</strong>: Large clumps of roots in trap. Roots over 1/8&quot; thick. <strong>Feel</strong>: Hose binds, jumps or slows down, hydraulic pressure can jump when using hydro cutter.</td>
</tr>
<tr>
<td>Grease</td>
<td><strong>Visual</strong>: No evidence of grease or very small bits of grease in flow or stuck to sewer cleaning hose. Water color change to light milky color with some odor.</td>
<td><strong>Visual</strong>: Popcorn size bits of grease with some larger chunks from 1/2&quot; to 1&quot; diameter. Water color change to light tan/brown with odor. <strong>Feel</strong>: Hose may slow but does not bind or hydraulic pressure does not jump when grease encountered.</td>
<td><strong>Visual</strong>: Any large chunks, logs or calcified grease of significant size. Water color change to dark brown to black with foul odor. <strong>Feel</strong>: Hose binds and requires repeated attempts to clear some sections of the pipe.</td>
</tr>
<tr>
<td>Debris</td>
<td><strong>Visual</strong>: No evidence of any debris. Conditions do not require shortening standard step length. No operator concern for blockage (no indication debris is concentrated in a small area). <strong>Quantity</strong>: Max pass less than: *1 gallon (8 inch)  *2 gallons (10 inches)  *3 gallons (12 inch)  Or -For every 25 feet step increment, less than 5% of channel filled.</td>
<td><strong>Visual</strong>: Debris is removed held by trap, but conditions do not require shortening standard step length. No operator concern for blockage (no indication debris is concentrated in a small area). <strong>Quantity</strong>: Max pass between: *1-3 gallons (&lt; 8 inch)  *2-5 gallons (10 inches)  *3-7 gallons (12 inch)  Or -For every 25 feet step increment, must be between 5-20% of channel filled.</td>
<td><strong>Visual</strong>: Large amounts of debris returned with each pass. Condition requires shortening standard step length. Operator concern for blockage (debris feels concentrated in a small area). <strong>Quantity</strong>: Max pass, more than: *3 gallons (&lt; 8 inch)  *5 gallons (10 inches)  *7 gallons (12 inch)  Or -For every 25 feet step increment, must be more than 20% of channel filled.</td>
</tr>
</tbody>
</table>
SECTION 02720

SEGMENTAL REPLACEMENT (PIPE AND TAP CONNECTIONS)

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. The work specified in this Section includes all labor, materials, accessories, equipment, and tools necessary to install and test the segmental replacements (SRs) of pipe and tap connections where shown and dimensioned on the Drawings and as specified herein.

B. SRs shall include the following:

1. Pre-excavation video or pictures of surface features in the immediate area surrounding the SR (particularly sidewalks and driveways)

2. Exposing the section of defective pipe in accordance with Section 02200 – Earthwork

3. Ensuring the SR excavation has sufficient length to install new pipe at a positive slope

4. Dewatering the excavation in accordance with Section 02200 – Earthwork

5. Installing the SR pipe or tap, coupling, and bedding

6. Replacement and reinstatement of all tap connections within the limits of the SR

   a. When an SR on a main line pipe is performed, each service lateral that falls within the limits of the main line SR shall only be connected to the main line using a factory-fabricated tee or wye on the main line as shown on Detail A – Segmental Replacement (Pipe and Tap Connection) on Drawing D01. Using a Romac-type coupling, Inserta Tee, or Inserta Wye to connect a new main line pipe to a service lateral is not acceptable.

7. Testing the SR pipe as specified

8. Backfilling and restoring surface features in accordance with Section 02200 – Earthwork, Section 02500 – Surface Restoration, Section 02575 – Pavement Repair, Section 02910 – Final Grading and Landscaping, and the Owner’s guidelines

9. CCTV inspection of SR segments from manhole to manhole after installation for acceptance
1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01010 – Summary of Work
B. Section 01300 – Submittals
C. Section 01540 – Demolition and Removal of Existing Structures and Equipment
D. Section 02050 – Demolition
E. Section 02200 – Earthwork
F. Section 02270 – Slope Protection and Erosion Control
G. Section 02500 – Surface Restoration
H. Section 02575 – Pavement Repair
I. Section 02600 – Wastewater Flow Control
J. Section 02731 – Sanitary Sewer Television Inspection
K. Section 02910 – Final Grading and Landscaping
L. Section 03300 – Cast-in-Place Concrete
M. Section 15000 – Basic Mechanical Requirements
N. Section 15006 – Ductile Iron Pipe

1.03 SUBMITTALS

A. The Contractor shall submit Shop Drawings of pipe and couplings and other information in accordance with the requirements set forth in Section 01300 – Submittals.

B. Construction video shall be taken in accordance with the requirements of Section 01010 – Summary of Work.

PART 2 -- PRODUCTS

2.01 GENERAL

A. Main line pipes, tees, wyes, laterals, service connections, and service connection fittings shall be ductile iron as specified in Section 15006 – Ductile Iron Pipe.

B. Bedding, aggregate, backfill, and surface restoration shall be as specified in Section 02200 – Earthwork, Section 02500 – Surface Restoration, and Section 02910 – Final Grading and Landscaping and as shown on the standard drawings in Appendix A and on Drawings D01 and D02.
C. Concrete collars shall be Class B as specified in Section 03300 – Cast-in-Place Concrete.

2.02 PIPE COUPLINGS

A. Couplings for joining existing pipes to proposed EPR pipes shall be specifically designed and rated for joining sewer pipes composed of different materials, such as Fernco 1002 Series for joining clay pipe to cast iron or plastic pipe, and/or having varying diameters.

B. All couplings shall have Type 304 stainless steel clamps, one on each side.

C. All couplings shall have Type 304 stainless steel shear rings.

D. All couplings shall be as manufactured by Fernco, Mission, or Engineer-approved equal.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. All EPRs shall be performed in accordance with Detail A – Segmental Replacement CIPP Lined Pipe and Detail C – Segmental Replacement (Pipe and Tap Connection) on Drawing D01 and the following:

1. Contractor shall mark off extents of SR and limits of excavation.

2. Contractor shall take pre-excavation video of surface features (sidewalks, driveways, etc.) adjacent to the limits of excavation.

3. Contractor shall perform wastewater flow control in accordance with Section 02600 – Wastewater Flow Control.

4. Contractor shall excavate in accordance with Section 02200 – Earthwork. Under no circumstances will the Contractor be allowed to remove concrete or asphalt without cutting it prior to removal. The saw cutting shall be deep enough to produce an even, straight cut.

5. Contractor shall expose the defective pipe so that undamaged sections of the existing pipe are visible on both sides of the proposed SR and shall confirm the required limits of the SR with the Owner and/or Engineer. At a minimum, a total of eight (8) feet of piping shall be replaced by the Contractor at each SR. Pipe and laterals (if present) shall be removed by cutting the pipe or lateral on each side along lines perpendicular to the longitudinal axis of the pipe so “spigot ends” remain in place to be connected to the replacement pipe. Disposal of pipe and excavated material shall be in accordance with Section 01540 – Demolition and Removal of Existing Structures and Equipment, Section 02050 – Demolition, and Section 02200 – Earthwork.

a. If the existing line to be repaired has been CIPP-lined and the host pipe is composed of brittle material (clay or concrete), it shall be removed to expose the CIPP liner.
6. Contractor shall confirm with Owner and/or Engineer that each proposed EPR will have a positive slope. Pipe sags shall be prohibited. Reverse grades shall be prohibited unless approved by the Owner and/or Engineer. If additional excavation and pipe removal is needed to achieve a positive slope, Contractor shall confirm length of additional footage required with Owner and/or Engineer.

7. Contractor shall dewater, sheet, and/or brace all excavations in accordance with Section 02200 – Earthwork. Well points, pumps, sump pits, sheeting, bracing, and/or sock drains shall be used to provide a safe, dry, open trench for all repairs or replacements specified herein. There shall be no sitting water in the trench bottom prior to laying new pipe. Erosion and sedimentation controls shall be provided for all SRs as specified in Section 02270 – Slope Protection and Erosion Control and as shown on the details on Drawing D03.

8. Contractor shall install pipe bedding and compact in accordance with Section 02200 – Earthwork and Section 15000 – Basic Mechanical Requirements.

9. New pipe shall be installed using the specified couplings. Gaps between existing pipe and new pipe shall be minimized. Sections of new pipe shall not be less than 12 inches in length. Couplings shall be installed in accordance with the manufacturer’s guidelines, including those related to pre-cleaning, installation direction, nut torque, etc. Concrete collar shall be poured around coupling.

10. If present, service laterals shall be reconnected at the edge of the trench. Shear rings shall be used on all lateral couplings.

11. Contractor shall confirm positive slope prior to backfilling.

12. Contractor shall flush or clean SR pipe.

13. Contractor shall backfill and compact in accordance with Section 02200 – Earthwork.

14. CCTV inspection after SR is completed shall be performed in accordance with Section 02731 – Sanitary Sewer Television Inspection. Owner and/or Engineer shall confirm visible acceptance of EPR.

15. Contractor shall restore any surface features including roadway and driveway pavement, sidewalks, and grass in accordance with Section 02500 – Surface Restoration, Section 02575 – Pavement Repair, and Section 02910 – Final Grading and Landscaping. Surface features shall be restored to at least the same condition as existed before construction began.

- END OF SECTION -
PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, materials, accessories, equipment, and tools required for the rehabilitation of sections of existing pipelines by the installation and testing of a resin-impregnated flexible tube which shall be formed to the original pipeline and cured to produce a continuous and tight-fitting sectional Cured-In-Place Pipe (CIPP) lining as shown on the Drawings and as specified herein. The CIPP liner shall be designed for a gravity wastewater application.

B. The finished sectional pipe liner shall be fabricated from materials which, when installed, shall be chemically-resistant to withstand exposure to domestic sewage and shall restore the structural integrity of the pipe section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals
B. Section 02600 – Wastewater Flow Control
C. Section 02650 – Sewer Line Cleaning
D. Section 02720 – Excavated Point Repair (Pipe and Tap Connections)
E. Section 02731 – Sanitary Sewer Television Inspection

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.


2. ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
1.04 DELIVERY, STORAGE, AND HANDLING

A. Care shall be taken in shipping, storage, and handling to avoid damaging the liner.

B. All material shall be shipped, stored, and handled in conformance with the manufacturer's requirements and recommendations.

1.05 WARRANTY

A. All lining work shall be warranted by the applicator and/or manufacturer against failure for a minimum of two (2) years after acceptance by the Owner; in no case shall the warranty be less than the manufacturer’s published standard warranty period. If any such failure occurs within the warranty period, the damage shall be repaired by the Contractor in a manner satisfactory to the Owner at no cost to the Owner within 60 days after written notification of the failure.

1.06 SUBMITTALS

A. Shop Drawings: The Contractor shall submit the following in accordance with the requirements set forth in Section 01300 – Submittals:

1. Design calculations
2. Resin physical and chemical properties
3. Manufacturer’s installation instructions
4. MSDS sheets

1.07 QUALIFICATIONS

A. The qualifications of the Contractor shall be submitted with the Bid Proposal. These qualifications shall include detailed descriptions of the following:

1. Name, business address, and telephone number of the Contractor
2. Name(s) of all supervisory personnel that will be directly involved in the Project
3. Proposed product information showing compliance with the specified requirements listed herein, including liner material and resin
4. Documentation of certification of specialty technicians by the equipment manufacturer and/or its authorized representative
5. A reference list of previous projects on which the Contractor and/or installer has installed sectional CIPP linings over the last four (4) years, including project name,
project number, customer name, owner’s contact information (name and phone number), and the number of sectional liners installed

6. To be acceptable, the Contractor/installer must have had a minimum of 400 sectional liner installations and a minimum of two (2) years of active experience in the commercial installation of the product.

7. The Contractor shall sign and date the information provided and certify that, to the extent of his knowledge, the information is true and accurate and that the supervisory personnel will be directly involved with and used on the Project. Substitutions of personnel and/or methods will not be allowed without prior written authorization by the Owner and/or Engineer.

PART 2 -- PRODUCTS

2.01 GENERAL

A. The finished liner shall be fabricated from material as specified herein which, when cured, shall be chemically-resistant to the corrosive effects of the raw sewage and hydrogen sulfide. The sectional CIPP lining shall be the Sectional Point Repair system as manufactured by LMK Technologies, Perma-Liner Industries, or Engineer-approved equal.

B. See Sectional Liner detail and Sectional Liner at Manhole Interface detail on Drawing D01.

2.02 LINER SIZING

A. The liner shall be fabricated to a size that, when installed, shall neatly fit the internal diameter of the pipeline to be repaired.

B. The Contractor shall verify the lengths in the field before cutting liner to length.

C. The minimum length shall be 8 feet for 8-inch to 12-inch diameter pipe. For 15-inch to 21-inch diameter pipe, a longer sectional liner may be required.

D. The sectional liner shall extend a minimum of 18 inches past the first non-defective joints and a minimum of 6 inches past any lateral cut reinstatements.

E. For rehabilitation of pipe sections at terminal points of pipe located adjacent to a manhole or other access structure, care shall be taken to ensure that the liner extends past the opening of the pipe and into the manhole or access structure. This extended section of liner shall be removed by the use of appropriate cutting tools once the liner has cured. The end of the liner shall be ground down such that it extends approximately 3 inches into the manhole, and non-shrink grout shall be used to create a fillet between the liner and the wall of the manhole.

2.03 LINER MATERIAL
A. The liner shall be one-piece and shall consist of one or more layers of flexible needled felt or an equivalent non-woven material. The liner shall be continuous in length, and the wall thickness shall be uniform. No overlapping sections shall be allowed in the circumference or the length of the lateral liner. The tube shall be capable of conforming to offset joints, bells, and disfigured pipe sections. The liner shall be flat with one end overlapping the second end and shall be sized accordingly to create a circular lining equal to the diameter of the mainline pipe. The resin shall be selected with proper consideration for the specific application. The sectional CIPP liner shall result in a smooth bore interior after installation. A report documenting the design criteria for a fully deteriorated pipe section, relative to the hydrostatic pressures, depth of soil cover, and type of soil, shall be submitted to the Engineer for each installation. The cured pipe repair system shall be watertight, shall conform to the existing pipe, and shall eliminate any leakage or connection to the outside of the host pipe/service.

B. The composite of the previously-listed materials shall, upon installation inside the host pipe, exceed the following ASTM test standards at a minimum:

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Value</th>
<th>Reference Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexural Strength</td>
<td>5,000 psi</td>
<td>ASTM D790</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>400,000 psi</td>
<td>ASTM D790</td>
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</table>

2.04 LINER DESIGN

A. The minimum required structural CIPP wall thickness shall be based on the physical properties previously described and shall be in accordance with the design equations in the appendix of ASTM F1216 and the following design parameters:

| Design Safety Factor       | 2.0        |
| Retention Factor for Long-Term Flexural Modulus for Design | 50 percent |
| Ovally*                   | 2 percent  |
| Groundwater Depth = Pipe Depth (above invert)* | _____ feet |
| Soil Depth (above crown)*  | _____ feet |
| Soil Modulus              | 1,000 psi  |
| Soil Load                 | 120 pcf    |
| Live Load                 | One AASHTO H-20 Truck |
| Design Condition          | Fully-Deteriorated |

*Denotes information which can be provided here or in inspection video tapes or project construction drawings. Multiple line segments may require a table of values.

B. The lining manufacturer shall submit complete design calculations for the liner, signed and sealed by a Professional Engineer registered in the State of Alabama and certified by the manufacturer as to the compliance of his materials to the values used in the calculations, to the Engineer for review.

C. Liner shall be neither accepted nor installed until design calculations are acceptable to the
PART 3 -- EXECUTION

3.01 GENERAL

A. The sectional lining procedure shall be performed in strict accordance with the manufacturer's current guidelines. If any deviations from the guidelines are proposed, Contractor shall submit explanation and approval from liner manufacturer.

B. If chemical or structural grouting is shown on the Drawings or required by the Owner or Engineer in addition to the sectional liner, grouting shall be completed and accepted by Owner and Engineer prior to installation of the sectional liner.

3.02 CLEANING SEWER LINES

A. Prior to applying a sectional CIPP liner to a pipeline, the Contractor shall remove internal deposits from the pipeline in accordance with Section 02650 – Sewer Line Cleaning.

3.03 TELEVISION SURVEY

A. Prior to application of the liner and again after application of the liner, a television survey of each sectional CIPP-lined pipeline shall be performed in accordance with Section 02731 – Sanitary Sewer Television Inspection.

B. The interior of the pipeline shall be carefully surveyed to determine the location(s) and extent(s) of any structural failures. The location(s) of any conditions which may prevent proper installation of lining materials in the pipeline shall be noted so that these conditions can be corrected. A videotape and suitable log shall be maintained and submitted to the Engineer.

3.04 FLOW BYPASSING

A. When required, the Contractor shall provide for the transfer of flow around a section or sections of pipe to be lined. The proposed bypassing system shall be approved in advance by the Owner and Engineer. The approval of the bypassing system shall in no way relieve the Contractor of his responsibility and/or public liability. The flow bypassing shall be performed in accordance with Section 02600 – Wastewater Flow Control.

1. If the installation of the lining can be completed in a few hours, bypass pumping may not be required. The placement carriage shall be equipped with a bypass section to allow flow once liner is pressed into place.
3.05 LINE OBSTRUCTIONS

A. The Contractor shall clear each pipeline of obstructions prior to lining. If the survey reveals an obstruction that cannot be removed by conventional cleaning equipment, the Contractor shall make a point repair excavation in accordance with Section 02720 – Excavated Point Repair (Pipe and Tap Connections) to uncover and remove or repair the obstruction. All excavations shall be approved by the Owner and Engineer in writing prior to the commencement of the work.

3.06 LINER INSTALLATION

A. Prior to liner installation, all active leaks which are severe enough to affect the success of liner installation shall be stopped using chemical grout. Contractor shall impregnate the liner with the 100 percent solids resin. Drop cloths, tarpaulins, etc. shall be used to prevent resin material from contacting the adjacent ground. Contractor shall place the liner on the placement carriage and maneuver the carriage and liner into position with the use of a video camera. Contractor shall then force the liner against the inside wall of the damaged host pipe, allowing the resin to permeate into any cracks in the host pipe. Lines shall be allowed to cure in accordance with the manufacturer’s recommendations. Heat may be introduced to speed up curing time. Contractor shall then retract the placement carriage and remove from pipe.

B. After the sectional liner has been cured in place, Contractor shall reconnect the service connections. Cutting of the liner pipe shall be performed from the interior of the pipeline using a robotic cutter. Where holes are cut through the liner, they shall be neat and smooth in order to prevent blockage at the service connections. Cut-in service connections shall be opened to a minimum of 95 percent of the flow capacity of the building sewer. Cuts shall be wire-brushed to remove jagged edges. All coupons shall be recovered at the downstream manhole and removed.

3.07 ACCEPTANCE

A. The finished sectional liner shall be continuous over the entire length of the installation. The liner shall be free from visual defects, damage, deflection, holes, delamination, uncured resin, etc. There shall be no visible infiltration through the liner or from behind the liner.

B. CCTV inspection after liner installation shall be performed in accordance with Section 02731 – Sanitary Sewer Television Inspection. Owner and Engineer shall confirm visible acceptance of sectional liner.

3.08 SITE RESTORATION

A. After the liner installation has been completed and accepted, the Contractor shall clean up the entire Project area and return the ground cover to grade. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.
- END OF SECTION –
SECTION 02731
SANITARY SEWER TELEVISION INSPECTION

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. The work covered by this Section includes furnishing all labor, competent certified technicians, equipment, tools, accessories, and materials required to perform closed-circuit television (CCTV) inspection of specific sanitary sewer pipes as shown on the Drawings and as specified as follows:

1. The existing sanitary sewer pipes designated for heavy cleaning after they are cleaned
2. All new sanitary sewer pipes and tap connections after they are installed
3. Additional sanitary sewer pipes as directed by the Owner or Engineer

B. Digital videos, data, and photos shall be delivered to the Engineer on external portable hard drive, which shall become property of the Owner. Data files shall be named in accordance with required standards, which will allow video files to be directly linked to pipe assets.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals
B. Section 01570 – Traffic Regulation
C. Section 02600 – Wastewater Flow Control

1.03 SUBMITTALS

A. Contractor shall submit a Traffic Control Plan in accordance with Section 01570 – Traffic Regulation.

B. Contractor shall submit schedules of work on a weekly basis. Provide 24-hour notice for deviations from the schedule that are not caused by weather or natural causes.

C. Contractor shall submit a confined space entry plan.

D. Informational Submittals: Prior to beginning CCTV inspection work, Contractor shall submit the following in accordance with Section 01300 – Submittals:

1. References: Contact names and telephone numbers of owners where the Contractor has performed similarly sized and type projects in the last five years
2. List of staff and equipment to be used on Project
3. Crew chief qualifications

4. Confined space entry and hazardous atmosphere training certifications

5. Submit a written description of procedures to be used to the Engineer, including product literature for all digital video equipment including, but not limited to, cabling, camera, monitor, footage counter, digital video tilting device, and recorder.

6. Proposed door hanger for public notification

E. Contractor shall furnish all labor, materials, machinery, equipment, and incidentals required to perform thorough CCTV inspection of the designated sewers.

F. Contractor shall send an email on a daily basis to the Owner and Engineer that lists the manholes that may be accessed during the next 24-hour period. A weekly list of manholes may be submitted in lieu of a daily list, subject to the Engineer’s written approval.

G. Contractor shall keep, and submit to Engineer weekly, daily work logs describing the work location, manhole numbers, work times, labor requirements, personnel names, equipment used (including identification numbers), fire hydrant and other required permits, and work progress. Work logs shall be kept independent of any other required logs.

H. The work described in this Section, including any internal sewer inspections, shall meet the minimum requirements as presented in the OSHA Standard, Title 29 CFR 1910.146, Permit Required Confined Spaces. Contractor shall notify the Owner and Engineer each day by phone or email when it is necessary for Contractor to enter a manhole(s). Contractor shall identify all manholes that he plans on entering that day by street location and manhole number.

I. Contractor shall submit final sewer inspection digital video and data as previously listed herein and as required per Article 3.05 of this Section.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Contractor: Successfully performed work on at least three other projects within the last five years with at least 500,000 linear feet of CCTV experience

2. CCTV Operator: Successfully performed work on at least three other projects within the last five years with at least 250,000 linear feet of CCTV experience

3. Crew Chief: Minimum of five years’ experience on projects similar to this Project and experienced using proposed equipment for this Project
1.05  NOTIFICATIONS

A.  Contractor’s Notification of Owner and Engineer:

1.  A minimum of five days prior to the anticipated commencement of inspections in any one area and 24 hours in advance of actual start

2.  When an obstruction that is restricting flow in the sewer pipelines is discovered

3.  If the conditions for CCTV inspection are found to be unsafe or impractical

4.  Each week, Contractor shall send an email to the Owner’s and Engineer’s designated contacts that lists the location(s) of work, the pipe segments and manholes that will be accessed each day, and the fire hydrants that will be utilized for a water source.

B.  Contractor’s Notification of the Public:

1.  Between 24 hours and 48 hours prior to the inspection of any line segment, Contractor shall distribute door-to-door a door hanger, approved by the Owner and Engineer, describing the work to be performed to notify every residence and business that may be affected. Door hangers shall be double-sided with the notification information in the English language on one side and in the Spanish language on the reverse side.

PART 2 -- PRODUCTS

2.01  TELEVISION INSPECTION EQUIPMENT

A.  Contractor shall provide a mobile vehicle with video monitoring equipment specifically compatible with the camera equipment being used. The vehicle shall be large enough to accommodate at least three people at any time for viewing of the monitor. Owner and Engineer shall have unrestricted access to observe the television screen and all other operations at all times.

B.  The television camera used for the inspection shall be specifically designed and constructed for such inspection. Adjustable light source to allow an even distribution of lighting for the camera shall be suitable to allow a clear color picture of the entire periphery of the pipe. The camera shall be capable of panning 360 degrees and tilting 270 degrees to facilitate the inspection of all laterals, with optimum picture quality provided by focus and iris adjustment. The camera, television monitor, and other components of the video system shall be capable of producing a minimum 600-line resolution picture. Backup camera shall be available on the Project site. The camera shall be operative in 100 percent humidity conditions and in a hazardous and corrosive environment. The camera shall be capable of zooming at least 10:1 for looking further down the pipe or up into the laterals.

C.  The camera, television monitor, and other components of the video system shall be capable of producing picture quality to the satisfaction of Owner and/or Engineer.

D.  The television inspection equipment shall have an accurate footage counter that shall display on the monitor the exact distance of the camera from the centerline of the starting manhole.
PART 3 -- EXECUTION

3.01 PREPARATION

A. Contractor shall, in the presence of Owner’s and/or Engineer’s inspector, calibrate the camera footage every week with an aboveground tape measure and simultaneous CCTV footage counter.

B. Contractor shall not float the camera unless permitted by the Owner or Engineer.

C. See Article 3.04 herein for conditions under which flow control is required.

3.02 TELEVISION INSPECTION

A. Contractor is required to complete the standard National Association of Sewer Service Companies (NASSCO) industry standard Pipeline Assessment and Certification Program (PACP) forms using the standard NASSCO PACP coding during filming of the CCTV videos.

B. Move the camera through the line in either direction at a rate less than or equal to 30 feet per minute, stopping when necessary to permit proper documentation of the condition of the sewer line section. Digital video shall be captured at a minimum video bit rate of 4,000 kbps. In no case shall the television camera be pulled at a speed greater than 30 feet per minute unless permitted by the Owner or Engineer. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line.

C. When manually-operated winches are used to pull the television camera through the line, use telephones or other suitable means of communication set up between the two manholes of the section being inspected to ensure good communications between members of the crew.

D. Obstructions that cause a stuck camera shall be the responsibility of the Contractor, and the retrieval of equipment or cameras shall be the responsibility of the Contractor and shall be performed at the Contractor’s expense.

E. Adjust the camera height such that the camera lens is always centered in the pipe being televised.

F. Provide a lighting system adequate for good quality pictures. A reflector in front of the camera may be required to enhance lighting in black pipe.

3.03 PASSAGE OF TV CAMERA

A. The intention shall be to inspect the full length of sewer between each manhole, but there may be occasions during the CCTV inspection of a sewer line section when the camera will be unable to pass an obstruction even though flow is continuing. If, during the inspection operation, the television camera will not pass through the entire manhole section, Contractor shall setup the CCTV equipment so that the inspection can be performed from the opposite manhole.

B. CCTV videos shall be submitted in one continuous video section from manhole to the immediately
adjacent manhole and not in multiple files, unless specifically approved by Engineer. If a reverse setup is conducted, then two separate video files are allowable; the two separate files shall have the same filename but with a different direction of survey, etc. in the filename or as otherwise directed by the Owner or Engineer, so that it is clear there are multiple files and videos for the same pipe segment.

C. Contractor can televise multiple upstream and/or downstream sewer segments from a single manhole setup location as long as each video of sewer section from one manhole to the immediately adjacent manhole is submitted as a separate file.

D. The television camera shall travel through the lines using its own power. The pictures taken of the entire inside periphery of the pipe shall be clear and visible. Picture quality and definition shall be to the satisfaction of Engineer, and if unsatisfactory, the equipment shall be removed and no payment shall be made for the unsatisfactory inspection.

E. Stop the camera at all service laterals and pan at such an angle that an internal view of the service lateral is available.

3.04 SEWER FLOW CONTROL

A. At all times during CCTV inspection, the flow in the sewer line section(s) undergoing inspection shall be suitably controlled in accordance with Section 02600 – Wastewater Flow Control. The depth of wastewater flow shall not exceed the following:

   4-inch to 10-inch Pipe: 20 percent of pipe diameter
   12-inch to 24-inch Pipe: 25 percent of pipe diameter
   Over 24-inch Pipe: 30 percent of pipe diameter

B. When the depth of flow in the section(s) being inspected is above the maximum allowable for the television inspection, the flow shall be reduced to allowable levels by performing the inspection during periods of minimum flow, with bypass pumping, or by pulling the camera with swab or a high velocity jet nozzle, as approved by the Engineer.

C. When flow in a sewer line is plugged, blocked, or bypassed, sufficient precautions must be taken to protect the sewer lines from damage that might result from sewer surcharging. Further, precautions must be taken to insure that sewer flow control operations do not cause flooding or damage to public or private property being served by the sewers involved.

3.05 SEWER INSPECTION REPORTS

A. Summary reports shall indicate individual survey results in tabular form and shall provide a sortable list of surveys based on a user-defined description field. It shall include starting and ending manhole numbers, depths, pipe material, total survey length, and pipe diameter.

B. Contractor shall submit, in electronic format, digital videos, photos, and evaluation reports to Engineer.
C. If digital videos are of such poor quality that Engineer is unable to evaluate the condition of the sanitary sewer main, locate the sewer service connections, or verify the proper installation, Contractor shall be required to re-televise the sanitary sewer and provide new digital videos of good quality, at no additional cost to Owner or Engineer.

D. All digital videos shall become the property of Owner.

E. Data to be provided weekly to Engineer shall either be recorded on a portable external hard drive or directly copied to Engineer’s portable external hard drive. Each hard drive shall be filled with as much data as practical to minimize the number of hard drives submitted. Sections of a single segment of sewer main shall not be recorded to more than one hard drive. Video footage of recorded segments shall be grouped by area and shall be submitted in sequential order relating to the area mapping designation. The footage counter reading from the camera equipment shall appear on all videos. Contractor shall review each submittal of CCTV inspection data to assure its quality and accuracy and shall revise the CCTV inspection data as needed to correct any inaccuracies prior to providing each submittal to the Engineer. Throughout the duration of the Project, should Engineer discover inaccuracies in any of the videos, Contractor shall re-inspect those segments at no additional cost to the Owner or Engineer. The Engineer will require a 30-day period to perform a quality review of sewer inspection data/videos after each submittal of data/videos has been received from the Contractor. The Contractor is encouraged to submit sewer inspection data/videos in a timely manner as payment will not be processed until the sewer inspection data/videos have successfully passed the quality review and been accepted by the Engineer. This 30-day review period applies to both the initial submittal of data/videos for a segment of sewer main and any subsequent resubmittals of data/videos originally determined to be unacceptable by the Engineer.

F. Contractor shall provide to Engineer CCTV inspection data via external hard drive on a weekly basis and on a monthly basis. The data shall specifically include video indexing for all observations. Prior to beginning the CCTV inspection work, Contractor shall submit a sample deliverable of CCTV inspection data for a single length of sewer pipeline obtained from a past CCTV inspection project performed by the Contractor; Contractor shall not proceed with the CCTV inspection work until this sample deliverable has been submitted to the Engineer for review and the Engineer has subsequently approved its format and contents. Data to be submitted with sample deliverable and weekly/monthly submittals shall include:

1. Database file
2. Videos for each pipe segment in MPEG-1 format or greater
3. An inspection report for each pipe segment as a .pdf file

Files shall be named in accordance with the Owner’s and Engineer’s requirements. Each video file and inspection report file name shall begin with Asset Id_Date_Time (GP001001-123456_20150106_1015.mpg, GP001001-123456_20150106_1015.pdf). All submitted video and inspection report files will follow this naming convention.

G. The camera equipment/software shall be capable of producing digitized images of all sewer mainlines and service connections in .jpg format. Contractor may be instructed to take digital still images of each mainline sewer joint and service connection to clearly depict it. The digital photographs (.jpegs) shall be at least 50 kilobytes in size. The screen capture shall include an
onscreen display with date, reach number, and footage. The photographs shall become the property of the Owner.

H. Upon approval by the Engineer of all, or portions of, the data delivered via the portable external hard drives, the approved CCTV data shall be delivered to Engineer on portable external hard drives. Each portable external hard drive shall be labeled to clearly indicate the date of the inspection, the designated segment(s) of sewer main(s) contained on the portable external hard drive, the name of the Project, the Project CIP number, Contractor name, and the index number of the portable external hard drive. The portable external hard drives shall contain separate digital files for each manhole-to-manhole section. The index number shall indicate the sequential number of the portable external hard drive followed by the mini-basin number.

I. The database shall be comprehensive for the entire Project, and additional data shall be added to the database each week. Each manhole has been given a unique manhole identification (Asset ID) per the Owner’s guidelines, and the name of each database file shall be either that unique upstream Asset ID followed by the unique downstream Asset ID or as otherwise directed by the Owner or Engineer.

J. There may be situations that require Contractor to televise an individual pipe segment from more than one direction (i.e. the camera is only able to televise 75 percent of the segment heading downstream, and the remaining 25 percent must be televised heading upstream). The name of additional database files, etc. produced in these circumstances shall be as shown below or as otherwise directed by the Owner or Engineer.

Examples: Initial file name:
Asset Id_Date_Time_Direction of Survey
GP001001-123456_20150106_1015_Downstream

Additional file name(s):
GP001001-123456_20150106_1032_Upstream

K. The name of each digital still image, if required, shall be based on the video/data file name of the sewer reach in which the image was taken. The name shall be either recorded as the video/data file name, followed by the footage at which the mainline sewer joint or service connection was encountered (i.e. (File Name) @(Footage).jpg) or as otherwise directed by the Owner or Engineer.

L. Contractor shall provide a typewritten summary that lists the contents of each portable external hard drive. The inspection logs shall be submitted on portable external hard drive in Adobe .pdf format with the pipe ID included in the filename, such as GP001001-123456_20150106_Downstream.pdf, and shall include color still photos (.jpg format) of mainline sewer joints and service connections encountered during the television inspection.

M. At the end of the Project, Contractor shall provide a digital and written summary listing of all videos provided under this Project. Digital version shall be developed and submitted in current version of either Microsoft® Excel or Microsoft® Access software.

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SECTION 02740
CURED-IN-PLACE PIPE LINING

PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, materials, accessories, equipment, tools, and incidentals required for the reconstruction of pipelines by the installation and testing of a resin-impregnated flexible tube which is formed to the original pipeline and cured to produce a continuous and tight-fitting Cured-in-Place Pipe (CIPP) lining as shown on the Drawings and as specified herein. The CIPP liner shall be designed for a gravity wastewater application.

B. CIPP lining is an acceptable product for lining all sewers shown on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals

B. Section 01510 – Temporary Utilities

C. Section 02600 – Wastewater Flow Control

D. Section 02650 – Sewer Line Cleaning

E. Section 02731 – Sanitary Sewer Television Inspection

F. Section 02750 – Chemical Grouting

G. Section 02770 – Full-Circle Main to Lateral Connection Lining

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

2. ASTM D2290 Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe


4. ASTM D5813 Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems

5. ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube

6. ASTM F1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

7. ASTM F2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)

1.04 SUBMITTALS

A. Shop Drawings: The Contractor shall submit the following in accordance with the requirements set forth in Section 01300 – Submittals:

1. Performance Work Statement (PWS) summarizing the work to be completed. PWS shall include verification of conformance to these Specifications and a detailed description of the work plan including product delivery, installation schedule, cleaning operations, CCTV inspection, bypass pumping, traffic control, provisions for pipes with sags too large for lining, curing method, repair methods, service reconnections, third party testing laboratory, as-built procedures, warranty, Quality Control Plan (QCP), etc. The QCP shall define the Contractor’s, Owner’s, Engineer’s, and testing labs’ role in quality control.

2. CIPP design data and manufacturer’s data sheets listing all parameters used in the CIPP design and thickness calculations based on ASTM F1216 or ASTM F2019 and ASTM D2412 for “fully deteriorated gravity pipe conditions” as
specified in Part 2 herein. All CIPP liner design calculations shall be signed and sealed by a Professional Engineer registered in the State of Alabama and certified by the manufacturer as to the compliance of his materials to the values used in the calculations. The buckling analysis shall account for the combination of dead load, live load, hydrostatic pressure, and grout pressure (if any). The liner side support shall be considered as if provided by soil pressure against the liner. Modulus of soil reaction shall be as specified in Part 2 herein, corresponding to a moderate degree of compaction of bedding and a fine-grained soil as shown in AWWA Manual M45, Fiberglass Pipe Design.

3. Detailed installation procedures; lining production schedule and location; testing procedures and schedule; quality control procedures; liner curing procedures including heat-up and cool-down rates, curing temperature and duration; and shipping and storage requirements, schedule, and procedures

4. Product data including cured color of fabric tube, fiberglass laminate, flexible membrane, resin, etc.

5. Technical data sheets showing the physical and chemical properties of the resin

6. Product data on cementitious patching material including manufacturer’s installation guidelines

7. Product data on hydrophilic end seal, including chemical and physical properties such as swelling capacity, and manufacturer’s intended application

8. Product data on water stopping (chemical seal) grout (if used)

9. Product data on mechanical coupling for joining dissimilar-sized pipes

B. After installation of the liner, the Contractor shall submit the following in accordance with the requirements set forth in Section 01300 – Submittals and in Part 3 herein:

1. Cure Report, including the following documentation:

   a. Curing log, including temperatures, pressures, and times during the curing process to document that a proper cure has been achieved. Curing log shall be submitted immediately after the curing is complete for each line segment that is rehabilitated.

2. Television survey documentation

3. All required test results
1.05 QUALIFICATIONS

A. The Contractor performing the CIPP lining work shall be fully qualified, experienced, and equipped to complete this work expeditiously and in a satisfactory manner and shall be certified and/or licensed as an installer by the CIPP manufacturer. Only commercially proven products and installers with substantial track records will be approved.

B. The qualifications of the Contractor shall be submitted with the Bid Proposal. These qualifications shall include detailed descriptions and verification of the following requirements:

1. The Contractor shall have successfully installed a minimum of 100,000 linear feet of CIPP lining in pipelines measuring 12 inches in diameter and smaller using the specified method of installation and curing.

2. The Contractor shall have successfully installed a minimum of 5,000 linear feet of CIPP lining in pipelines measuring greater than 12 inches in diameter using the specified method of installation and curing.

3. The Contractor’s superintendent who will perform the work specified herein shall have at least 5 years of experience and shall have successfully installed at least 150,000 linear feet of the proposed CIPP lining using the proposed curing method.

4. The Contractor shall submit a certified statement from the manufacturer that the Contractor is a certified and/or licensed installer of the CIPP lining.

5. An installation reference list of a minimum of three municipal clients that the Contractor has performed this type of work for, including contact names, phone numbers, pipeline diameter, linear footage of pipeline rehabilitated, and a description of the actual work performed.

C. The Contractor shall be capable of providing crews as needed to complete the work without undue delay.

D. The Owner and Engineer shall approve or disapprove the Contractor and/or lining manufacturer based on the submitted information and a follow up interview, if warranted.

E. Inspection of the liner may be made by the Owner and/or Engineer after delivery. The liner shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein, even though sample liner may have been accepted as satisfactory at the place of manufacture. Liner rejected after delivery shall be marked for identification and shall be immediately removed from the job site.
F. Sewer rehabilitation products submitted for approval shall include third party test results supporting the long-term performance and structural strength of the product. Contractor shall acquire test results. Test samples shall be prepared so as to simulate installation methods and trauma of the product. No product will be approved by the Owner and Engineer without satisfactory independent third party testing verification.

G. Documentation of the permitted wet out facility where the resin impregnation of the CIPP tube will be carried out shall be submitted for pre-approval.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Care shall be taken in shipping, storage, and handling to avoid damaging the liner. Extra care shall be taken during cold weather construction. Any liner damaged in shipment shall be replaced at no cost to the Owner and as directed by the Owner and/or Engineer.

B. All material shall be shipped, stored, and handled in conformance with the manufacturer’s requirements and recommendations.

C. Any liner showing a split or tear, or which has otherwise received damage, shall be marked as rejected and immediately removed from the site.

D. The liner shall be maintained at a proper temperature in refrigerated facilities to prevent premature curing at all times prior to installation. The liner shall be protected from UV light prior to installation. Any liner showing evidence of premature curing shall be rejected for use and shall be immediately removed from the site.

1.07 WARRANTY

A. The materials used for this Project shall be certified by the manufacturer for the specified purpose. The Contractor shall warrant the liner material and its installation for two (2) years from the date of acceptance. During the warranty period, any defects which affect the integrity, strength, function, and/or operation of the pipe shall be repaired at the Contractor’s expense in a manner mutually agreed upon by the Owner, Engineer, and the Contractor. All repairs shall also be warranted by the Contractor for two (2) years from the date of repair acceptance. The Owner or Engineer may conduct an independent television inspection, at the Owner’s expense, of the lining work prior to the completion of the one-year guarantee period.

PART 2 -- PRODUCTS

2.01 MATERIALS
A. CIPP lining shall be Insituform by Insituform Technologies, Inliner by Layne/Inliner Technologies, AM-Liner by Premier-Pipe USA, Blue-Tek by Reline America, CIPP liner by Inland Pipe Rehabilitation (IPR), CIPP liner by SAK Construction, or Engineer-approved equal.

B. Inversion: The sewed tube shall consist of one or more layers of absorbent non-woven felt fabric in accordance with the requirements of ASTM F1216.

C. Pulled-in-Place: The tube shall consist of one or more layers of fiberglass laminate in accordance with the requirements of ASTM F2019 and ASTM F1743.

D. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge breaks and missing sections of the existing pipe, and stretch to fit irregular pipe sections. The new jointless pipe-within-a-pipe shall fit tightly against the existing pipe wall and shall consolidate all disconnected sections into a single continuous pipeline, eliminating infiltration or exfiltration.

E. The wet-out tube shall have a uniform thickness that, when compressed at installation pressures, shall meet or exceed the design thickness.

F. The tube shall be sewn to a size that, when installed, shall tightly fit the internal circumference and length of the original pipe with minimal shrinkage, in such a way as to minimize water migration (tracking) between the liner and the host pipe. Allowance shall be made for circumferential stretching during inversion and longitudinal stretching during pull-in. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be acceptable.

G. The minimum tube length shall be that deemed necessary by the Contractor to effectively span the distance between the access points and to facilitate a good seal without water migration. The Contractor shall verify the lengths in the field before cutting liner to length and otherwise preparing it for installation.

H. The outside layer of the tube (before wet-out) shall be coated with an impermeable, flexible membrane that shall contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wet-out) procedure.

I. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.
J. The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.

K. Seams in the tube shall be stronger than the seamless felt and shall meet the requirements of ASTM D5813.

L. The outside of the tube shall be marked for distance at regular intervals, not exceeding five (5) feet, along its entire length. Such markings shall include the manufacturer’s name or identifying symbol. The tubes shall be manufactured in the USA.

M. The resin system shall be a corrosion-resistant polyester, vinyl ester, or epoxy and catalyst system that, when properly cured within the tube composite, meets the requirements of ASTM F1216 or ASTM F2019 and ASTM F1743, the physical properties specified herein, and any additional physical properties that are utilized in the design of the CIPP for this Project. The resin shall produce CIPP which shall comply with the structural and chemical resistance requirements specified herein.

N. The finished CIPP shall be fabricated from materials which, when cured, shall be chemically-resistant to withstand internal exposure to domestic sewage. All constituent materials shall be suitable for service in the environment intended. The final product shall not deteriorate, corrode, or lose structural strength resulting in reduction of the projected product life.

O. The CIPP shall be designed in accordance with the requirements of ASTM F1216 or ASTM F2019 or ASTM F1743, Appendix X1. The CIPP design shall assume no bonding to the original pipe wall. The structural performance of the finished pipe shall be adequate to accommodate all anticipated loads throughout its design life.

P. The CIPP shall have a minimum design life of fifty (50) years. The minimum design life shall be documented by submitting life estimates by national and/or international authorities or specifying agencies.

Q. The Contractor shall have performed long-term testing for flexural creep of the CIPP material installed by his company. These testing results shall be used to determine the long-term, time-dependent flexural modulus to be utilized in the product design. This testing shall include demonstration of performance of the materials (tube and resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D790 testing) shall be used in design calculations for external buckling. The percentage, or the long-term creep retention value, utilized shall be verified by this testing. Values in excess of 50 percent shall not be applied unless substantiated by qualified third party test data. The materials utilized
for this Project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in design.

R. The minimum required structural CIPP wall thickness shall be based on the physical and structural properties described herein and shall be in accordance with the design equations in the Appendices of ASTM F1216 or F2019 and the following design parameters:

<table>
<thead>
<tr>
<th>Design Safety Factor</th>
<th>2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention Factor for Long-Term Flexural Modulus for Design</td>
<td>50 percent</td>
</tr>
<tr>
<td>Ovality*</td>
<td>2 percent</td>
</tr>
<tr>
<td>Groundwater Depth = Grade Elevation</td>
<td>Refer to Drawings</td>
</tr>
<tr>
<td>Soil Depth (above crown)</td>
<td>Refer to Drawings</td>
</tr>
<tr>
<td>Soil Modulus</td>
<td>1,000 psi</td>
</tr>
<tr>
<td>Soil Load</td>
<td>120 pcf</td>
</tr>
<tr>
<td>Live Load</td>
<td>One AASHTO H-20 Truck</td>
</tr>
<tr>
<td>Design Condition</td>
<td>Fully-Deteriorated</td>
</tr>
</tbody>
</table>

* Value listed is based on the best available information. Ovality shall be calculated by Contractor from ASTM F1216, Appendix X1.1 based on information from sewer inspection.

S. The minimum CIPP wall thickness for any mainline sewer pipe shall be 6 millimeters.

T. The layers of the cured CIPP shall be uniformly-bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers cleanly separate or the probe or knife blade freely moves between the layers. If separation of the layers occurs during testing of field samples, new samples shall be cut from the work. Any reoccurrence of separation shall be cause for rejection of the work.

U. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.

V. A chloroprene, hydrophilic waterstop end seal shall be installed at both of the manhole interfaces. End seals shall be full-circle and shall swell when in contact with water. End seal sleeve to be LMK Technologies; INSIIGNIA End Seal Sleeve.

W. A cementitious patching material shall be used in the manholes to reconstruct a proper flow channel around the end of the cured liner. Patching material shall be Hyperform by Quadex or Engineer-approved equal.

2.02 STRUCTURAL REQUIREMENTS FOR MAIN LINES

A. Resin shall be impregnated by vacuum application, resin bath, or Engineer-approved equal method. If reinforcing materials (fiberglass, etc.) are used, the reinforcing material shall be fully-encapsulated within the resin to ensure that the reinforcement is not
exposed, either to the inside of the pipe or at the interface of the CIPP and the existing pipe.

B. The design for the CIPP wall thickness shall be based on the following strengths, unless otherwise approved by the Owner and Engineer in advance.

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Cured Composite per ASTM F1216</th>
<th>Cured Composite per ASTM F2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexural Modulus of Elasticity</td>
<td>ASTM D790</td>
<td>250,000 psi</td>
<td>725,000 psi</td>
</tr>
<tr>
<td>Flexural Stress</td>
<td>ASTM D790</td>
<td>4,500 psi</td>
<td>6,500 psi</td>
</tr>
</tbody>
</table>

PART 3 -- EXECUTION

3.01 GENERAL

A. Contractor shall clean the pipeline with a high-pressure water jet and hydraulically-powered root cutting equipment to remove all internal debris from the pipeline in accordance with Section 02650 – Sewer Line Cleaning.

B. Hydraulic cementitous patching material used for flow channel construction shall be installed as directed by the manufacturer.

3.02 SEWER REPAIRS

A. Any protruding pieces of concrete, dropped joints, or broken pipe shall be subjected to point repairs so that the pipe is left in a clean, smooth condition in all respects ready for lining, unless otherwise jointly determined by the Contractor, Engineer, and the Owner that the defect will not compromise the integrity of the liner.

B. If conditions such as broken pipe and major blockages are found that will prevent proper cleaning, or where additional damage would result if cleaning is attempted or continued, the Contractor shall notify the Engineer immediately. The Contractor shall not line through pipe sagging more than 30 percent without written permission from the Engineer.

3.03 JOINT, CRACK, ANNULAR SPACE, AND LINER END CHEMICAL SEALING

A. Prior to CIPP liner installation, all active leaks of a magnitude that will compromise the integrity of the liner shall be stopped at least one hour prior to installation of the liner using chemical seal grout, at no additional cost to the Owner.

B. Chemical seal grout shall have the following properties:
1. Chemical seal grout shall react quickly to form a permanent watertight seal.

2. Resultant seal shall be flexible and immune to the effects of wet/dry cycles.

3. Chemical seal grout shall be non-biodegradable and immune to the effects of acids, alkalis, and organics in sewage.

4. Component packaging and mixing shall be compatible with field conditions and worker safety.

5. Extraneous sealant left inside pipe shall be readily removable.

6. Chemical seal grout shall be compatible with the CIPP liner resin system utilized.

The chemical sealing materials shall be acrylic resin-type and shall be furnished with activators, initiators, inhibitors, and any other materials recommended by the manufacturer for a complete grout system. Sealing grout shall be furnished in liquid form in manufacturer's standard containers. Sealing grout shall be AV-100 by Avanti International or Engineer-approved equal.

C. The Contractor shall modify his equipment as necessary to seal the leaks. The Contractor's equipment and sealing method shall be approved by the Owner and Engineer prior to use. Extreme caution shall be utilized during leak sealing (pressure) operations in order to avoid damaging the already-weakened sewer pipe. If any damage occurs, it shall be repaired at the Contractor's expense and to the satisfaction of the Owner and Engineer. Excessive pumping of grout which might plug a service lateral shall be avoided. Any service laterals blocked by the grouting operation shall be immediately cleared by the Contractor.

3.04 FLOW CONTROL

A. Flow control shall be exercised as required to ensure that no flowing sewage comes into contact with sections of the sewer under repair in accordance with Section 02600 – Wastewater Flow Control for additional information.

3.05 LINER INSTALLATION

A. In presence of the Engineer, perform a pre-lining CCTV inspection immediately prior to CIPP lining to demonstrate that the pipe is clean and free of roots, grease, sand, rocks, sludge, PACP runners or gushers, pockets of water, or structural impediments that would affect long-term viability of the pipe liner. Obtain Owner's and/or Engineer's approval of the acceptability of the existing pipe condition prior to installation of CIPP.
B. Prior to the Preconstruction Meeting, the Contractor shall submit to the Owner and Engineer for review and approval a description of the proposed methods for avoiding liner stoppage due to conflict and friction with such points as the manhole entrance and the bend into the pipe entrance. Contractor shall also submit plans for dealing with a liner stopped by snagging within the pipe.

C. The Contractor shall immediately notify the Owner and Engineer of any construction delays during the insertion operation. Such delays may require sampling and testing of portions of the cured liner by an independent laboratory at the Owner's discretion. The cost of such testing shall be borne by the Contractor, and no extra compensation will be allowed. Any failure of sample tests or a lack of immediate notification of delay shall be automatic cause for rejection of that part of the work at the Owner's discretion.

D. The Contractor shall submit construction schedules for review and approval by the Owner and Engineer. At no time shall any service lateral remain inoperative for more than an eight (8) hour period. Any service that will be out of service for more than eight (8) hours shall be temporarily bypassed into a mainline sanitary sewer at the Contractor's expense.

E. The materials and processes shall be reasonably available and accessible for pre-installation, installation and post-installation inspections. Areas which require inspection shall include, but not be limited to, the following:

1. Product materials shall exhibit sufficient transparency to visually verify the quality of resin impregnation.

2. Temperature sensing devices, such as thermocouples, shall be located between the existing pipe and the CIPP to ensure the quality of the cure of the wall laminate.

F. Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or input and output temperatures shall be monitored and logged during the cure cycles if applicable. The manufacturer’s recommended cure method and schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per applicable ASTM standards, shall be taken into account by the Contractor.

G. Initial cure shall be deemed complete when the exposed portions of the tube appear to be hard and sound and the temperature sensor indicates that the temperature is of a magnitude to realize an exotherm. The cure period shall be of a duration recommended by the resin manufacturer and may require continuous recirculation of water to maintain the temperature. The Contractor shall have on hand at all times, for use by his
personnel, the Owner, and the Engineer, a digital thermometer or other means of accurately and quickly checking the temperature of exposed portions of the liner.

H. CIPP installation shall be in accordance with Section 7 of ASTM F1216, Section 6 of ASTM F1743, or ASTM F2019, with modifications as listed herein.

I. Resin Impregnation: The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation, resin bath, or Engineer-approved equal method shall be used. To ensure thorough resin saturation throughout the length of the felt tube, the point of vacuum shall be no further than 25 feet from the point of initial resin introduction. After vacuum in the tube is established, a vacuum point shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular as possible. A roller system shall be used to uniformly distribute the resin throughout the tube. If the installer uses an alternate method of resin impregnation, the method shall produce the same results. Any alternate resin impregnation method shall be proven and subject to the approval of the Owner and Engineer.

J. Tube Insertion: The wet-out tube shall be positioned in the pipeline using either inversion or a pull-in method. If pulled into place, a power winch shall be utilized and care shall be exercised not to damage the tube as a result of pull-in friction. The tube shall be pulled-in or inverted through an existing manhole or approved access point and shall fully extend to the next designated manhole or termination point. Water for inversion and cure shall be provided in accordance with Section 01510 – Temporary Utilities.

K. Temperature gauges shall be placed inside the tube at the invert level of each end, or throughout its length, to monitor the temperatures during the cure cycle.

L. Curing shall be performed in accordance with the manufacturer’s recommended cure schedule.

M. Cool Down: The Contractor shall cool the hardened pipe to a temperature below 100 degrees Fahrenheit before relieving the hydrostatic head. Cool down shall be accomplished by the introduction of cool water into the inversion standpipe to replace water being pumped out of the manhole. Care shall be taken in release of static head so that vacuum will not be developed that could damage the newly-installed liner.

N. Finish: The new pipe shall be cut off in the manhole at a suitable location. The finished product shall be continuous over the length of pipe reconstructed and shall be free from dry spots, delamination, and lifts. Pipe entries and exits shall be smooth, free of irregularities, and watertight. Visible leaks shall not be present, and the Contractor shall
perform grouting to remove leaks or fill voids between the host pipe and the liner. During the warranty period, any defects which will affect the integrity or strength of the product shall be repaired at the Contractor’s expense, in a manner mutually agreed upon by the Owner, Engineer, and the Contractor.

O. **Reconstructing Inverts:** A proper flow channel shall be reconstructed around the cured liner using a cementitious patching material. Flow channel shall not leave any voids under the liner which will become clogged with debris.

P. **Reinstatement of Services:** The exact location and number of service connections to be reinstated shall be determined from CCTV footage and field inspection. Contractor shall accurately field-locate all existing service connections. The Contractor shall reconnect all active service connections to the lined pipe. All services shall be internally reinstated to a minimum of 95 percent of the original opening shape and capacity, resulting in a smooth opening with no jagged edges. The bottom of the openings shall be flush with the bottom of the lateral pipe with no protruding material able to hinder flow or catch debris. Services shall not be reconnected from unoccupied, abandoned, or vacant lots, unless directed otherwise by Owner or Engineer. In case of oversized cuts to service connections, Contractor shall install a full-circle tap connection in accordance with Section 02770 – Full-Circle Main to Lateral Connection Lining at no cost to Owner (unless the lateral is already scheduled for full-circle rehabilitation). Contractor shall also restore/correct, without any delay, all missed or faulty reconnections and any damage caused to property owners for not reconnecting the services soon enough or for not giving adequate notice to the property owners. The contractor shall certify a minimum of two complete functional cutters plus key spare components are on the job site before installation or are in the immediate area of the jobsite and can be quickly obtained.

Q. **Reinstatement of Services by Excavation:** Service lateral connections that are designated on the Drawings or directed by the Engineer as Sanitary Sewer Service External Replacement (EX) shall be replaced with InSerta Tee, Romac CB Saddle, or approved equal. InSerta Tees shall be “Fatboy” type with hub manufactured of SDR 26 PVC material incorporating a 360 degree integral stop on the hub surface and exceeding ASTM F1336 Section 10.3 Pipe Stop Load Support Test. The approved product shall be installed per manufacturer’s specifications and recommendations to produce a watertight seal. Post EX installation shall be performed in accordance with Section 02731 Sanitary Sewer Television Inspection and submitted to and approved by the Engineer prior to approval of payment application. Leaking EX’s will not be accepted or paid for.

3.06 **FIELD QUALITY CONTROL**

A. For all runs of CIPP liner and where the thickness of the liner changes, the Contractor shall take samples and shall test them in accordance with Article 3.11 herein.
B. Where the pipe diameter is less than or equal to 15 inches, the samples shall be restrained-type samples made by extending the liner through a form with a diameter as close as possible to the existing pipeline. The formed sample shall be provided with insulation to contain cure heat as well as a heat sink, such as sandbags, for cool down. The length of the tube shall be large enough to provide at least five samples.

C. Where the pipe diameter is greater than 15 inches, a plate sample shall be prepared. The test sample shall be fabricated from the material taken from the liner and cured in a clamped mold with the resin used in the liner construction placed in the down tube.

D. Test specimens shall be clearly marked in indelible ink to identify the name of the Project, location, appropriate lateral or main section, work order number, date of installation, and orientation to the top of the pipe (direction of up) so the results can be correlated to the work performed. All test results shall use this designated labeling as a reference.

E. The extraction and labeling of test specimens shall be performed by the Contractor in the presence of the Owner and/or Engineer. The Owner and/or Engineer and Contractor shall, upon completion of sample extraction and labeling, all sign a chain-of-custody form that shall subsequently accompany the sample at all times and shall ultimately be received and signed at the testing laboratory. Test reports shall include a copy of the chain-of-custody form with all signatures to ensure that reported test results are for the correct sample.

F. Each sample shall be large enough to provide at least five total specimens for testing. One test for thickness, flexural strength, and flexural modulus shall be conducted in accordance with ASTM F1216 or ASTM F2019, ASTM D790, and ASTM D2290 for each run of lines. The material shall meet the initial strength requirements of Table 1 of ASTM F1216 or ASTM F2019 (UV cured).

3.07 WET-OUT AND CURE REPORT

A. The Contractor shall submit wet-out and cure reports documenting the specific details of the liner’s vacuum impregnation and saturation with resin and the CIPP installation of the liner. A report shall be generated for each liner installation. Copies of all wet-out and cure records shall be submitted to the Owner and Engineer on a weekly basis and prior to submitting an Application for Payment on which payment for the specific liner(s) included in the wet-out and cure records is requested. If the wet-out and cure reports are not submitted prior to the associated Application for Payment, payment for the work will not be made and the Application for Payment will be rejected. At a minimum, the report shall include:

1. Contractor name
2. Owner’s Contract number
3. Line identification and location
4. Date of wet-out
5. Identification of sample(s) and name of technician(s)
6. Date of installation in sewer
7. Inside diameter of host sewer pipe
8. Liner thickness
9. Liner length
10. Liner and resin batch numbers
11. Resin type
12. Wet-out length
13. Roller spacing
14. Vacuum setting
15. Quantity of resin and catalyst utilized
16. Name of wet-out technician(s)
17. Time wet-out started and completed
18. Applicable remarks
19. **Heat Cure:** Boiler and liner heating fluid (water or steam) pressure and temperature versus time log during cure period
20. **UV Cure:** Pressure and temperature versus time log and light train speed during cure period
21. Cool down report

3.08 SITE RESTORATION
A. After the liner installation has been completed and accepted by the Owner, the Contractor shall restore the entire Project area and shall return the ground cover to its original or better condition. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

3.09 TELEVISION SURVEY

A. Prior to application of the liner and again after application of the liner, a television survey of each CIPP-lined pipeline shall be performed in accordance with Section 02731 – Sanitary Sewer Television Inspection. Television survey shall be performed for all CIPP lining, and post-installation inspection shall be completed within 2 weeks of liner installation. Cleaning of sewer lines shall be in accordance with Section 02650 – Sewer Line Cleaning. Post-installation inspection shall be submitted and approved by the Engineer prior to approval of payment application.

3.10 PUBLIC NOTIFICATION

A. The Contractor shall maintain sewer service usage for adjacent property owners throughout the duration of the Project. In the event that sewer service to any single property must be temporarily stopped for CIPP lining, the service shall be restored within 8 hours or less. A public notification program shall be implemented, and, at a minimum, Contractor shall contact each home or business connected to the sanitary sewer to inform them of the work to be performed and when the sewer will be offline. The Contractor shall also provide the following:

1. Whether or not an interruption in service is expected, a written notice delivered to each home or business the day prior to the beginning of work being conducted on the sewer section to which their services are connected. Written notice shall include a local telephone number for the Contractor that the property owner can call to discuss the Project or any problems which could arise.

2. Personal contact with any home or business which cannot be reconnected within the time stated in the written notice.

3.11 TESTING REQUIREMENTS

A. Testing on physical samples from a random 20 percent of cured lines shall be performed, unless a pattern of failure occurs, at which point the Owner or Engineer can request additional testing at no cost to the Owner. At a minimum, one sample shall be tested for each 1,000 linear feet of liner installed. All of the costs for sample collection and testing shall be included in the amount bid for the applicable Bid Item for CIPP lining, and no separate payment shall be made.
B. For each inversion length, one CIPP sample shall be cut from a section of cured CIPP that has been inverted through a like-diameter pipe at an intermediate manhole or at the termination point. This sample pipe shall have been held in place by a suitable heat sink such as sandbags. Other sampling techniques may be required for special situations.

C. The Contractor shall submit a method to the Owner and Engineer for review and approval for obtaining representative samples from the installed liners in accordance with Article 3.06 herein. These samples shall be tested by a third party ASTM-certified testing laboratory at the Contractor’s expense to verify compliance with the installed material specifications. The Contractor shall produce these test samples when directed by the Owner and/or Engineer.

D. The CIPP shall meet the chemical resistance requirements of ASTM F1216 or ASTM F2019. CIPP samples for testing shall be of a tube and resin system similar to that proposed for actual construction. CIPP samples, both with and without plastic coating, shall meet these chemical testing requirements. The CIPP samples shall be prepared and the samples’ physical properties tested in accordance with ASTM F1216, ASTM F2019, or Section 8 of ASTM F1743 using either proposed method. Wall thickness of samples shall be in accordance with paragraph 8.1.6 of ASTM F1743.

E. The installed CIPP liner shall be leakage tested in accordance with ASTM F1216. The leakage testing shall be conformed before the service connections are re-instated. The Contractor may perform air testing in lieu of water leakage test. The Contractor shall perform a 4 psi air test on the segment after curing the CIPP and prior to internally re-instating laterals on 18-inch and smaller diameter sewers. The CIPP shall be able to hold a 4 psi pressure for a 5-minute minimum duration after a 2-minute stabilization period. Any lining not able to meet the water leakage test or air test shall be repaired and retested at no additional cost to the Owner.

F. When post-installation thickness measurements and/or physical property testing is performed, installed liners which do not pass these material tests will be accepted at reduced payment or rejected as follows:

1. **Full Payment**: If the thickness, flexural strength, and flexural modulus of elasticity of installed liner are all equal or greater than 95 percent of specified values, full payment will be made.

2. **Reduced Payment**: If the thickness, flexural strength, or flexural modulus of elasticity of installed liner is between 90 and 94.9 percent of specified value, payment will be made based on an adjusted amount, which shall equal the appropriate unit price bid multiplied by a Value Factor calculated as follows:

   \[
   \text{Value Factor} = \text{Thickness} \times \text{Flexural Strength} \times \text{Flexural Modulus of Elasticity}
   \]
Elasticity (all percentages expressed as decimals)

3. **Rejected:** If the thickness, flexural strength, or flexural modulus of elasticity of installed liner is 89.9 percent or less of specified value, product may be rejected.

### 3.12 ACCEPTANCE

**A.** The finished liner shall be continuous over the entire length of the installation. The liner shall be free from visual defects, damage, deflection, holes, delaminations, uncured resin, etc. No pinholes, splits, cracks, thin spots, dry spots, lifts, ridges, or other defects in the CIPP liner shall be permitted. There shall be no visible infiltration through the liner or from behind the liner at manholes and service connections. Wrinkles in the finished liner that cause backwater, reduce the pipe’s hydraulic capacity or structural stability, or create voids between the liner and pipe wall are unacceptable.

**B.** Cut-ins and attachments at service connections shall be neat and smooth. All service connections shall be open, clear, and watertight. The liner opening shall neatly conform to the opening in the host pipe and shall be free of burrs or debris.

**C.** Following installation of the liner and reopening of the service connections, the Contractor shall conduct a final digitally-recorded color CCTV inspection of the completed work. Copies of these post-installation digital recordings and the digital recordings made prior to the liner installation shall be submitted to the Engineer for approval. Payment will not be made for any CIPP lining until the Engineer has reviewed and approved these digital recordings. The Contractor shall submit the CDs, DVDs, or portable hard drives of this inspection footage a minimum of two weeks in advance of submitting an Application for Payment on which payment for the CIPP lining shown in the footage is requested.

**D.** Defective lining shall be removed and the pipe re-lined at no additional cost to the Owner. If the host pipe is damaged during the removal process, Contractor shall perform a point repair at Contractor’s expense. Prior to removing or repairing any defective lining, the Contractor shall supply a complete CCTV inspection of the CIPP segment to the Engineer.

**E.** Preliminary field acceptance of the liner shall be based on the Owner’s and/or Engineer’s evaluation of the installation and curing data, results of air testing where required, and review of the digital CCTV recordings.

1. **Groundwater infiltration shall not be observed through the liner.**

2. **There shall be no evidence of splits, cracks, breaks, lifts, kinks, delaminations, or crazing in the liner.**
3. If any defective liner is discovered after it has been installed, it shall be removed and replaced with either a sound liner or a new pipe at no additional cost to the Owner.

F. Final acceptance of the liner shall be based on the preliminary field acceptance of the liner by the Owner and/or Engineer as previously listed and on the results of the certified laboratory tests on the liner specimens as previously listed.

G. Liners meeting or exceeding the certified thicknesses and specified strengths, as evidenced by the certified laboratory testing results, shall be paid for per Paragraph D of Article 3.11 herein.

- END OF SECTION -
PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, materials, accessories, equipment, and tools required for the rehabilitation, infiltration reduction, and root treatment of pipe sections, lateral connections, and manholes using chemical grouting as shown on the Drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals
B. Section 02600 – Wastewater Flow Control
C. Section 02650 – Sewer Line Cleaning
D. Section 02720 – Segmental Replacement (Pipe and Tap Connections)
E. Section 02731 – Sanitary Sewer Television Inspection
F. Section 02740 – Cured-in-Place Pipe Lining

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ASTM F2304 Standard Practice for Sealing of Sewers Using Chemical Grouting
2. ASTM F2414 Standard Practice for Sealing Sewer Manholes Using Chemical Grouting
3. ASTM F2454 Standard Practice for Sealing Lateral Connections and lines from the mainline Sewer Systems by the Lateral Packer Method, Using Chemical Grouting
5. NASSCO Specification Guidelines – Specification for Television Inspection Main Sewer


1.04 SUBMITTALS

A. **Shop Drawings:** The Contractor shall submit the following in accordance with the requirements set forth in Section 01300 – Submittals:

1. Chemical grout and additive product data showing physical and chemical properties

2. Manufacturer’s installation instructions

3. MSDS sheets

1.05 QUALIFICATIONS

A. The qualifications of the Contractor shall be submitted with the Bid Proposal. These qualifications shall include detailed descriptions of the following:

1. Name, business address, and telephone number of the Contractor

2. Name(s) of all supervisory personnel that will be directly involved in the Project

3. Proposed product information showing compliance with the specified requirements listed herein, including chemical grouts, additives, and packers

4. Documentation of certification of Contractor/installer by the chemical grout manufacturer and/or its authorized representative

5. A reference list of previous projects on which the Contractor and/or installer has provided chemical grouting over the last five years, including project name, project number, customer name, and owner’s contact information (name and phone number

6. To be acceptable, the Contractor/installer must have had a minimum of five (5) years of active experience in chemical grouting.

7. The chemical grout shall have documented service of successful performance in similar usage, with a minimum of 10,000 joints, laterals, and manholes grouted in the United States.

8. The Contractor shall sign and date the information provided and certify that, to the extent of his knowledge, the information is true and accurate and that the
supervisory personnel will be directly involved with and used on the Project. Substitutions of personnel and/or methods will not be allowed without written authorization by the Owner and/or Engineer.

PART 2 -- PRODUCTS

2.01 CHEMICAL GROUT

A. For main lines and laterals, chemical grout shall be a minimum of 10 percent acrylamide base material by weight.

B. Chemical grout shall have the ability to tolerate dilution and react in moving water.

C. Chemical grout shall have the ability to increase viscosity, density, and strength with the use of approved additives.

D. Chemical grout shall have an initial viscosity of approximately 2 centipoise.

E. Chemical grout shall have a controllable reaction time of 10 seconds to 60 minutes.

F. Contractor shall provide a chemical sealant solution containing a principal chemical sealant constituent, initiator (trigger), and catalyst specifically recommended for the purpose of sealing in sanitary sewer lines and manholes. Chemical sealant constituent, initiator (trigger), and catalyst shall be compatible when mixed.

G. After final reaction, cured grout shall be continuous, irreversible, impermeable, firm yet flexible, chemically-stable, and non-biodegradable.

H. Grout used shall be Avanti AV-100 acrylamide or Engineer-approved equal. Urethane based grout may be used for infiltration control in manholes.

2.02 ADDITIVES

A. The following additives, in quantities as recommended by the manufacturer and as approved by the Engineer, shall be used for all grouting applications:

1. Strengthening Agents: For joint grouting, a latex or diatomaceous earth additive shall be added to increase compressive and tensile strength. The strengthening agent shall be Avanti AV-257 Icoset or Engineer-approved equal.

2. Root Inhibitor: A root deterrent chemical shall be added to control root re-growth. The root inhibitor shall be Avanti AC-50W or Engineer-approved equal.

B. If required by field conditions, the following additives, in quantities as recommended by the manufacturer, may be used at the Contractor's discretion:

1. Dye: A manufacturer-approved water soluble dye without trace metals may be added to the grout tank(s) for visual confirmation.
2. **Gel Time Modifier**: A gel time extending agent may be used to extend gel time as necessary.

3. **Freeze/Thaw**: In those lines where the grouting material may be exposed to a freeze-thaw cycle, ethylene glycol or an alternative Engineer-approved additive shall be used to prevent chemical grout cracking once set.

C. When using non-soluble additives, the grout tanks shall have mechanical mixing devices to keep the additives in suspension and maintain a uniform solution of grout and additive.

**PART 3 -- EXECUTION**

3.01 **CLEANING SEWER LINES**

A. Prior to any chemical grouting of a pipe, the Contractor shall remove internal deposits, protrusions, and anything that prevents proper packer seating from the pipeline in accordance with Section 02650 – Sewer Line Cleaning. After application of the chemical grout, the Contractor shall remove any excess chemical grout in accordance with Section 02650 – Sewer Line Cleaning prior to post-installation inspection.

3.02 **TELEVISION SURVEY**

A. Prior to application of the chemical grout and again after application of the chemical grout, a television survey of each grouted pipeline shall be performed in accordance with Section 02731 – Sanitary Sewer Television Inspection. Post-installation inspection shall be submitted and approved by the Engineer prior to approval of payment application.

B. The interior of the pipeline shall be carefully surveyed to determine the location(s) and extent(s) of any structural failures. The location(s) of any conditions which may prevent proper application of grouting materials in the pipeline shall be noted so that these conditions can be corrected. A videotape and suitable log shall be maintained and submitted to the Engineer.

3.03 **FLOW BYPASSING**

A. When required, the Contractor shall provide for the transfer of flow around a section or sections of pipe to be grouted. The proposed bypassing system shall be approved in advance by the Owner and Engineer. The approval of the bypassing system shall in no way relieve the Contractor of his responsibility and/or public liability. The flow bypassing shall be performed in accordance with Section 02600 – Wastewater Flow Control.

   1. If the grouting can be completed in a few hours, bypass pumping may not be required. The placement carriage shall be equipped with a bypass section to allow flow once grouting is completed.

3.04 **LINE OBSTRUCTIONS**
A. The Contractor shall clear each pipeline of obstructions prior to grouting. If the survey reveals an obstruction that cannot be removed by conventional cleaning equipment, the Contractor shall notify the Engineer.

3.05 CHEMICAL GROUT APPLICATION

A. The entire chemical grouting process shall be performed in strict accordance with the manufacturer’s current guidelines. If any deviations from the guidelines are proposed, Contractor shall submit explanation and approval from grout and/or packer manufacturer(s).

B. Repairs shall take place at joints, generally small circumferential cracks, small holes, or similar points of infiltration as listed in the Pipe Rehabilitation Schedules and Manhole Rehabilitation Schedules on the Drawings. The repair shall not permanently reduce or change the original cross-sectional area and shape of the interior of the sewer pipeline.

C. Sewer Pipe Joints or Defects:

1. Contractor shall position the sealing packer over the area to be repaired using a metering device at the surface and CCTV camera in the line.

2. Accurate measurement of the location of the defect to be sealed shall be made using the portion of sealing packer as the datum (i.e. measurement point or target).

3. A similar measurement to the target shall also be used to obtain the necessary measurement for positioning the injection area of the sealing packer over the area to be sealed.

4. Contractor shall expand the sealing packer sleeves using controlled pressures.

5. Expanded sleeve shall seal against the inside periphery of the pipeline to form a void area at the point of infiltration that is completely isolated from the rest of the pipeline.

6. Contractor shall pump sealant materials into the isolated area through those systems at controlled pressures that are in excess of groundwater pressures.

7. Contractor shall pump as much grout as is required to seal any leaks and fill the voids. Under pressure, the grout shall then be forced out into the soil through any leaking joints and pipe defects. No more than 20 gallons of grout shall be pumped into a single sewer section. If a sewer section requires more than 20 gallons of grout to achieve an effective seal, the Engineer shall be notified and shall approve the use of the additional grout before pumping is continued.

8. Chemical grout shall break away from the packer and stay in place when the packer is deflated and moved from the point of infiltration.
9. Upon completion of injection, Contractor shall test the point of repair. If testing shows the seal was not completely effective, Contractor shall repeat the sealing process until the defect successfully passes the pressure test.

10. After sealing each sewer section, Contractor shall remove surplus grouting material from the section at the manhole immediately downstream of the grouting location.

11. If surplus grouting materials left in a sewer section by the Contractor result in sewer surcharging and subsequent damage to public or private property, Contractor shall be responsible for damage to property and payment of any related expenses incurred by Owner.

12. For sealing main line sewer pipe joints and laterals connected to manholes by packer injection grouting, gel times shall be plus or minus 30 seconds unless otherwise approved by Engineer.

D. Lateral Connections:

1. All lateral connections that are not designated on the Drawings or directed by the Owner and/or Engineer to be replaced via excavation or rehabilitated with a full-circle lateral liner shall be chemically grouted after the CIPP liner is installed and lateral opening has been reinstated in accordance with Section 02740 – Cured-in-Place Pipe Lining. The grout shall extend a minimum of 6 inches up the lateral pipe. If a minimum of 6 inches of grout in the lateral cannot be achieved due to blockages, the Contractor shall proceed to the next connection and shall immediately inform the Engineer of the location and cause of the blocked connection.

2. The lateral packer shall remain in position during the sealing of the connection so the isolated void is maintained. Grout shall be pressure-injected through the lateral packer into the annular space between the inversion tube and the lateral pipe. Under pressure, the grout shall then be forced out into the soil through any leaking joints and pipe defects. No more than 20 gallons of grout shall be pumped through a single lateral connection. If a connection requires more than 20 gallons of grout to achieve an effective seal, the Engineer shall be notified and shall approve the use of the additional grout before pumping is continued.

3. Upon completion of the lateral sealing procedure, the lateral shall be air-tested to confirm the sealing of the connection. If the lateral fails the air test, the grouting procedure shall be repeated at no additional cost to the Owner. This sequence of grouting and subsequent air testing shall be repeated until either the lateral is sealed or it is determined that the grout consumption is too high and may result in the blockage of the lateral pipe. The final determination to stop subsequent attempts to seal a lateral will be jointly made by the Engineer and the Contractor.

4. The Contractor shall confirm lateral flow after the successful sealing of each lateral tap. With the lateral packer in position, the inversion tube shall be retracted and air shall be pressure-injected into the lateral. If a pressure builds in the lateral and
does not drop to approximately zero in a few seconds, the packer shall be moved off the connection and the connection shall be viewed with a television camera. With the camera viewing the connection point, an attempt shall be made to obtain a water flush by the property owner served by the lateral. If water is not visible during this flushing procedure, it shall be assumed that the building sewer connection is blocked with grout and the Contractor shall clear the lateral at no additional cost to the Owner. Contractor shall not be responsible for clearing blockages in the lateral that are not due to grouting operations.

E. Curtain Grouting (Manholes):

1. The entire manhole shall be sealed with grout, including the corbel, wall, pipe seals, bench, and invert using the manufacturer’s recommended material(s) and method(s).

2. Drilling grout injection holes in the manhole in strategic locations to redirect flow coming through cracks and other defects in the wall, or to seal the entire exterior surface of the manhole, shall be in accordance with the grout manufacturer’s recommendations. Injection holes shall be in staggered rows and near observed defects and pipe seals.

3. Grout typically shall be injected through the lowest holes first and shall proceed higher up the manhole until it is externally sealed with grout. Additional holes may be required to verify that the grout has encompassed the entire exterior of the manhole.

4. The injection holes shall be cleaned and patched as recommended by the manufacturer.

3.06 ACCEPTANCE AND TESTING

A. Prior to and during the joint testing phases of the work, the Contractor shall perform control, intermediate, and final testing in accordance with ASTM F2304, ASTM F2414, and ASTM F2454.

B. Testing Sewer Joints:

1. Joint testing pressure shall be equal to 0.5 psi per vertical foot of pipe depth plus 2 psi. Test pressure shall not exceed 10 psi without prior approval by the Engineer.

2. Joints in laterals which are directly connected to manholes shall be tested to 18 inches.

3. Each sewer pipe joint shall be tested at the previously-specified pressure in accordance with the following air test procedure:

   a. The packer shall be positioned within the pipe so it straddles the joint to be tested.
b. The packer ends shall be expanded so the joint is isolated from the remainder of the pipe and a void area is created between the packer and the pipe joint. The ends of the testing device shall be expanded against the pipe per the manufacturer’s recommendations. If all attempts to isolate the joint fail, grout shall be pumped to seal the leak around the packer end elements. The Contractor shall be paid at the unit price for grout to seal the packer unless the Engineer determines that the sewer was inadequately cleaned or the packer is not properly working.

c. Air shall then be slowly introduced into the void area until a pressure equal to or greater than the required test pressure, but in no cases greater than 2 psi above the required test pressure, is observed on the pressure monitoring equipment. When the desired pressure is reached, the air flow shall be stopped. If the void pressure decreases by more than 1.0 psi within the next 15 seconds, the joint will have failed the test and shall be sealed.

d. Upon completing the testing of each individual joint, the packer shall be deflated with the pressure meter continuing to display void pressure. If the void pressure reading does not drop to 0.0 plus or minus 0.5 psi, the test equipment shall be cleaned of residual grout material or repaired as needed to result in an accurate void pressure reading.

C. Testing Lateral Connections:

1. Lateral connection testing pressure shall be equal to 0.5 psi per vertical foot of pipe depth plus 2 psi. Test pressure shall not exceed 10 psi without prior approval by the Engineer.

2. Each lateral connection shall be tested at the previously-specified pressure in accordance with the following air test procedure:

a. The area to be tested shall be isolated using the lateral connection packer and by applying positive pressure into the isolated void area. For laterals directly connected to the main line sewer, a pan and tilt camera shall be used to position the lateral packer.

b. The lateral bladder shall be inverted from the main line assembly into the lateral pipe and inflated. The main line elements shall then be inflated to isolate the lateral connection and the portion of the lateral to be tested.

c. A sensing unit shall monitor the pressure of the packer void and shall accurately transmit a continuous readout of the void pressure to the control panel at the grouting truck or to a pressure gauge on the packer recorded by the CCTV camera.

d. Air shall then be slowly introduced into the void area until a pressure equal to or greater than the required test pressure, but in no cases greater than 2 psi above the required test pressure, is observed on the pressure monitoring equipment. When the desired pressure is reached, the air flow...
shall be stopped. If the void pressure decreases by more than 2.0 psi within the next 15 seconds, the lateral will have failed the test and shall be grouted and retested.

e. Upon completing the testing of each individual lateral, the lateral packer shall be deflated with the pressure meter continuing to display void pressure. If the void pressure reading does not drop to 0.0 plus or minus 0.5 psi, the test equipment shall be cleaned of residual grout material or repaired as needed to result in an accurate void pressure reading.

D. Manholes:

1. All manholes shall be visually inspected to ensure that the inflow and infiltration into the manhole has been eliminated.

3.07 SITE RESTORATION

A. After the grouting has been completed and accepted by the Owner, the Contractor shall restore the entire Project area and shall return the ground cover to its original or better condition. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

B. A container shall be furnished for the collection of solvents used in the cleaning of the grouting equipment. Contractor shall use an approved solvent recovery process to dispose of the collected solvents. Disposal of cleaning solvents into the sewer system or into natural watercourses is strictly prohibited.

- END OF SECTION -
PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, materials, accessories, equipment, tools, and incidentals required for the rehabilitation and testing of main line sewer sections and the adjacent laterals without excavation by providing a one-piece, leak-free connection at the interface of the main line and lateral using Cured-in-Place Pipe (CIPP) as shown on the Drawings and as specified herein. The CIPP liner shall be designed for a gravity wastewater application.

B. The finished main-to-lateral connection pipe liner shall be fabricated from materials which, when installed, shall be chemically-resistant to withstand exposure to domestic sewage and shall restore the structural integrity of the main line section and lateral.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals
B. Section 02600 – Wastewater Flow Control
C. Section 02650 – Sewer Line Cleaning
D. Section 02720 – Segmental Replacement (Pipe and Tap Connections)
E. Section 02731 – Sanitary Sewer Television Inspection

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.


2. ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
1.04 DELIVERY, STORAGE, AND HANDLING

A. Care shall be taken in shipping, storage, and handling to avoid damaging the liner.

B. All material shall be shipped, stored, and handled in conformance with the manufacturer’s requirements and recommendations.

1.05 WARRANTY

A. All lining work shall be warranted by the applicator and/or manufacturer against failure for a minimum of two (2) years after acceptance by the Owner; in no case shall the warranty be less than the manufacturer’s published standard warranty period. During this period, all serious defects, including failure of the seal between the service lateral lining and the main sewer, shall be removed and replaced by the Contractor in a satisfactory manner at no additional cost to the Owner within 60 days after written notification of the failure. Any defects replaced at that time shall be fully guaranteed by the Contractor and manufacturer for one year from the date the defect was repaired. Wrinkles, blisters, dry spots in resin, or other defects in the finished lateral, which in the Engineer’s opinion, negatively affect the service lateral’s integrity or strength or the pipe’s flow capacity or performance of solids passage are unacceptable. Defects also include leakage through the lining, lining separating from the pipe, delamination, and excessive wrinkles inhibiting flow.

1.06 SUBMITTALS

A. Shop Drawings: The Contractor shall submit the following in accordance with the requirements set forth in Section 01300 – Submittals:

   1. Design calculations
   2. Resin physical and chemical properties
   3. Manufacturer’s installation instructions
   4. MSDS sheets
   5. Hydrophilic sealing material product data and installation instructions

1.07 QUALIFICATIONS

A. The qualifications of the Contractor shall be submitted with the Bid Proposal. These qualifications shall include detailed descriptions of the following:

   1. Name, business address, and telephone number of the Contractor
   2. Name(s) of all supervisory personnel that will be directly involved in the Project
   3. Proposed product information showing compliance with the specified requirements listed herein, including liner material, resin, and hydrophilic material
4. Documentation of certification or licensing by the lining manufacturer of the CIPL blindshot method.

5. Documentation of certification of specialty technicians by the equipment manufacturer and/or its authorized representative

6. A reference list of at least two (2) previous projects on which the Contractor and/or installer has installed CIPP linings at main-to-lateral connections over the last three years, including project name, project number, customer name, owner's contact information (name and phone number), and the number of CIPP linings at main-to-lateral connections installed

7. To be acceptable, The Contractor/installer must have had a minimum of 400 main-to-lateral connection liner installations and a minimum of two (2) years of active experience in the commercial installation of the product. Contractor must show evidence of installing main-to-lateral connection liners using the blindshot method in an established residential or commercial subdivision with minimal impacts to the property owners use of their sanitary sewer collection system, driveways, and street rights-of-ways.

8. Installation crew(s) sent to the Project must be directly supervised by a dedicated foreman/supervisor having successfully completed two (2) previous projects as listed above. Exclusive of the foreman/supervisor, installation crew(s) must include at least two (2) crew members who have successfully completed these projects.

9. The Contractor shall sign and date the information provided and certify that, to the extent of his knowledge, the information is true and accurate and that the supervisory personnel will be directly involved with and used on the Project. Substitutions of personnel and/or methods will not be allowed without prior written authorization by the Owner and Engineer.

PART 2 -- PRODUCTS

2.01 GENERAL

A. The finished liner shall be fabricated from material as specified herein which, when cured, shall be chemically-resistant to the corrosive effects of the raw sewage and hydrogen sulfide. The main-to-lateral connection CIPP lining shall be as manufactured by LMK Technologies, Perma-Liner Industries, BLD Services, or Engineer pre-approved equal.

B. See Full-Circle Tap Connection Repair Detail, CIPP Lateral Lining Detail, and other detail in the Drawings.

2.02 LINER SIZING

A. The liner shall be fabricated to a size that, when installed, shall neatly fit the internal circumference of the main line pipe and lateral connection to be repaired.
B. The length projected into the lateral shall extend to the property line or as directed by the Drawings and/or Engineer.

2.03 LINER MATERIAL

A. The liner shall be one-piece, shall consist of a main line portion and a lateral portion, and shall consist of one or more layers of flexible needled felt or an equivalent non-woven material. The liner shall be continuous in length, and the wall thickness shall be uniform. No overlapping sections shall be allowed in the circumference or the length of the lateral liner, unless approved by the Engineer. The tube shall be capable of conforming to offset joints, bells, and disfigured pipe sections. The main line liner shall be flat with one end overlapping the second end and shall be sized accordingly to create a circular lining equal to the diameter of the main line pipe. The resin shall be selected with proper consideration for the specific application and shall meet the requirements of ASTM F1216, Section 5.2. The main-to-lateral connection CIPP liner shall result in a smooth bore interior after installation. A report documenting the design criteria for a fully deteriorated pipe section, relative to the hydrostatic pressures, depth of soil cover, and type of soil, shall be submitted to the Engineer for each installation. The main line liner shall be a full-circle, 16-inch long CIPP liner integrally manufactured to the lateral liner to provide a seamless connection between the main line liner and the lateral liner. Installation shall be remotely accomplished using air or water for inversion and curing. The cured pipe repair system shall be watertight, shall conform to the existing pipe, and shall eliminate any leakage or connection to the outside of the host pipe/service.

B. The composite of the previously-listed materials shall, upon installation inside the host pipe, exceed the following ASTM test standards at a minimum:

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Value</th>
<th>Reference Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexural Strength</td>
<td>4,500 psi</td>
<td>ASTM D790</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>250,000 psi</td>
<td>ASTM D790</td>
</tr>
</tbody>
</table>

2.04 LINER DESIGN

A. The minimum required structural CIPP wall thickness shall be based on the physical properties previously described and shall be in accordance with the design equations in the appendix of ASTM F1216, and the following design parameters:

| Design Safety Factor       | 2.0        |
| Retention Factor for Long-Term Flexural Modulus for Design | 50 percent |
| Ovality*                  | 2 percent  |
| Groundwater Depth = Pipe Depth (above invert)* | ________ feet |
| Soil Depth (above crown)* | ________ feet |
| Soil Modulus              | 700 psi    |
| Soil Load                 | 120 pcf    |
| Live Load                 | One AASHTO H-20 Truck |

31242-000/02770/03-25-17 02770-4 SSSR – AMP 2019 AMP01 WYLAM PS AREA REHAB
**Design Condition**

<table>
<thead>
<tr>
<th>Design Condition</th>
<th>Fully-Deteriorated</th>
</tr>
</thead>
</table>

*Denotes information which can be provided here or in inspection video tapes or project construction drawings. Multiple line segments may require a table of values.*

B. The lining manufacturer shall submit complete design calculations for the liner, signed and sealed by a Professional Engineer registered in the State of Alabama and certified by the manufacturer as to the compliance of his materials to the values used in the calculations, to the Engineer for review.

C. The finished lining shall have a 3 mm minimum thickness for 4-inch laterals.

D. Liner shall be neither accepted nor installed until design calculations are acceptable to the Owner and Engineer.

### 2.05 HYDROPHILIC SEALING MATERIAL

A. The liner shall be inverted into place with a continuous hydrophilic gasket, waterstop, or sealing paste along the entire interface between the main line and the lateral and the terminal ends of the main line and lateral.

B. Hydrophilic gasket, waterstop, or sealing paste shall be a material specifically designed to expand in the presence of water. Expansion by volume shall be a minimum of 100 percent. Material shall be resistant to chemical contaminants, such as hydrogen sulfide, at the concentrations typically found in domestic wastewater.

### PART 3 -- EXECUTION

### 3.01 CLEANING SEWER LINES

A. Prior to applying a CIPP liner to a main-to-lateral connection, the Contractor shall remove internal deposits from the main and lateral in accordance with Section 02650 – Sewer Line Cleaning.

### 3.02 TELEVISION SURVEY

A. Prior to application of the liner and again after application of the liner, a television survey of each CIPP-lined main-to-lateral connection shall be performed in accordance with Section 02731 – Sanitary Sewer Television Inspection. Post-installation inspection shall be submitted and approved by the Engineer prior to approval of payment application. Each lateral lining longer than 18 inches shall be televised separate from the main line.

B. The interior of the main line and lateral shall be carefully surveyed to determine the location(s) and extent(s) of any structural failures. The location(s) of any conditions which may prevent proper installation of lining materials in the main line and lateral shall be noted so that these conditions can be corrected. A video file and suitable log shall be maintained and submitted to the Engineer as per the Specifications.

### 3.03 FLOW BYPASSING
A. When required, the Contractor shall provide for the transfer of flow around a section or sections of pipe to be lined. The proposed bypassing system shall be approved in advance by the Owner and Engineer. The approval of the bypassing system shall in no way relieve the Contractor of his responsibility and/or public liability. The flow bypassing shall be performed in accordance with Section 02600 – Wastewater Flow Control.

1. If the installation of the lining can be completed in a few hours, bypass pumping may not be required. The placement carriage shall be equipped with a bypass section to allow flow once liner is pressed into place.

3.04 LINE OBSTRUCTIONS

A. The Contractor shall clear each main line and lateral of obstructions prior to lining. If the survey reveals an obstruction that cannot be removed by conventional cleaning equipment, the Contractor shall notify the Engineer immediately.

3.05 LINER INSTALLATION

A. The tube shall be inspected for tears and frayed sections. The tube, after it is verified to be in good condition, shall be vacuum-impregnated with the thermosetting resin. The resin shall be introduced into the tube by creating a slug of resin at the beginning of the tube. A calibration roller shall be used to assist the movement of the resin slug throughout the tube. All air in the tube shall be removed using a vacuum, which will allow the resin to thoroughly impregnate the tube. All resin shall be contained to ensure that public properties or persons are not exposed to the liquid resin. The main line liner shall be saturated on a wet-out platform. The resin-impregnated sample (wick) shall be retained by the installer to provide verification of the curing process taking place in the host pipe.

B. The saturated tube shall be inserted into the carrying device along with the inversion bladder. The main line liner shall be affixed on the “T” launching device. Both the launching device and carrying device shall be pulled into the pipe using a cable winch. The pull shall be complete when the open port of the “T” launching device is aligned with the interface between the main line and lateral. The resin-saturated lateral tube shall be completely protected during the pull. Resin shall not be lost by contact with manhole walls or the pipe during the pull. The resin-saturated main line liner shall be supported on the rigid “T” launcher that is elevated above the pipe invert using a rotating skid system. The main line liner shall not be contaminated or diluted by exposure to dirt, debris, or water during the pull.

C. The installer shall document the placement of the “T” Liner by internal CCTV inspection. The camera shall be inserted from the lateral down to the main line pipe.

D. The main line liner shall be expanded against the main line, and the lateral tube shall be inverted out of the “T” launcher/carrying device using controlled air or water pressure. The installer shall be able to view the lateral liner contacting the lateral from the beginning to the end of the repair. The main line liner and the lateral tube shall be held tightly in place against the wall of the host pipe by controlled pressure until the cure is complete.
E. When the curing process is complete, the pressure shall be released. The inversion bladder and launching device shall be removed from the host pipe using the winch. No barriers, coatings, or any material other than the cured tube/resin composite shall be left in the host pipe. Any materials used in the installation other than the cured tube/resin composite shall be removed from the pipe by the installer.

F. Hydrophilic gasket, waterstop, or sealing paste shall be installed in strict accordance with the manufacturer’s current guidelines, including those related to bead thickness, overlap, cure time before applying pressure or exposure to water, etc.

3.06 ACCEPTANCE AND TESTING

A. The finished liner shall be continuous over the entire length of the installation. The liner shall be free from visual defects, damage, deflection, holes, delamination, uncured resin, etc.. There shall be no visible infiltration through the liner or from behind the liner.

B. CCTV inspection after liner installation shall be performed in accordance with Section 02731 – Sanitary Sewer Television Inspection. Owner and/or Engineer shall confirm visible acceptance of sectional liner.

3.07 SITE RESTORATION

A. After the liner installation has been completed and accepted, the Contractor shall clean up the entire Project area and return the ground cover to grade. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

- END OF SECTION -
PART 1 -- GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, materials, accessories, equipment, tools, and incidentals required to rehabilitate and test manholes as shown on the Drawings and as specified herein, including surface preparation, flow diversion, inflow control, invert and channel reconstruction, internal lining, chimney seals, and pipe connections.

B. The manhole rehabilitation products shall be fabricated from materials which, when installed, shall terminate infiltration, shall be chemically-resistant to withstand exposure to domestic sewage, and shall resist hydrostatic loads.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals

B. Section 02750 – Chemical Grouting

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.


2. ASTM C273 Standard Test Method for Shear Properties of Sandwich Core Materials

3. ASTM C293 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)

4. ASTM C496 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
5. ASTM C882 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear
6. ASTM C1244 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
8. ASTM D624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
13. ASTM D4787 Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates

1.04 SUBMITTALS

A. Shop Drawings: The Contractor shall submit the following for the manhole rehabilitation products in accordance with the requirements set forth in Section 01300 – Submittals:

1. Physical and chemical properties
2. Material composition
3. Confirmation of conformance to applicable reference standards
4. MSDSs
5. Warranty information
6. Instructions for installation and repair
7. Manufacturer’s statement of compatibility between epoxy or polyurethane coating and cementitious base coat

8. Infiltration control and patching material

9. OSHA Confined Space Supervisor Certificate

1.05 QUALIFICATIONS

A. The Contractor/installer/applicator performing the work shall be fully qualified, experienced, and equipped to complete the work expeditiously and in a satisfactory manner. The qualifications of the Contractor/installer/applicator shall include detailed descriptions of the following:

1. Name, business address, and telephone number of the Contractor

2. Name(s) of all supervisory personnel that will be directly involved in the Project

3. Proposed product information showing compliance with the specified requirements listed herein, including chimney seal, grout, and internal liner material, and the respective manufacturer’s installation instructions.

4. Documentation of certification of the Contractor, specialty technician, and/or installer by the product manufacturer and/or its authorized representative

5. A reference list of previous projects on which the Contractor and/or installer has rehabilitated manholes over the last two years, including project name, project number, customer name, owner’s contact information (name and phone number), and the number of manholes rehabilitated

6. To be acceptable, the Contractor/installer must have had a minimum of 500 manhole rehabilitation product installations and a minimum of two (2) years of active experience in the commercial installation of the products.

7. Documentation of warranty repair process

8. The Contractor shall sign and date the information provided and certify that, to the extent of his knowledge, the information is true and accurate and that the supervisory personnel will be directly involved with and used on the Project. Substitutions of personnel and/or methods will not be allowed without prior written authorization by the Owner and Engineer.

1.06 WARRANTY

A. All rehabilitation systems, except the internal liner system, shall be warranted by the applicator and/or manufacturer against failure for a minimum of two (2) years after
acceptance by the Owner; in no case shall the warranty be less than the manufacturer’s published standard warranty period.

1. Multilayered polyurethane/polymeric stress skin panel system and epoxy or polyurethane coating used for internal liner systems shall be warranted by both the applicator and manufacturer against failure for a minimum of ten (10) years after acceptance by the Owner. The internal liner system applicator and the internal liner system manufacturer shall both submit an affidavit that confirms the warranty period provided. Affidavit must be signed by an officer of the basic corporation, partnership, or company that applied or manufactured the internal liner system and witnessed by a notary public.

   B. Failure of the liners and chimney seals will be deemed to have occurred if they fail to prevent groundwater infiltration, prevent the internal deterioration or corrosion of the manhole, or prevent hydrostatic loads from damaging the liner system. If any such failure occurs within the warranty period, the damage shall be repaired by the Contractor in a manner satisfactory to the Owner at no cost to the Owner within 60 days after written notification of the failure. If the damaged manhole(s) are not repaired within the 60 days after written notification in a manner satisfactory to the Owner, the system applicator and manufacturer will have their prequalification revoked for a period of five (5) years. After such time a new prequalification package can be submitted for review.

PART 2 -- PRODUCTS

2.01 GENERAL

   A. The materials to be utilized in the rehabilitation of manholes shall be designed and manufactured to withstand the corrosive effects of hydrogen sulfide in a wastewater environment, prevent infiltration, resist hydrostatic loads, and withstand constant and direct contact with flowing wastewater.

2.02 CHIMNEY SEAL

   A. Chimney seals shall be a spray-applied, brush-applied, or trowel-applied plural component system composed of a polymeric, epoxy, or urethane flexible sealant.

   B. The sealant shall be specifically designed to adhere to cementitious, brick, and metallic materials typically found in a manhole chimney, withstand the corrosive gases of domestic wastewater (especially hydrogen sulfide), and prevent leakage of groundwater through the frame and chimney.

   C. Chimney seals shall meet the following requirements at a minimum:
1. **Shore A Hardness**: 65 (per ASTM D2240)

2. **Elongation**: 67 percent (per ASTM D412)

3. **Tensile Strength**: 1,150 psi (per ASTM D412)

4. **Finished thickness**: 125 mils

D. Chimney seals shall be Flex-Seal Utility Sealant by Sealing Systems, Inc., SpectraShield by CCI Spectrum, Inc., Madewell 806 by Madewell Products Corporation, or Engineer pre-approved equal.

2.03 CHEMICAL GROUT

A. Provide chemical grout in accordance with Section 02750 – Chemical Grouting.

2.04 INTERNAL LINER SYSTEM

A. The internal liner system shall be specifically designed for a minimum service life of 50 years, to continuously bond to the substrate, to withstand a temperature range of 0 degrees to 100 degrees Fahrenheit, to restore the interior of the manhole, to withstand the corrosive gases of domestic wastewater (especially hydrogen sulfide), to eliminate the infiltration of groundwater through the manhole walls and mortar joints, and to be structurally capable of withstanding the pressure of groundwater based on the depth of the specific manhole being lined.

B. The internal liner system shall be a multilayered polyurethane/polymeric stress skin panel system, a 100 percent solids epoxy or polyurethane coating, or a composite system consisting of an epoxy or polyurethane top coat over a cementitious base coat. Infiltration control, patching material, and/or a cementitious base coat may be necessary depending on the extent of the manhole corrosion, damage, substrate profile, loss of material, and infiltration. All materials used shall be completely compatible with all other manhole rehabilitation products being used. Contractor shall ensure compatibility of all products with the individual material manufacturers.

C. Where necessary, infiltration control and patching materials shall be installed in accordance with the lining manufacturer’s requirements prior to installing the lining system to control active infiltration and repair voids in the existing manhole walls or damaged inverts. Infiltration control and patching materials shall be rapid-setting, high early strength, hand-applied cementitious materials for stopping infiltrating water and making repairs to concrete, brick, or other masonry-constructed manholes. The materials shall be non-shrinking, nonmetallic, and non-corrosive. The materials shall be compatible with
the lining material used. Infiltration control and patching materials shall be as manufactured by The Strong Company, Inc., Raven Lining Systems, Madewell Products Corporation, Quadex, Inc., or Engineer pre-approved equal.

D. Multilayered polyurethane/polymeric stress skin panel system shall consist of a moisture barrier, surfacer, and final corrosion barrier. Multilayered panel system shall be SpectraShield by CCI Spectrum, Inc. or Engineer pre-approved equal prior to bid. Multilayered panel system shall meet the following requirements at a minimum:

1. **Shore A Hardness**: 95 (per ASTM D2240)
2. **Elongation**: 300 percent (per ASTM D412)
3. **Tensile Strength**: 2,400 psi (per ASTM D412)
4. **Tear Strength**: 500 pounds/linear inch (per ASTM D624)
5. **Shear Strength**: 225 psi (per ASTM C273)
6. **Finished Dry Thickness**: 500 mils
7. **Adhesion to Concrete**: Substrate failure (per ASTM D7234)

E. Epoxy or polyurethane coating shall be high-build, shall be 100 percent solids, and shall contain no volatile organic compounds. Coating shall be suitable for use as a trowel-applied or spray-applied monolithic surfacing at the minimum dry film thickness specified herein. Epoxy or polyurethane coating shall be Raven 405 by Raven Lining Systems, Mainstay DS-5 by Madewell Products Corporation, SprayWall by Sprayroq, S-301 Epoxy Spray System by Warren Environmental, Inc., Sauereisen SewerGard No. 210X, or Engineer pre-approved equal. Epoxy or polyurethane coating shall meet the following requirements at a minimum:

1. **Shore D Hardness**: 85 (per ASTM D2240)
2. **Compressive Strength**: 12,000 psi (per ASTM D695)
3. **Tensile Strength**: 6,800 psi (per ASTM D638)
4. **Flexural Strength**: 11,000 psi (per ASTM D790)
5. **Finished Dry Thickness**: 125 mils
6. **Adhesion to Concrete**: Substrate failure (per ASTM D7234)
F. Cementitious base coat shall be a pumpable, Portland-based microsilica cement or calcium aluminate cement. If the epoxy or polyurethane coating manufacturer also manufactures a cementitious base coat, the cementitious base coat product shall be by the same manufacturer as the epoxy or polyurethane top coat product. If the epoxy or polyurethane coating manufacturer does not manufacture a cementitious base coat, the cementitious base coat product shall be compatible with the epoxy or polyurethane top coat product. Contractor shall ensure compatibility between the top coat product and cementitious base coat product. Cementitious base coat shall be Raven 705CA by Raven Lining Systems, Mainstay ML-72 by Madewell Products Corporation, or Engineer pre-approved equal. Cementitious base coat, when cured, shall meet the following requirements at 28 days at a minimum:

1. **Compressive Strength**: 9,200 psi (per ASTM C109)
2. **Tensile Strength**: 685 psi (per ASTM C496)
3. **Flexural Strength**: 1,200 psi (per ASTM C293)
4. **Finished Dry Thickness**: See Article 3.04, Paragraph H herein
5. **Bond Strength**: 2,000 psi (per ASTM C882)

2.05 BENCH, CHANNEL, AND INVERT

A. The existing flow channel shall be removed and replaced with a cast-in-place flow channel, invert, and bench to the dimensions shown on the Rehabilitation of Existing Manhole detail on Drawing D02.

B. All channels, inverts, and benches shall be monolithically constructed of 4,000 psi concrete.

2.06 DROP BOWL ASSEMBLY

A. Drop pipe and fittings shall be installed per Section 02640 – Utility Structures.

B. Contractor shall properly repair the internal lining system after installation of drop bowl assembly in accordance with manufacturer’s recommendations.

PART 3 -- EXECUTION

3.01 GENERAL

A. Contractor shall accurately field-measure and size the rehabilitation products for each
individual manhole. Each existing sewer manhole to be rehabilitated may have a different configuration and varying field dimensions. All field measurements shall conform to the requirements of the manufacturers of the rehabilitation products.

3.02 CHIMNEY SEAL

A. All loose and protruding mortar, bricks, roots, and anything else that might prevent proper application of the chimney seal shall be removed prior to application.

B. Active leaks shall be stopped with chemical or hydraulic sealants or cements prior to installation.

C. All areas to be sealed shall be dry, clean, and free of dust, dirt, sand, and other contaminants prior to installation. A torch may be required to ensure a dry surface.

D. Chimney seal shall be installed in strict accordance with the manufacturer’s installation instructions over the entire chimney area and shall overlap the frame and cone by two (2) inches minimum. A primer shall be used if recommended by the manufacturer.

3.03 CHEMICAL GROUT

A. Install chemical grout in accordance with Section 02750 – Chemical Grouting.

B. Chemical grouting shall be completed and accepted prior to performing internal lining if both methods are specified or directed by the Owner and/or Engineer for a specific manhole.

3.04 INTERNAL-LINER SYSTEM

A. All loose and protruding mortar, bricks, roots, and anything else that might prevent proper application of the liner shall be removed prior to application. Manhole steps, protruding pipes, and exposed rebar shall be removed and ground back 1/2 inch into the manhole wall. Manhole steps and protruding pipe shall not be replaced after installation of the liner.

B. High pressure water shall be used during surface preparation to produce a clean, abraded, and sound surface with no evidence of laitance, loose material, or other contaminants. Surface shall have a suitable profile for application of liner in accordance with the manufacturer’s requirements.

C. Active leaks shall be stopped with chemical or hydraulic sealants or cements prior to installation.
D. All areas to be lined shall be dry, clean, and free of dust, dirt, sand, and other contaminants prior to installation. A torch or heat lamp may be required to ensure a dry surface.

E. Any spray equipment used for application shall be specifically designed to accurately ratio and apply the liner system. Liner system shall be installed in strict accordance with the manufacturer's installation instructions over the entire interior of the manhole and 2 inches up onto the frame and 6 inches down onto the bench as shown on the Rehabilitation of Existing Manhole detail on Drawing D02.

F. Multilayered polyurethane/polymeric stress skin panel system shall be installed in strict accordance with the manufacturer's installation instructions, including those for materials handling, mixing, environmental controls, working time, working temperature, pot life, allowable time between coats (recoat time), safety, and spray equipment. A permanent identification and date of work performed shall be affixed to the structure in a readily-visible location, and a final written report shall be provided to Owner and Engineer detailing the asset ID, depth of manhole, diameter of manhole, date of report, and description of liner installation.

G. Epoxy or polyurethane coating shall be installed in strict accordance with the manufacturer's installation instructions, including those for materials handling, primers, mixing, environmental controls, working time, working temperature, pot life, allowable time between coats (recoat time), safety, and spray equipment. Installation of epoxy or polyurethane coating over cementitious base coat shall not occur until the cementitious base coat has cured to the extent and time required by the manufacturer. A permanent identification and date of work performed shall be affixed to the structure in a readily-visible location, and a final written report shall be provided to Owner and Engineer detailing the asset ID, depth of manhole, diameter of manhole, date of report, and description of liner installation.

H. Cementitious base coat shall be installed in strict accordance with the manufacturer's installation instructions, including those for materials handling, on-site mixing, environmental controls, working time, working temperature, safety, and spray equipment. Water shall only be added to the materials during the mixing process and prior to material pumping or spray application; water shall not be added at the nozzle. Cementitious base coat shall only be installed via low-pressure application. The cured base coat surface shall be troweled smooth and continuous with proper sealing connections to all unsurfaced areas. The total thickness of the cementitious base coat shall be in accordance with the epoxy or polyurethane lining manufacturer's recommendations and the following minimum requirements:

1. For all brick manholes and for block or cast concrete manholes in poor condition with notable loss of surface material or exposed reinforcing, apply to a minimum thickness of 1 inch.
2. For block or cast concrete manholes in fair condition, apply to a minimum thickness of 0.5 inch.

3. For block or cast concrete manholes in good condition with no loss of surface material, it may be acceptable to apply the epoxy or polyurethane top coat directly to the manhole surface without applying a cementitious base coat if the Contractor confirms that the existing manhole surface meets the requirements of the epoxy or polyurethane top coat manufacturer.

3.05 BENCH, CHANNEL, AND INVERT

A. Flow channels shall conform in shape and slope to that of the existing sewers entering and exiting the manholes.

B. Invert shall be smooth, shall be semi-circular in cross-section, and shall have the same diameter as the existing pipe exiting the manhole.

C. Changes in direction of flow or sewer centerline within a manhole shall be made by forming the flow channel along a smooth curve with as long of a radius as the inside of the manhole will allow.

D. Bench shall slope toward invert as shown on the Rehabilitation of Existing Manhole detail on Drawing D02 for proper drainage to the invert channel.

E. Benches shall be built up to a height as shown on the Rehabilitation of Existing Manhole detail on Drawing D02 for the entering and exiting pipes and shall be given a uniform wood float finish.

F. Where possible, a non-shrink grout fillet shall be installed around pipe penetrations above the bench.

3.06 DROP BOWL ASSEMBLY

A. Drop pipe and bowl shall be installed in strict accordance with the manufacturer’s installation instructions and guidelines and Section 02640 – Utility Structures.

C. Contractor shall properly repair the internal lining system after installation of drop bowl assembly in accordance with manufacturer’s recommendations.

3.07 INSPECTION, TESTING, AND ACCEPTANCE
A. Contractor shall have appropriate equipment and OSHA training to allow the Owner and/or Engineer to enter and inspect the manholes during rehabilitation. If any defects are observed, products shall be repaired or replaced at no cost to the Owner using a method acceptable to the manufacturer and Owner and/or Engineer.

B. Vacuum testing, when required by the Engineer, shall be in accordance with ASTM C1244. Contractor shall perform vacuum testing with appropriate test equipment in the presence of an inspector. Any manholes failing this test shall be reworked as necessary and retested at no additional cost to the Owner. All verification and vacuum testing shall be at no cost to the Owner and shall be paid for by the manufacturer or the Contractor.

C. Holiday detection testing in accordance with ASTM D4787 shall be required on all manholes rehabilitated with internal chimney seals or liners. Contractor shall perform holiday detection testing in the presence of an inspector with test equipment appropriate for the product. A small pinhole shall be purposely placed in the liner on the bench or the chimney. This pinhole shall be used to verify a spark will occur when the wand passes over it. Using the metal frame to confirm a spark is not acceptable. The hole shall be repaired in accordance with the liner manufacturer’s repair guidelines. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or another hand-tooling method. After abrading and cleaning, additional coating shall be hand-applied to the repair area as needed. All touch-up/repair procedures shall be in accordance with the coating manufacturer’s recommendations. All verification and holiday detection testing shall be at no cost to the Owner and shall be paid for by the manufacturer or the Contractor.

D. Adhesion (Pull-off) testing shall be required on one randomly-selected chimney seal for each group of ten manholes rehabilitated with internal chimney seals or liners. A portable pull-off adhesion tester shall be used to achieve substrate failure. Any chimney seals or liners failing this test shall be reworked as necessary and retested at no additional cost to the Owner.

E. Chimney seals shall be accepted by the Owner and Engineer after they pass holiday detection testing, adhesion testing, and a visual inspection for voids, pinholes, and leakage.

F. Internal liners shall be accepted by the Owner and Engineer after they pass vacuum testing (when required), holiday detection testing, adhesion testing, and a visual manned entry inspection for voids, pinholes, cracks, leakage, and any other defect.

G. Drop bowl assemblies, and reconstructed channels, inverts, and benches shall be accepted by the Owner and Engineer after they pass a visual inspection for voids, pinholes, cracks, leakage, and any other defect.
SECTION 02910

FINAL GRADING AND LANDSCAPING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish all labor, equipment, and materials necessary for final grading, topsoiling, seeding, and miscellaneous site work not included under other Sections, but required to complete the Work as shown on the Drawings and specified herein. Under this Section, all areas of the project site disturbed by excavation, materials storage, temporary roads, etc., shall be reseeded as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01510 – Temporary Utilities
B. Section 02270 – Slope Protection and Erosion Control

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:
   1. Product data
   2. Certification of all materials
   3. Three (3) copies of composition and germination certification and test results for grass seed

PART 2 -- PRODUCTS

2.01 CONTRACTOR’S RESPONSIBILITIES

A. Furnish and submit certification for the materials used as specified in the General Conditions, Division 1 – General Requirements, and Division 2 – Sitework.

2.02 TOPSOIL

A. Upon completion and approval of the rough grading, the Contractor shall place the topsoil over all areas disturbed during construction under any contract, except those areas which will be paved, graveled, or rip rapped. Topsoil shall not be placed in a frozen or muddy condition and shall contain no toxic materials harmful to grass growth. Topsoil shall be as defined under Section 02200 – Earthwork.
2.03 WATER

A. Contractor shall provide water in accordance with the requirements of Section 01510 – Temporary Utilities.

B. The Contractor shall furnish all hoses and connections necessary to complete the landscaping work.

2.04 FERTILIZER

A. Fertilizer shall be a complete commercial fertilizer with components derived from commercial sources. Fertilizer analysis shall be determined from field soil sampling in appropriate numbers taken by the Contractor and analyzed by the Alabama Department of Agriculture and Industries or other independent laboratory. Contractor shall furnish fertilizer in accordance with the recommendations of the Alabama Department of Agriculture and Industries. Fertilizer shall conform to the standards of the Association of Official Agricultural Chemists and when tested by their current methods, shall comply with Alabama Fertilizer Laws, Title 2, Section 282-300, Alabama Code of 1940, as amended.

B. Nitrogen may be derived from any nitrogen-containing material approved by the State Commissioner of Agriculture and Industries. Available Phosphoric Acid shall be free from superphosphate, bone, or tankage.

C. Fertilizer shall be delivered in standard size bags marked with the weight, analysis of contents, and the name of the manufacturer. Containers used to transport fertilizer shall be commonly used for the transport of such fertilizers and shall ensure proper protection and handling of the fertilizer. Fertilizer shall be stored in weatherproof storage areas and in such a manner that its effectiveness will not be impaired.

D. Manufactured fertilizer shall be standard commercial products and shall contain not less than the percentages by weight (mass) of the ingredients in the following table:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Nitrogen (N)</th>
<th>Phosphorus (P₂O₅)</th>
<th>Potash (K₂O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-0-15</td>
<td>15</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>13-13-13</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>10-10-10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>8-8-8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>0-14-14</td>
<td>0</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>4-12-12</td>
<td>4</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>4-16-8</td>
<td>4</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>Super Phosphate</td>
<td>18.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium Nitrate</td>
<td>33.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonium Sulphate</td>
<td>20.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium Nitrate</td>
<td>16.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium Chloride</td>
<td>60.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
E. An allowance of +/- 5 percent variation or tolerance of the above proportions shall be permitted based on relative commercial value.

2.05 LIME

A. At least 50 percent shall pass a No. 60 U.S.S. mesh sieve, and 90 percent shall pass a No. 10 U.S.S. mesh sieve. Calcium Carbonate shall not be less than 90 percent.

2.06 GRASS SEED

A. The Contractor shall furnish the kinds and amounts of seed to be seeded in all areas disturbed by the construction work. Each bag of seed shall bear a tag or label bearing the seal of the Official Seed Certifying Agency to show that it meets the requirements of the Alabama Seed Law. All seed must have been tested within six (6) months immediately preceding the planting of such material on the job.

B. The inoculant for treating legume seed shall be a pure culture of nitrogen-fixing bacteria prepared specifically for the species. Inoculants shall not be used later than the date indicated on the container.

C. Seed shall be at least 95 percent pure seed of the required type. Seed for Lespedezas shall have a minimum germination rate of 80 percent, and seed for all other species shall have a minimum germination rate of 85 percent.

D. Bermudagrass may be either hulled or unhulled as indicated in the following seed mixture tables, Sericea Lespedeza shall be hulled and scarified, and Annual Lespedeza (Kobe), White Dutch Clover, and Reseeding Crimson Clover shall be hulled. Coated seeds will not be accepted for planting.

E. Seed containing prohibited noxious weed seed shall not be accepted. Seed shall be in conformance with Alabama Seed Law restrictions for restricted noxious weeds.

F. Seed mixes to be used on the Project shall be mixtures of the types of seeds shown in the following tables. The required weights indicated in the tables are the actual seed weights as delivered and take into account the minimum required percentages of pure seeds and minimum required germination rates.

1. Seed mixes designated for “AREAS SUBJECT TO FREQUENT MOWING” shall be used on roadway shoulders, medians, and front slopes flatter than 3:1 extending 60 feet beyond the edge of pavement or to the toe of the front slope, whichever is less. All other areas designed for seeding shall be considered to be “AREAS NOT SUBJECT TO FREQUENT MOWING”.

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TEMPORARY SEEDING

<table>
<thead>
<tr>
<th>Date of Planting</th>
<th>1/1 – 4/15</th>
<th>4/16 – 8/31</th>
<th>9/1 – 12/31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ryegrass</td>
<td>15</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Bermudagrass (Hulled)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kentucky 31 Tall Fescue</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Reseeding Crimson Clover</td>
<td>30</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Brown Top Millet</td>
<td></td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Notes:
(1) From 8/16 thru 2/29, Annual Ryegrass, Bermudagrass (Unhulled), and White Dutch Clover are required where vegetation must be established within an area no further than 15 feet from the edge of mainline pavement.

PERMANENT SEEDING

(IN AREAS SUBJECT TO FREQUENT MOWING)

<table>
<thead>
<tr>
<th>Date of Planting</th>
<th>8/16 – 2/29</th>
<th>3/1 – 5/15</th>
<th>5/16 – 8/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ryegrass</td>
<td>10 (1)</td>
<td>25 (2)</td>
<td></td>
</tr>
<tr>
<td>Bermudagrass (Hulled)</td>
<td>18</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Bermudagrass (Unhulled)</td>
<td>30 (1)</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Annual Lespedeza (Kobe)</td>
<td></td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>White Dutch Clover</td>
<td>5 (1)</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
(1) From 8/16 thru 2/29, Annual Ryegrass, Bermudagrass (Unhulled), and White Dutch Clover are required where vegetation must be established within an area no further than 15 feet from the edge of mainline pavement.
(2) From 8/16 thru 2/29, only Annual Ryegrass is required where vegetation must be established within an area that extends further than 15 feet from the edge of mainline pavement. Seeding in stubble for the establishment of permanent vegetation is required during the following month of March.

PERMANENT SEEDING

(IN AREAS NOT SUBJECT TO FREQUENT MOWING)

<table>
<thead>
<tr>
<th>Date of Planting</th>
<th>11/16 – 2/29</th>
<th>3/1 – 8/15</th>
<th>8/16 – 11/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ryegrass</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bermudagrass (Hulled)</td>
<td></td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Bermudagrass (Unhulled)</td>
<td>35</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Kentucky 31 Tall Fescue</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Weeping Lovegrass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sericea Lespedeza (Hulled)</td>
<td>38</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Sericea Lespedeza (Unhulled)</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reseeding Crimson Clover</td>
<td></td>
<td></td>
<td>29</td>
</tr>
</tbody>
</table>

2.07 MULCHING FOR VEGETATION ESTABLISHMENT

A. Mulch materials shall be furnished in compliance with the requirements given in Article 860.03 of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, latest edition.
1. **Hydraulic Mulch**: Hydraulic mulch products shall consist of natural fibers with or without tackifier adhesives and/or binding agents. A list of acceptable hydraulic mulch products, mulch control netting and tackifiers (List II-20, “TACKIFIERS, MULCH CONTROL NETTING, AND HYDRAULIC MULCH PRODUCTS”) is given in the ALDOT manual titled “Materials, Sources, and Devices with Special Acceptance Requirements”. Hydraulic mulch products shall be applied in accordance with the manufacturer’s recommendations.

   a. Hydraulic mulch products shall be applied at the rate designated by the manufacturer for the specific slope where they are being applied to provide a solid blanket of the mulch product with no soil showing. In no case shall the applied rate be less than 2,000 pounds per acre.

2. **Dry Blown Mulch**: Dry blown mulch shall be hay or straw. Hay shall be native hay or Sudan grass, broom straw, coastal bermudagrass, or other materials approved by the Engineer. Straw shall be threshed straw of oats, wheat, or rye. Mulch materials shall not contain an excessive quantity of matured seeds or noxious weeds or a species which would constitute a menace to the planted species and to surrounding farmland. Mulch shall not be too fresh, or excessively brittle, or so decomposed as to retard growth of grass. The moisture content of the mulch shall not exceed 15 percent at the time that the mulch is weighed.

   Dry blown mulch shall be stabilized by crimping, by the application of a tackifier adhesive, or by anchoring with a mulch control netting. Tackifiers shall be used at the manufacturer’s recommended rates when chosen for mulch stabilization. Acceptable tackifier adhesives and mulch control netting products are listed on List II-20, “TACKIFIERS, MULCH CONTROL NETTING, AND HYDRAULIC MULCH PRODUCTS” of the ALDOT manual titled “Materials, Sources, and Devices with Special Acceptance Requirements”. Asphalt adhesives are not acceptable for use.

   a. Dry blown mulch shall be applied at a rate of not less than 4,000 pounds per acre.

B. Seeded areas shall be covered with mulch within 48 hours after seeding.

2.08 **TEMPORARY SOIL STABILIZER**

   A. The temporary agent for soil erosion control shall consist of an specially-prepared, highly-concentrated powder which, when mixed with water, forms a thick liquid such as "Enviroseal 2001" by Enviroseal Corp., "Terra Control" by Quattro Environmental, Inc., or "CHEM-CRETE ECO-110" by International CHEM-CRETE Corp. Agent shall have no growth or germination inhibiting factors. The agent shall be used for hydroseeding grass seed in combination with other approved amendments resulting in a highly viscous slurry which, when sprayed directly on the soil, forms a gelatinous crust.

2.09 **ROLLED EROSION CONTROL MAT**

   A. The rolled erosion control mat (RECM) shall be as specified in Section 02270 – Slope Protection and Erosion Control.
2.10 RIPRAPH AND HERBICIDES

A. Furnish and install sufficient quantity of landscape gravel or riprap to cover the ground to a minimum 4-inch depth for gravel and 24-inch depth for riprap, unless otherwise noted or indicated on the Drawings. Also furnish and apply an approved herbicide to the subgrade surface just prior to installing the landscape gravel or riprap.

B. During placing, the stone shall be graded so that the smaller stones are uniformly distributed through the mass. The Contractor may place the stone by mechanical methods, augmented by hand placing where necessary or ordered by the Engineer. The placed riprap shall form a properly graded, dense, neat layer of stone.

C. All topsoil and vegetative matter shall be removed from the subgrade surfaces prior to the application of the weed killer (herbicide) and the placement of landscape gravel or riprap. Apply commercial-type herbicide as preemergence control of miscellaneous grasses and broadleaf weeds in granular or liquid form such as "Treflan" or "Dymid". Methods and rates of application shall be in strict compliance with manufacturer's directions and acceptable to the Engineer.

D. The herbicide selected shall be safe for use around ornamental plantings, have long-lasting weed control, and shall be resistant to leaching away under excessive rainfall.

E. A second application of the herbicide shall be made on the surface of the landscape gravel or riprap sometime after the first 6 months but not later than 12 months. Same methods and rates apply as specified previously.

PART 3 -- EXECUTION

3.01 DISPOSITION OF MATERIALS AND STRUCTURES ENCOUNTERED IN THE WORK

A. Existing materials or structures that may be encountered within the lines, grades, or trenching sections established for completion of the Work, if unsuitable or unacceptable to the Engineer for use in the Work, and for which the disposition is not otherwise specified, shall either be disposed of by the Contractor or shall remain the property of the Owner as further provided in this Section.

B. At the option of the Owner, any existing materials or structures of "value" encountered in the Work shall remain the property of the Owner. The term "value" shall be defined by the Owner.

C. Any existing materials or structures encountered in the Work and determined not to be of "value" by the Owner shall be disposed of by the Contractor in an approved manner, except as otherwise specified in Section 02100 – Clearing, Grubbing, and Site Preparation.

3.02 GRADING
A. After approval of the rough grading, the Contractor shall commence his preparations of the subgrade for the various major conditions of the work as follows:

1. Bare soil for rip rap area at subgrade shall be 24 inches below final grade or as directed by the Engineer.

2. For topsoil for lawn and road shoulder seed areas, scarify 2-inch depth of subgrade (4 inches below final grade) prior to placing topsoil.

B. Final surface grading of the topsoiled, landscape graveled, and rip rapped areas shall be mechanically raked or hand raked to an even finished surface alignment.

3.03 TOPSOIL

A. Topsoil shall be spread in place at the quantity required for lawn and road shoulder seed areas at a 4-inch consolidated depth and a sufficient quantity for certain plant beds and backfill for shrubs and trees as specified.

3.04 SEEDBED PREPARATION

A. Contractor shall prepare all areas to receive temporary or permanent seeding measures prior to planting. Ground preparation shall consist of cultivation to a loose depth of approximately 4 inches, minimum, and the application and lime and fertilizer as follows.

B. Topsoil shall be placed in areas to be seeded and roughened with tracked equipment or other suitable measures. Slopes steeper than 3:1 may be roughened by grooving, furrowing, tracking, or stairstep grading. Slopes flatter than 3:1 should be grooved by diskling, harrowing, or raking before operating planting equipment on the contour.

C. Permanent Seeding: Soil amendments including, but not limited to, lime and fertilizer shall be spread as follows for initial fertilization of the ground prior to permanent seeding:

1. Soft Soil

   a. Lime: Apply at a rate of 4,000 pounds per acre.

   b. Fertilizer: Apply a commercial fertilizer that shall provide at least 120 pounds of N, 120 pounds of P₂O₅, and 120 pounds of K₂O per acre, as computed from the nominal contents of fertilizer elements. Only 1/2 of this rate shall be applied when the required seeding is Annual Ryegrass.

2. Rocky or Hardpan Areas: The requirements for planting in rocky or hardpan areas shall apply when the Engineer determines that the area is too rocky or compacted for plowing, diskling, and harrowing, but is sufficiently soft or shaley to permit some form of treatment.

   a. Initial Soil Amendments: 1/2 of the fertilizer and all of the lime required for the initial fertilization of soft soil shall be applied before the initial scarification.
b. **Initial Scarification:** The fertilizer and lime shall be worked into the rocky or hardpan area by an initial scarification as directed by the Engineer.

c. **Coverage with Topsoil:** Approximately 4 inches of topsoil shall be placed over the scarified and fertilized rocky or hardpan area.

d. **Soil Amendments After Placement of Topsoil:** The second half of the fertilizer required for the initial fertilization of soft soil shall be applied after the placement of the topsoil.

3. **Steep Slopes (2H:1V or Steeper)**

   a. **Ground Preparation:** Planting operations may proceed without further ground preparation after topsoil spreading and tracking if the planting can be accomplished within 72 hours after the tracking operations. Tracking is the mechanical roughening of the slope surface. Tracking shall be accomplished by the movement upslope and downslope (not along the slope) of heavy equipment that operates on tracks.

   b. **Initial Soil Amendments:** 1/2 of the fertilizer and all of the lime required for the initial fertilization of soft soil shall be applied.

4. **Stubble:** The seeding in stubble method of planting shall be used to establish permanent species when initial vegetation establishment occurs during a season that is not optimal for the permanent planting. Dates for seeding in stubble are designated in the seed mix tables in Article 2.06.

   a. **Ground Preparation:** This method requires that the existing vegetation be mowed to a height of approximately 3 inches or sprayed with an approved herbicide, or both, to retard further growth. The area shall then be lightly scarified by disking or other approved method to prepare a suitable seedbed.

   b. The initial fertilization shall be in accordance with the previous requirements given for this work in soft soil.

D. **Temporary Seeding and Mulching:** At locations where final grading will not be completed within 60 calendar days, all bare ground shall be stabilized with temporary seeding and mulching.

   1. **Ground Preparation:** Areas to be temporarily seeded shall be left in a rough graded condition. Areas that are smooth or hard shall be lightly scarified with scarifying teeth or some other acceptable method, running perpendicular to the direction of water flow. The intent of this scarifying is to obtain a rough area to hold seed and prevent the formation of rills and gulleys. Areas where sight distances must be maintained shall be bladed smooth. All debris in these areas shall be removed to allow mowing.

   2. **Fertilizer:** Apply 8-8-8 fertilizer at 1,000 pounds per acre.
E. Fertilizers and lime shall be applied uniformly at the required rates of placement. The fertilizer shall be well pulverized and free of lumps when applied. In no case shall fertilizer that is not mixed with soil be permitted to be in direct contact with seed. When fertilizers are applied hydraulically, they shall be sufficiently diluted so that no damage is done to either seed or established vegetation.

3.05 HYDROSEEDING AND GRASS

A. All grassing on State right-of-way shall comply with Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, latest edition.

B. After the area around a manhole is backfilled and a sufficient amount of time has elapsed for the backfill to settle, the disturbed area shall be machined to a smooth surface matching the adjacent or adjoining ground surfaces.

C. The Contractor shall grow a stand of grass by the hydroseeding method on all disturbed areas. The Contractor shall be responsible for the satisfactory growth of grass throughout the period of the 1-year guarantee.

D. The Contractor's work shall include the preparation of the topsoil and bare soil seed bed; application of fertilizer, limestone, mulching, inoculant, and temporary soil stabilizer; watering; and all other operations necessary to provide a satisfactory growth of sod at the end of the 1-year maintenance period. Areas without satisfactory sod at the end of 1 year shall be replanted until satisfactory growth is obtained and is acceptable to the Engineer.

E. All areas to be seeded shall be done by the hydraulic seeding method including all additives and amendments required. A "Reinco", "Finn", or "Bowie" type hydromulcher with adjustable nozzles and extension hoses shall be utilized. General capacity of tank should range from 500 to 2,500 gallons or as approved by the Engineer.

F. Hydraulic seeding shall be carried out in three steps. Step one shall consist of the application of lime. In step two, the seed mixture shall be mixed with the fertilizer, hydraulic mulch, and any required inoculants and applied to the seed bed. Step three shall consist of application of top dressing during the first spring or fall, whichever comes first.

G. Sowing of seed shall promptly follow after incorporation of fertilizer in a uniform manner at the rates specified for each seed species. Permanent seeding and temporary seeding shall be per the type and rates specified in Article 2.06 herein. Seed shall be broadcast as soon as possible following roughening, before surface has been sealed by rainfall.

H. Permanent Seeding: After initial fertilization of the ground and subsequent seeding, the types and application rates of lime, fertilizer, and mulch shall be as follows for permanent seeding:

1. Soft Soil
   a. Mulching: Mulching shall be applied in accordance with the requirements given in Article 2.07.
b. **Soil Amendments After Growth:** After the required grass species have emerged and shown normal growth (usually approximately 40 days) and while the soil surface is moist, a second application of fertilizer shall be made. This second application shall be placed as a uniformly applied top dressing of 40 pounds of N, 40 pounds of P$_2$O$_5$, and 40 pounds of K$_2$O per acre or equivalent as approved by the Engineer. This application of fertilizer will not be required for temporary planting (Annual Ryegrass).

2. Rocky or Hardpan Areas

   a. The mulching and soil amendments after growth of the seeds shall be in accordance with the requirements given for this work in soft soil.

3. Steep Slopes (2H:1V or Steeper)

   a. **Mulching:** Mulching shall be applied in accordance with the requirements given for this work in soft soil.

   b. **Second Application of Fertilizer After Mulching:** 1/2 of the fertilizer required for the initial fertilization of soft soil shall be applied approximately 40 calendar days after mulching.

   c. **Third Application of Fertilizer:** A third application of fertilizer shall be made approximately 40 calendar days after the second application of fertilizer. This application shall be placed as a uniformly applied top dressing of 500 pounds of 8-8-8 fertilizer per acre or equivalent as approved by the Engineer.

4. Stubble

   a. The soil amendments after growth of the seeds shall be in accordance with the requirements given for this work in soft soil.

   b. Additional lime application will not be required for seeding in stubble.

   c. Mulch may be applied to bare areas if requested by the Contractor and approved by the Engineer.

I. **Temporary Mulching Only:** At locations where the final grading should be completed within 60 calendar days, all bare ground shall be stabilized with temporary mulching at a rate of no less than 6,000 pounds per acre.

J. **Temporary Seeding and Mulching**

   1. **Seeding and Mulching:** Apply at a rate of no less than 4,000 pounds per acre, either separately or concurrently with fertilizer.
2. Areas seeded with temporary seed mixtures shall be reseeded with permanent seed by the Contractor at no additional cost to the Owner as directed by the Engineer.

K. Ingredients for the mixture and steps should be dumped into a tank of water, thoroughly mixed into a homogeneous slurry, and sprayed out under a minimum of 300 to 350 pounds of pressure in suitable proportions to accommodate the type and capacity of the hydraulic machine to be used. Applications shall be evenly sprayed over the ground surface. The Contractor shall free the topsoil of stones, roots, rubbish, and other deleterious materials and dispose of same off the site. The bare soil, except existing steep embankment areas, shall be rough raked to remove stones, roots, and rubbish over 4 inches in size and other deleterious materials, and this material shall be disposed of off the site.

L. No seeding should be undertaken in windy or unfavorable weather, when the ground is too wet to rake easily, when it is in a frozen condition, or when it is too dry. Any bare spots shown in two to three weeks shall be recultivated, fertilized at half the rate, raked, seeded, and mulched again by mechanical or hand broadcast method acceptable to the Engineer.

M. A satisfactory stand of grass cover shall be defined as 80 percent coverage of the required seed species designated for establishment. There shall be no areas void of the required species larger than 4 square feet. If these requirements are not met prior to Final Completion of the Project, Contractor shall reseed the affected area(s) following the original seeding recommendations.

N. Areas that have been seeded with a temporary seed mixture shall be mowed to a height of less than 2 inches and scarified prior to seeding with the permanent seed mixture.

O. The Contractor shall provide, at his own expense, protection for all seeded areas against trespassing and damage at all times until acceptance of the Work. Slopes shall be protected from damage due to erosion, settlement, and other causes and shall be repaired promptly at the Contractor's expense.

P. The Contractor shall water newly seeded areas of the lawn and road shoulder mix once a week until the grasses have germinated sufficiently to produce a healthy turf, unless otherwise directed by the Engineer. Each watering shall provide 3 gallons per square yard. The Contractor shall furnish all necessary hoses, sprinklers, and connections.

Q. The first and second cutting of the lawn grasses only shall be done by the Contractor. All subsequent cuttings will be done by the Owner's forces in a manner specified by the Contractor.

3.06 DITCH AND SWALE EROSION PROTECTION

A. All ditches and swales indicated on the Drawings shall be lined with a rolled erosion control mat (RECM). The area to be covered shall be properly graded and hydroseeded before the RECM is installed. Installation shall be in accordance with Section 02270 – Slope Protection and Erosion Control.

3.07 MAINTENANCE
A. The Contractor shall be responsible for maintaining all seeded areas through the end of his warranty period. Maintenance shall include, but not be limited to, annual fertilization, mowing, repair of seeded areas, irrigation, and weed control. The Contractor shall provide, at his own expense, protection for all seeded areas against trespassing and damage at all times until acceptance of the Work. Slopes shall be protected from damage due to erosion, settlement, and other causes and shall be repaired promptly at the Contractor's expense.

B. Annual fertilization shall consist of an application of 500 pounds per acre of 10-10-10 commercial grade fertilizer or its equivalent and 60 pounds per acre of Nitrogen in early fall, or other analysis as may be determined by soil test. Annual fertilization shall be in addition to top dressing and shall be performed by the Contractor each fall season after planting until the Work is substantially complete.

C. Mowing shall be scheduled so as to maintain a minimum stand height of 4 inches or as directed by the Engineer. Stand height shall be allowed to reach 8 to 10 inches prior to mowing.

D. All seeded areas shall be inspected on a regular basis, and any necessary repairs or reseedings shall be made within the planting season if possible. If the stand should be over 60 percent damaged, it shall be reestablished following the original seeding recommendations.

E. Weed growth shall be maintained mechanically and/or with herbicides. When chemicals are used, the Contractor shall follow the current Alabama Agricultural Experiment Stations' weed control recommendations and shall strictly adhere to the instructions on the label of the herbicide. No herbicide shall be used without prior approval of the Engineer.

3.08 FENCE RESET AND FENCE REPLACEMENT

A. Should performance of the Work require the removal of an existing fence, the Contractor shall reset the fence in-kind to the satisfaction of the fence owner.

B. Should performance of the Work result in the damage to an existing fence, the Contractor shall replace the fence in-kind to the satisfaction of the fence owner.

C. The Contractor shall make every effort to maintain the integrity of an existing fence.

D. Removal of an existing fence must be supervised and/or approved by the Owner and/or Engineer.

3.09 CLEANUP

A. The Contractor shall remove from the site all subsoil excavated from his Work and all other debris including, but not limited to, branches, paper, and rubbish in all landscape areas. Contractor shall remove temporary barricades as the work proceeds.

B. All areas shall be kept in a neat and orderly condition at all times. Prior to Final Acceptance, the Contractor shall clean up the entire landscaped area to the satisfaction of the Engineer.
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SECTION 03100

CONCRETE FORMWORK

PART 1 -- GENERAL

1.01 THE REQUIREMENT
   A. Provide materials, labor, and equipment required for the design and construction of all concrete formwork, bracing, shoring and supports in accordance with the provisions of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE
   A. Section 01300 – Submittals
   B. Section 03200 – Reinforcing Steel
   C. Section 03250 – Concrete Accessories
   D. Section 03290 – Joints in Concrete
   E. Section 03300 – Cast-in-Place Concrete
   F. Section 03350 – Concrete Finishing

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS
   A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
      1. 2009 International Building Code
      2. ACI 318 - Building Code Requirements for Structural Concrete
      3. ACI 301 - Specifications for Structural Concrete for Buildings
      4. ACI 347 - Recommended Practice for Concrete Formwork
      5. U.S. Product Standard for Concrete Forms, Class I, PS 1
      6. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials
1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals.

1. Manufacturer’s data on proposed form release agent
2. Manufacturer’s data on proposed formwork system including form ties

1.05 QUALITY ASSURANCE

A. Concrete formwork shall be in accordance with ACI 301, ACI 318, and ACI 347.

PART 2 -- PRODUCTS

2.01 FORMS AND FALSEWORK

A. All forms shall be smooth surface forms unless otherwise specified.

B. Wood materials for concrete forms and falsework shall conform to the following requirements:

1. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.

C. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

2.02 FORMWORK ACCESSORIES

A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 7/8-inch, and all such fasteners shall be such as to leave holes of regular shape for reaming.

B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. A preformed mechanical EPDM rubber
plug shall be used to seal the hole left after the removal of the taper tie. Plug shall be X-Plug by the Greenstreak Group, Inc., or approved equal. Friction fit plugs shall not be used.

C. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "bug holes" in cast-in-place concrete.

PART 3 -- EXECUTION

3.01 FORM DESIGN

A. Forms and falsework shall be designed for total dead load, plus all construction live load as outlined in ACI 347. Design and engineering of formwork and safety considerations during construction shall be the responsibility of the Contractor.

B. Forms shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members.

C. All forms shall be designed for predetermined placing rates per hour, considering expected air temperatures and setting rates.

3.02 CONSTRUCTION

A. The type, size, quality, and strength of all materials from which forms are made shall be subject to the approval of the Engineer. No falsework or forms shall be used which are not clean and suitable. Deformed, broken or defective falsework and forms shall be removed from the work.

B. Forms shall be smooth and free from surface irregularities. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Joints between the forms shall be sealed to eliminate any irregularities. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum.

C. Forms shall be true to line and grade, and shall be sufficiently rigid to prevent displacement and sagging between supports. Curved forms shall be used for curved and circular structures. Straight panels joined at angles will not be acceptable for forming curved structures. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. Facing material shall be supported with studs or other backing which shall prevent both visible deflection marks in the concrete and deflections beyond the tolerances specified.

D. Forms shall be mortar tight so as to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on
concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2 inch diameter polyethylene rod held in position to the underside of the wall form.

E. All vertical surfaces of concrete members shall be formed, and side forms shall be provided for all footings, slab edges and grade beams, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1-inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

F. All forms shall be constructed in such a manner that they can be removed without hammering or prying against the concrete. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.

G. Adequate clean-out holes shall be provided at the bottom of each lift of forms. Temporary openings shall be provided at the base of column forms and wall forms and at other points to facilitate cleaning and observation immediately before the concrete is deposited. The size, number and location of such clean-outs shall be as acceptable to the Engineer.

H. Construction joints shall not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. For flush surfaces at construction joints exposed to view, the contact surface of the form sheathing over the hardened concrete in the previous placement shall be lapped by not more than 1 inch. Forms shall be held against hardened concrete to prevent offset or loss of mortar at construction joints and to maintain a true surface.

I. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. Set forms and intermediate screed strips for slabs accurately to produce the designated elevations and contours of the finished surface. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. When formwork is cambered, set screeds to a like camber to maintain the proper concrete thickness.

J. Positive means of adjustment (wedges or jacks) for shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Shores and struts shall be securely braced against lateral deflections. Wedges shall be fastened firmly in place after final adjustment of forms prior to concrete placement. Formwork shall be anchored to shores or other supporting surfaces or members to prevent upward or lateral movement of any part of the formwork system during concrete placement. If adequate foundation for shores cannot be secured, trussed supports shall be provided.
K. Runways shall be provided for moving equipment with struts or legs. Runways shall be supported directly on the formwork or structural member without resting on the reinforcing steel.

3.03 TOLERANCES

A. Unless otherwise indicated in the Contract Documents, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in ACI 117.

B. Structural framing of reinforced concrete around elevators and stairways shall be accurately plumbed and located within 1/4 in. tolerance from established dimensions.

C. The Contractor shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project, sufficient control points and bench marks to be used for reference purposes to check tolerances. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor’s personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

D. Regardless of the tolerances specified, no portion of the building shall extend beyond the legal boundary of the building.

3.04 FORM ACCESSORIES

A. Suitable moldings shall be placed to bevel or round all exposed corners and edges of beams, columns, walls, slabs, and equipment pads. Chamfers shall be 3/4 inch unless otherwise noted.

B. Form ties shall be so constructed that the ends, or end fasteners, can be removed without causing appreciable spalling at the faces of the concrete. After ends, or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 inches from the formed face of the concrete that is exposed to wastewater or enclosed surfaces above the wastewater, and not less than 1 inch from the formed face of all other concrete. Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar as specified in Section 03350 – Concrete Finishing. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete member. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. No snap ties shall be broken off until the concrete is at least three days old. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste.

3.05 APPLICATION - FORM RELEASE AGENT
A. Forms for concrete surfaces that will not be subsequently waterproofed shall be coated with a form release agent. Form release agent shall be applied on formwork in accordance with manufacturer's recommendations.

3.06 INSERTS AND EMBEDDED ITEMS

A. Sleeves, pipe stubs, inserts, anchors, expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement prior to concreting. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.07 FORM CLEANING AND REUSE

A. The inner faces of all forms shall be thoroughly cleaned prior to concreting. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

3.08 FORM REMOVAL AND SHORING

A. Forms shall not be disturbed until the concrete has attained sufficient strength. Sufficient strength shall be demonstrated by structural analysis considering proposed loads, strength of forming and shoring system, and concrete strength data. Shoring shall not be removed until the supported member has acquired sufficient strength to support its weight and the load upon it. Members subject to additional loads during construction shall be adequately shored to sustain all resulting stresses. Forms shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete to be exposed by form removal shall have sufficient strength not to be damaged thereby.

B. Provided the strength requirements specified above have been met and subject to the Engineer's approval, forms may be removed at the following minimum times. The Contractor shall assume full responsibility for the strength of all such components from which forms are removed prior to the concrete attaining its full design compressive strength. Shoring may be required at the option of the Engineer beyond these periods.

<table>
<thead>
<tr>
<th>Ambient Temperature (°F.) During Concrete Placement</th>
<th>Over 95°</th>
<th>70°-95°</th>
<th>60°-70°</th>
<th>50°-60°</th>
<th>Below 50°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>5 days</td>
<td>2 days</td>
<td>2 days</td>
<td>3 days</td>
<td>Do not remove until directed by Engineer (7 days minimum)</td>
</tr>
<tr>
<td>Columns</td>
<td>7 days</td>
<td>2 days</td>
<td>3 days</td>
<td>4 days</td>
<td></td>
</tr>
<tr>
<td>Beam Soffits</td>
<td>10 days</td>
<td>7 days</td>
<td>7 days</td>
<td>7 days</td>
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</tr>
<tr>
<td>Elevated Slabs</td>
<td>12 days</td>
<td>7 days</td>
<td>7 days</td>
<td>7 days</td>
<td></td>
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</tbody>
</table>

C. When, in the opinion of the Engineer, conditions of the work or weather justify, forms may be required to remain in place for longer periods of time.
D. An accurate record shall be maintained by the Contractor of the dates of concrete placings and the exact location thereof and the dates of removal of forms. These records shall be available for inspection at all times at the site, and two copies shall be furnished the Engineer upon completion of the concrete work.

3.09 RESHORING

A. When reshoring is permitted or required the operations shall be planned in advance and subjected to approval by the Engineer.

B. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.

C. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no construction or live loads shall be permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified.

D. For floors supporting shores under newly placed concrete, the original supporting shores shall remain in place or reshores shall be placed. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores shall be located directly under a reshore position above unless other locations are permitted.

E. In multi-story buildings, reshoring shall extend over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

- END OF SECTION -
PART 1 -- GENERAL

1.01 THE REQUIREMENTS

A. Provide all concrete reinforcing including all cutting, bending, fastening and any special work necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this section.

B. Provide deformed reinforcing bars to be grouted into reinforced concrete masonry walls.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03100 – Concrete Formwork

B. Section 03250 – Concrete Accessories

B. Section 03300 – Cast-in-Place Concrete

C. Section 03400 – Precast Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. 2009 International Building Code

2. CRSI Concrete Reinforcing Institute Manual of Standard Practice

3. ACI SP66 ACI Detailing Manual

4. ACI 315 Details and Detailing of Concrete Reinforcing

5. ACI 318 Building Code Requirements for Structural Concrete


7. ASTM A615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcing

8. ASTM A1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals.

1. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (SP66), shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, spacing and splicing of the bars.

2. Mill test certificates - 3 copies of each

3. Description of the reinforcing steel manufacturer's marking pattern

4. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated

5. Proposed supports for each type of reinforcing

6. Request to use splices not shown on the Drawings

7. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation and certified test reports on the couplers' capacity

8. Request for placement of column dowels without the use of templates

9. Request and procedure to field bend or straighten partially embedded reinforcing

10. Certification that all installers of dowel adhesive are certified as Adhesive Anchor Installers in accordance with the ACI-CRSI Anchor Installer Certification Program.

1.05 QUALITY ASSURANCE

A. If requested by the Engineer, the Contractor shall provide samples from each load of reinforcing steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.

B. Installer Qualifications for Drilled-In Rebar: Drilled-in rebar shall be installed by an Installer with at least three years of experience performing similar installations. Installer shall be certified as an Adhesive Anchor Installer in accordance with ACI-CRSI Adhesive Anchor Installation Certification Program.

C. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer’s representative for the Installer on the project. Training shall consist of a review of the complete installation process for drilled-in anchors to include, but not be limited to, the following:

1. Hole drilling procedure

2. Hole preparation and cleaning technique
3. Adhesive injection technique and dispenser training/maintenance

4. Rebar doweling preparation and installation

5. Proof loading/torquing

PART 2 -- PRODUCTS

2.01 REINFORCING STEEL

A. Bar reinforcing shall conform to the requirements of ASTM A615 for Grade 60 Billet Steel reinforcing. All reinforcing steel shall be from domestic mills and shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on Drawings.

B. Welded wire fabric reinforcing shall conform to the requirements of ASTM A1064 and the details shown on the Drawings.

C. A certified copy of the mill test on each load of reinforcing steel delivered showing physical and chemical analysis shall be provided, prior to shipment. The Engineer reserves the right to require the Contractor to obtain separate test results from an independent testing laboratory in the event of any questionable steel. When such tests are necessary because of failure to comply with this Specification, such as improper identification, the cost of such tests shall be borne by the Contractor.

D. Field welding of reinforcing steel will not be allowed.

E. Use of coiled reinforcing steel will not be allowed.

2.02 ACCESSORIES

A. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers and other devices to position reinforcing during concrete placement. Slab bolsters shall have gray plastic-coated legs.

B. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located.

2.03 MECHANICAL COUPLERS

A. Mechanical couplers shall develop a tensile strength which exceeds 125 percent of the yield strength of the reinforcing bars being spliced at each splice. The reinforcing steel and coupler used shall be compatible for obtaining the required strength of the connection.

B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied.
C. Hot-forged sleeve type couplers shall not be used. Acceptable mechanical couplers are Dayton Superior Dowel Bar Splicer System by Dayton Superior, Dayton, Ohio. Mechanical couplers shall only be used where shown on the Drawings or where specifically approved by the Engineer.

2.04 DOWEL ADHESIVE SYSTEM

A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions. All holes shall be drilled with a carbide bit unless otherwise recommended by the manufacturer. If coring holes is allowed by the manufacturer and approved by the Engineer, cored holes shall be roughened in accordance with manufacturer requirements. Thoroughly clean drill holes of all debris and drill dust with compressed air followed by a wire brush prior to installation of adhesive and reinforcing bar. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Where depth of hole exceeds the length of the static mixing nozzle, a plastic extension hose shall be used to ensure proper adhesive injection from the back of the hole. Injection of adhesive into the hole shall utilize a piston plug to minimize the formation of air pockets. The embedment depth of the bar shall be per manufacturer's recommendations, so as to provide a minimum allowable bond strength that is equal to 125 percent of the yield strength of the bar, unless noted otherwise on the Drawings. The adhesive system shall be Epcon System G5 as manufactured by ITW Redhead, HIT-HY 200 Injection Adhesive Anchor System as manufactured by Hilti, Inc. SET-XP as manufactured by Simpson Strong-Tie Co. or PE-1000+ by Powers Fasteners. Engineer's approval is required for use of this system in locations other than those shown on the Drawings. **Fast-set epoxy formulations shall not be acceptable. No or equal products will be considered, unless pre-qualified and approved by Engineer and Owner.**

B. Where identified on the Contract Drawings or for installation of concrete where anchorage failure could present a life-threatening hazard, the adhesive system shall be IBC compliant for use in both cracked and uncracked concrete in all Seismic Design Categories, must comply with the latest revision of ICC-ES Acceptance Criteria AC308, and shall have a valid ICC-ES report in accordance with the applicable building code. The adhesive system shall be HIT-HY 200 Injection Adhesive Anchoring System as manufactured by Hilti, Inc. PE-1000 SD by Powers Fasteners, SET-XP by Simpson Strong-Tie Co. or Epcon System G5 as manufactured by ITW Redhead. Installation of adhesive system shall be in accordance with manufacturer's recommendations and as required in Article 2.04, Paragraph A herein. **Alternate adhesive system shall not be acceptable.**

C. All individuals installing dowel adhesive system shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRCSI Anchor Installation Certification Program.

**PART 3 -- EXECUTION**

3.01 TEMPERATURE REINFORCING

A. Unless otherwise shown on the Drawings or in the absence of the concrete reinforcing being shown, the minimum cross sectional area of horizontal and vertical concrete reinforcing in walls shall be 0.0033 times the gross concrete area and the minimum cross sectional area...
of reinforcing perpendicular to the principal reinforcing in slabs shall be 0.0020 times the gross concrete area. Temperature reinforcing shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

3.02 FABRICATION

A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.

B. The Contractor shall fabricate reinforcing bars for structures in accordance with the bending diagrams, placing lists and placing Drawings.

C. No fabrication shall commence until approval of Shop Drawings has been obtained. All reinforcing bars shall be shop fabricated unless approved by the Engineer to be bent in the field. Reinforcing bars shall not be straightened or rebent in a manner that will injure the material. Heating of bars will not be permitted.

D. Welded wire fabric with longitudinal wire of W9.5 size or smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches. Welded wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only.

3.03 DELIVERY, STORAGE, AND HANDLING

A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.

B. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.

C. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

D. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be reinspected and if necessary recleaned.

3.04 PLACING

A. Reinforcing steel shall be accurately positioned as shown on the Drawings and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the reinforcing bars without settlement. In no case shall concrete block supports be continuous.
B. The portions of all accessories in contact with the formwork shall be made of plastic or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.

C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

D. Reinforcing bars additional to those shown on the Drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcing in position, shall be provided by the Contractor at no additional cost to the Owner.

E. Reinforcing placing, spacing, and protection tolerances shall be within the limits specified in ACI 318 except where in conflict with the Building Code, unless otherwise specified.

F. Reinforcing bars may be moved within one bar diameter as necessary to avoid interference with other concrete reinforcing, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed placing tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer.

G. Welded wire fabric shall be supported on slab bolsters spaced not less than 30 inches on centers, extending continuously across the entire width of the reinforcing mat and supporting the reinforcing mat in the plane shown on the Drawings.

H. Reinforcing shall not be straightened or rebent unless specifically shown on the Drawings or authorized in writing by the Engineer. Bars with kinks or bends not shown on the Drawings shall not be used. Coiled reinforcement shall not be used.

I. Dowel Adhesive System shall be installed in strict conformance with the manufacturer’s recommendations and as required in Article 2.04, Paragraph A herein. A representative of the manufacturer must be on site when required by the Engineer. Testing of adhesive dowels shall be as indicated as follows, and if the dowels are required to have a hook at the end to be embedded in the new work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate the testing.

J. Adhesive Dowel Testing

1. At all locations where adhesive dowel testing is shown on the Drawings, at least 25 percent of all adhesive dowels installed shall be tested to the value indicated on the Drawings, with a minimum of one tested dowel per group. If no test value is indicated on the Drawings but the installed dowel is under direct tension, the Contractor shall notify the Engineer to verify whether anchor load testing is required.

2. Contractor shall submit a plan and schedule indicating locations of dowels to be tested, load test values, and proposed dowel testing procedure (including a diagram of the testing equipment proposed for use) to the Engineer for review prior to conducting any testing. The testing equipment shall have a minimum of three support points and shall be of sufficient size to locate the edge of supports no closer than two times the anchor embedment depth from the center of the anchor.

3. Where Contract Documents indicate adhesive dowel design to be the Contractor’s responsibility, the Contractor shall submit a plan and schedule indicating locations of
dowels to be tested and load test values, sealed by a Professional Engineer currently registered in the State of Alabama. The Contractor’s engineer shall also submit documentation indicating that the Contractor’s testing procedures have been reviewed and the proposed procedures are acceptable.

4. Adhesive Dowel shall have no visible indications of displacement or damage during or after the proof test. Concrete cracking in the vicinity of the dowel after loading shall be considered a failure. Dowels exhibiting damage shall be removed and replaced. If more than 5 percent of tested dowels fail, then 100 percent of dowels shall be proof tested.

3.05 SPLICING

A. Reinforcing bar splices shall only be used at locations shown on the Drawings. When it is necessary to splice reinforcing at points other than where shown, the splice shall be as acceptable to the Engineer.

B. The length of lap for reinforcing bars, unless otherwise shown on the Drawings, shall be in accordance with ACI 318 for a class B splice.

C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

D. Mechanical splices shall be used only where shown on the Drawings or when approved by the Engineer.

E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Drawings. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

3.06 INSPECTION

A. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.

B. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

3.07 CUTTING OF EMBEDDED REBAR

A. The Contractor shall not cut embedded rebar cast into structural concrete without prior approval of the Engineer.

-END OF SECTION-
SECTION 03250
CONCRETE ACCESSORIES

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish all materials, labor and equipment required to provide all concrete accessories including waterstops, expansion joint material, joint sealants, expansion joint seals, contraction joint inserts, and epoxy bonding agent.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals
B. Section 03100 – Concrete Formwork
C. Section 03290 – Joints in Concrete

B. Section 03300 – Cast-in-Place Concrete
C. Section 07900 – Joint Fillers, Sealants, and Caulking

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ASTM C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
2. ASTM D412 Standard Tests for Rubber Properties in Tension
3. ASTM D471 Standard Test Method for Rubber Properties
4. ASTM D624 Standard Test Method for Rubber Property - Tear Resistance
5. ASTM D638 Standard Test Method for Tensile Properties of Plastics
6. ASTM D1171 Standard Test Method for Ozone Resistance at 500 pphm
7. ASTM D1751 Standard Specifications for Preformed Expansion Joint fillers for Concrete Paving and Structural Construction (nonextruding and resilient bituminous types)
8. ASTM D1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals.

1. Manufacturer's literature on all products specified herein including material certifications

2. Proposed system for supporting PVC waterstops in position during concrete placement

3. Samples of products if requested by the Engineer

PART 2 -- PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) WATERSTOPS

A. PVC waterstops for construction joints shall be flat ribbed type, 6 inches wide with a minimum thickness at any point of 3/8 inch.

B. Waterstops for expansion joints shall be ribbed with a center bulb. They shall be 9 inches wide with a minimum thickness at any point of 3/8 inch unless shown or specified otherwise. The center bulb shall have a minimum outside diameter of 1 inch and a minimum inside diameter of 1/2 inch.

C. The waterstops shall be manufactured from virgin polyvinyl chloride plastic compound and shall not contain any scrap or reclaimed material or pigment whatsoever. The properties of the polyvinyl chloride compound used, as well as the physical properties of the waterstops, shall exceed the requirements of the U.S. Army Corps. of Engineers' Specification CRD-C572. The waterstop material shall have an off-white, milky color.

D. The required minimum physical characteristics for this material are:

1. Tensile Strength: 1,750 psi (ASTM D638)

2. Ultimate Elongation: Not less than 280% (ASTM D638)

E. No reclaimed PVC shall be used for the manufacturing of the waterstops. The Contractor shall furnish certification that the proposed waterstops meet the above requirements.

F. PVC waterstops shall be as manufactured by BoMetals, Inc., DuraJoint Concrete Accessories, or Sika Greenstreak.

G. All waterstop intersections, both vertical and horizontal, shall be made from factory fabricated corners and transitions. Only straight butt joint splices shall be made in field.
2.02 RETROFIT WATERSTOPS

A. Retrofit waterstops shall be used where specifically shown on Drawings for sealing joints between existing concrete construction and new construction.

B. Retrofit waterstops shall be PVC waterstops fabricated from material as described in Article 2.01 of this Specification.

C. Retrofit waterstop shall be attached to existing concrete surface as shown on Drawings.

D. Use of split waterstop in lieu of specially fabricated retrofit waterstop will not be acceptable.

E. Retrofit waterstop manufacturer must provide a complete system including all waterstop, stainless steel anchoring hardware, and epoxy for installation.

F. For construction joints, retrofit waterstop shall be style number 609 by Sika Greenstreak, RF-638 by BoMetals, Inc., or Type 18 kit by DuraJoint Concrete Accessories. For expansion joints, retrofit waterstop shall be style number 667 by Sika Greenstreak or Type 18-9 kit by DuraJoint Concrete Accessories.

2.03 CHEMICAL RESISTANT WATERSTOPS

A. Where specifically noted on Contract Drawings, chemical resistant waterstops shall be used instead of PVC waterstops.

B. Chemical resistant waterstops for construction joints shall be ribbed with a center bulb. They shall be 6 inches wide with a minimum thickness at any point of 3/16 inches.

C. Chemical resistant waterstops for expansion joints shall be ribbed tear web. They shall be 9 inches wide with a tear web designed to accommodate 1 inch of free movement minimum.

D. Chemical resistant retrofit waterstop shall be a minimum of 2-1/2 inches wide along the ribbed side and a minimum 5 inches wide along the side attached to the existing concrete surface. Retrofit waterstop shall include a centerbulb and shall have a minimum thickness of 3/16 inch. Retrofit waterstop manufacturer shall provide a complete system including waterstop, stainless steel anchoring hardware, and epoxy for installation.

E. Chemical resistant waterstops shall be manufactured from a fully crosslinked thermoplastic vulcanizate rubber.

F. Waterstops shall be TPE-R by BoMetals, Inc., Earth Shield TPV/TPE-R by JP Specialties, Inc., Westec TPE-R by Westec Barrier Technologies, or TPE-R by DuraJoint Concrete Accessories.

2.04 HYPALON RUBBER WATERSTOPS

A. Hypalon rubber waterstops shall be Sikadur Combiflex by Sika Corporation or approved equal. Minimum width of waterstop material shall be 12 inches unless shown otherwise on Contract Drawings.
2.05 EXPANDING RUBBER WATERSTOP

A. Expanding rubber shall be designed to expand under hydrostatic conditions. Waterstops shall be Adeka Ultra Seal MC-2010M by Adeka Ultra Seal/OCM, Inc. or Hydrotite CJ-1020-2K by Sika Greenstreak for concrete thickness greater than 9 inches. For thicknesses less than 9 inches, Adeka Ultra Seal KBA-1510FF or Hydrotite CJ-1020-2K shall be used.

B. Waterstop shall be a chemically modified natural rubber product with a hydrophilic agent.

C. Waterstop has a stainless steel mesh or coextrusion of non-hydrophilic rubber to direct expansion in the thickness direction and restrict the expansion in the longitudinal direction.

2.06 WATERSTOP ADHESIVE

A. Adhesive between waterstops and existing concrete shall be 20+F Contact Cement by Miracle Adhesives Corporation, Neoprene Adhesive 77-198 by JGF Adhesives, Sikadur 31 Hi-Mod Gel by Sika Corporation, or DP-605 NS Urethane Adhesive by 3M Adhesive Systems.

2.07 JOINT SEALANTS

A. Joint sealants shall comply with Section 07900 – Joint Fillers, Sealants, and Caulking.

2.08 EXPANSION JOINT MATERIAL

A. Preformed expansion joint material shall be non-extruding and shall be of the following types:

1. Type I - Sponge rubber, conforming to ASTM D1752, Type I
2. Type II - Cork, conforming to ASTM D1752, Type II
3. Type III - Self-expanding cork, conforming to ASTM D1752, Type III
4. Type IV - Bituminous fiber, conforming to ASTM D1751

2.09 EXPANSION JOINT SEAL

A. Expansion Joint Seal System shall consist of a preformed neoprene profile, installed using the same dimensions as the joint gap, bonded with a two-component epoxy adhesive and pressurized during the adhesive cure time.

B. The expansion joint system shall be Hydrozo/Jeene Structural Sealing joint system by Hydrozo/Jeene, Inc. or equal.

2.10 CONTRACTION JOINT INSERTS
A. Contraction joint inserts shall be ZipCap Control Joint former by Greenstreak Plastic Products.

2.11 EPOXY BONDING AGENT
A. Epoxy bonding agent shall conform to ASTM C881 and shall be Sikadur 32 Hi-Mod by Sika Corporation, Euco #452 Epoxy System by Euclid Chemical Company, or MasterInject 1500 by BASF Master Builder Solutions.

2.12 EPOXY RESIN BINDER
A. Epoxy resin binder shall conform to the requirements of ASTM C881, Type III, Grade 3, Class B and C for epoxy resin binder and shall be Sikadur 23, Low-Mod-Gel by the Sika Corporation, Flexocrete Gel by DuraJoint Concrete Accessories, Euco #352 Gel by Euclid Chemical Company, or MasterEmaco ADH 327 or 327 RS by BASF Master Builder Solutions.

PART 3 -- EXECUTION

3.01 PVC AND CHEMICAL RESISTANT WATERSTOPS
A. PVC and chemical resistant waterstops shall be provided in all construction and expansion joints in water bearing structures and at other such locations as required by the Drawings.

B. Waterstops shall be carefully positioned so that they are embedded to an equal depth in concrete on both sides of the joint. They shall be kept free from oil, grease, mortar or other foreign matter. To ensure proper placement, all waterstops shall be secured in correct position at 12 inches on center along the length of the waterstop on each side, prior to placing concrete. Such method of support shall be submitted to the Engineer for review and approval. Grommets or small pre-punched holes as close to the edges as possible will be acceptable for securing waterstops.

C. Splices in PVC waterstops and chemical resistant waterstops shall be made with a thermostatically controlled heating element. Only straight butt joint splices will be allowed in the field. Factory fabricated corners and transitions shall be used at all intersections. Splices shall be made in strict accordance with the manufacturer's recommended instructions and procedures. At least three satisfactory sample splices shall be made on the site. The Engineer may require tests on these splices by an approved laboratory. The splices shall exhibit not less than 80 percent of the strength of the unspliced material.

D. All splices in waterstops will be subject to rigid review for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, discoloration, charring, and other defects which would reduce the potential resistance of the material to water pressure at any point. All defective joints shall be replaced with material which will pass said review and all faulty material shall
be removed from the site and disposed of by the Contractor at no additional cost to the Owner.

E. Retrofit waterstops shall be installed as shown on Contract Drawings using approved waterstop adhesive and Type 316 stainless steel batten bars and expansion anchors.

F. Waterstop installation and splicing defects which are unacceptable include, but are not limited to the following:

1. Tensile strength not less than 80 percent of parent material
2. Overlapped (not spliced) waterstop
3. Misalignment of waterstop geometry at any point greater than 1/16 inch
4. Visible porosity or charred or burnt material in weld area
5. Visible signs of splice separation when splice (24 hours or greater) is bent by hand at sharp angle

3.02 HYPALON RUBBER AND EXPANDING RUBBER WATERSTOPS

A. Waterstops shall be installed only where shown on the Drawings.

B. Waterstops shall be installed in strict accordance with manufacturer's recommendations.

3.03 WATERSTOP ADHESIVE

A. Adhesive shall be applied to both contact surfaces in strict accordance with manufacturer's recommendations.

B. Adhesive shall be used where waterstops are attached to existing concrete surfaces.

3.04 INSTALLATION OF EXPANSION JOINT MATERIAL AND SEALANTS

A. Type I, II, or III shall be used in all expansion joints in structures and concrete pavements unless specifically shown otherwise on the Drawings. Type IV shall be used in sidewalk and curbing and other locations specifically shown on the Drawings.

B. All expansion joints exposed in the finish work, exterior and interior, shall be sealed with the specified joint sealant. Expansion joint material and sealants shall be installed in accordance with manufacturer's recommended procedures and as shown on the Drawings.

C. Expansion joint material that will be exposed after removal of forms shall be cut and trimmed to ensure a neat appearance and shall completely fill the joint except for the space required for the sealant. The material shall be held securely in place and no concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.
D. A bond breaker shall be used between expansion joint material and sealant. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surfaces shall present a clean and even appearance.

E. Type 1 joint sealant shall be used in all expansion and contraction joints in concrete, except where Type 7 or Type 8 is required as follows, and wherever else specified or shown on the Drawings. It shall be furnished in pour grade or gun grade depending on installation requirements. Primers shall be used as required by the manufacturer. The sealant shall be furnished in colors as directed by the Engineer.

F. Type 8 joint sealant shall be used in all concrete pavements and floors subject to heavy traffic and wherever else specified or shown on the Drawings.

G. Type 7 joint sealant shall be used for all joints in chlorine contact tanks and wherever specified or shown on the Drawings.

3.05 EXPANSION JOINT SEAL

A. The expansion joint seal system shall be installed as shown on the Drawings in strict accordance with the manufacturer's recommendations.

3.06 CONTRACTION JOINT INSERTS

A. For contraction joints in slabs, inserts shall be floated in fresh concrete during finishing.

B. For contraction joints in walls, inserts shall be secured in place prior to casting wall.

C. Inserts shall be installed true to line at the locations of all contraction joints as shown on the Drawings.

D. Inserts shall extend into concrete sufficient depth as indicated on the Drawings or specified in Section 03290 – Joints in Concrete.

E. Inserts shall not be removed from concrete until concrete has cured sufficiently to prevent chipping or spalling of joint edges due to inadequate concrete strength.

3.07 EPOXY BONDING AGENT

A. The Contractor shall use an epoxy bonding agent for bonding fresh concrete to existing concrete as shown on the Drawings.

B. Bonding surface shall be clean, sound and free of all dust, laitance, grease, form release agents, curing compounds, and any other foreign particles.

C. Application of bonding agent shall be in strict accordance with manufacturer's recommendations.
D. Fresh concrete shall not be placed against existing concrete if epoxy bonding agent has lost its tackiness.

3.08 EPOXY RESIN BINDER

A. Epoxy resin binder shall be used to seal all existing rebar cut and burned off during demolition operations. Exposed rebar shall be burned back 1/2-inch minimum into existing concrete and the resulting void filled with epoxy resin binder.

- END OF SECTION -
SECTION 03290

JOINTS IN CONCRETE

PART 1 -- GENERAL

1.01 THE REQUIREMENTS

A. Provide all materials, labor and equipment required for the construction of all joints in concrete specified herein and shown on the Drawings.

B. Types of joints in concrete shall be as follows:

1. Construction Joints - Joints between adjacent concrete placements continuously connected with reinforcement.

2. Expansion Joints - Joints in concrete which allow thermal expansion and contraction of concrete. Reinforcement terminates within concrete on each side of joint.

3. Contraction Joints - Joints formed in concrete to provide a weakened plane in concrete section to control formation of shrinkage cracks.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals

B. Section 03100 – Concrete Formwork

C. Section 03250 – Concrete Accessories

D. Section 03300 – Cast-in-Place Concrete

E. Section 07900 – Joint Fillers, Sealants and Caulking

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ACI 301 - Specifications for Structural Concrete for Buildings

2. ACI 318 - Building Code Requirements for Structural Concrete

3. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures
1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.

1. Layout drawings showing location and type of all joints to be placed in each structure.

2. Details of proposed joints in each structure.

PART 2 -- MATERIALS

2.01 MATERIALS

A. All materials required for joint construction shall comply with Section 03250 – Concrete Accessories and Section 07900 – Joint Fillers, Sealants and Caulking.

PART 3 -- EXECUTION

3.01 CONSTRUCTION JOINTS

A. Construction joints shall be as shown on the Drawings. Otherwise, Contractor shall submit description of the joint and its location to Engineer for approval.

B. Unless noted otherwise on the Drawings, construction joints shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point. In this case, the joints in the girders shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and the top of footings or floor slabs unless noted otherwise on Drawings. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.

C. Maximum distance between horizontal joints in slabs and vertical joints in walls shall be 45'-0". For exposed walls with fluid or earth on the opposite side, the spacing between vertical and horizontal joints shall be a maximum of 25'-0".

D. All corners shall be part of a continuous placement, and should a construction joint be required, the joint shall not be located closer than five feet from a corner.

E. All reinforcing steel and welded wire fabric shall be continued across construction joints. Keys and inclined dowels shall be provided as shown on the Drawings or as directed by the Engineer. Longitudinal keys shall be provided in all joints in walls and between walls and slabs or footings, except as specifically noted otherwise on the Drawings. Size of keys shall be as shown on the Drawings.
F. All joints in water bearing structures shall have a waterstop. All joints below grade in walls or slabs which enclose an accessible area shall have a waterstop.

3.02 EXPANSION JOINTS

A. Size and location of expansion joints shall be as shown on the Drawings.

B. All expansion joints in water-bearing structures shall have a center-bulb type waterstop. All expansion joints below grade in walls or slabs which enclose an accessible area shall have a center-bulb type waterstop. Waterstop shall be as shown on Drawings and specified in Section 03250 – Concrete Accessories.

3.03 CONTRACTION JOINTS

A. Location of contraction joints shall be as shown on the Drawings.

B. Contraction joints shall be formed with contraction joint inserts as specified in Section 03250 – Concrete Accessories.

C. Sawcutting of contraction joints in lieu of forming will not be allowed unless otherwise noted on the Drawings. Where sawcutting is allowed, joints shall be sawed as soon as the concrete can support foot traffic without leaving any impression, normally the same day as concrete is placed and in no case longer than 24 hours after concrete is placed.

D. Unless noted otherwise on Drawings, depth of contraction joints shall be 1-1/2 inches in reinforced concrete and 1/3 of concrete thickness in unreinforced concrete.

3.04 JOINT PREPARATION

A. No concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.

B. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed by wire brushing, air or light sand blasting.

C. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surface shall present a clean and even appearance.

D. All joints shall be sealed as shown on the Drawings and specified in Section 03250, Concrete Accessories.

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PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Provide all labor, equipment, materials and services necessary for the manufacture, transportation and placement of all plain and reinforced concrete work, as shown on the Drawings or as ordered by the Engineer.

B. The requirements in this section shall apply to the following types of concrete:

1. **Class A Concrete**: Normal weight structural concrete to be used in all structures, sidewalks and pavements, except where noted otherwise in the Contract Documents. All concrete shall be Class A concrete unless another class is specifically called for on Contract Documents or specified herein.

2. **Class B Concrete**: Normal weight structural concrete used for duct bank encasements, catch basins, fence and guard post embedment, concrete fill, and other areas where specifically noted on Contract Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02575 – Pavement Repair

B. Section 03100 – Concrete Formwork

C. Section 03200 – Reinforcing Steel

D. Section 03250 – Concrete Accessories

E. Section 03290 – Joints in Concrete

F. Section 03350 – Concrete Finishes

G. Section 03370 – Concrete Curing

H. Section 03600 – Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
1. International Building Code
2. ACI 214  Recommended Practice for Evaluation of Strength Test Results of Concrete
3. ACI 301  Specifications for Structural Concrete for Buildings
4. ACI 304  Guide for Measuring, Mixing, Transporting, and Placing Concrete
5. ACI 305  Hot Weather Concreting
6. ACI 306  Cold Weather Concreting
7. ACI 309  Recommended Practice for Consolidation of Concrete
8. ACI 318  Building Code Requirements for Structural Concrete
9. ACI 350  Code Requirements for Environmental Engineering Concrete Structures
10. ASTM C31  Standard Methods of Making and Curing Concrete Test Specimens in the Field
11. ASTM C33  Standard Specification for Concrete Aggregates
12. ASTM C39  Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
13. ASTM C42  Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
14. ASTM C88  Standard Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
15. ASTM C94  Standard Specification for Ready-Mixed Concrete
17. ASTM C136  Standard Method for Sieve Analysis of Fine and Coarse Aggregate
18. ASTM C138  Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
19. ASTM C143  Standard Test Method for Slump of Portland Cement Concrete
21. ASTM C172 Standard Method of Sampling Fresh Concrete
22. ASTM C192 Standard Method of Making and Curing Concrete Test Specimens in the Laboratory
23. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
25. ASTM C295 Standard Guide for Petrographic Examination of Aggregates for Concrete
26. ASTM C457 Standard Recommended Practice for Microscopical Determination of Air-Void Content and Parameters of the Air-Void System in Hardened Concrete
27. ASTM C494 Standard Specification for Chemical Admixtures For Concrete
29. ASTM C618 Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
30. ASTM C989 Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
31. ASTM C1077 Recommended Practice for Labs Testing Concrete
33. ASTM C1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals.

1. Sources of all materials and certifications of compliance with specifications for all materials
2. Certified current (less than 1 year old) chemical analysis of the Portland Cement or Blended Cement to be used
3. Certified current (less than 1 year old) chemical analysis of fly ash or slag cement
4. Aggregate test results showing compliance with required standards, i.e., sieve analysis, aggregate soundness tests, petrographic analysis, mortar bar expansion testing per ASTM C1567, etc.

5. Manufacturer's data on all admixtures stating compliance with required standards

6. Concrete mix design for each class of concrete specified herein

7. Field experience records and/or trial mix data for the proposed concrete mixes for each class of concrete specified herein

### 1.05 QUALITY ASSURANCE

A. Tests on materials used in the production of concrete shall be required as specified in PART 2 -- PRODUCTS. These tests shall be performed by an independent testing laboratory approved by the Engineer at no additional cost to the Owner.

B. Trial concrete mixes shall be tested when required in accordance with Article 3.01 at no additional cost to the Owner.

C. Field quality control tests, as specified in Article 3.08, unless otherwise stated, will be performed by a materials testing consultant employed by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field Testing Technician, Grade I, in accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C1077.

### PART 2 -- PRODUCTS

#### 2.01 HYDRAULIC CEMENT

A. Portland Cement

1. Portland Cement shall be Type II conforming to ASTM C150. Type I cement may be used provided either fly ash or slag cement is also included in the mix in accordance with Articles 2.02 or 2.03 respectively.

2. When potentially reactive aggregates as defined in Article 2.05 are to be used in concrete mix, cement shall meet the following requirements:

   a. For concrete mixed with only Portland Cement, the total alkalies in the cement (calculated as the percentage of $\text{Na}_2\text{O}$ plus 0.658 times the percentage of $\text{K}_2\text{O}$) shall not exceed 0.40%.

   b. For concrete mixed with Portland Cement and an appropriate amount of fly
ash (Article 2.02) or slag cement (Article 2.03) the total alkalies in the Portland Cement (calculated as the percentage of Na₂O plus 0.658 times the percentage of K₂O) shall not exceed 0.85%.

3. When non-reactive aggregates as defined in Article 2.05 are used in concrete mix, total alkalies in the cement shall not exceed 1.0%.

4. The proposed Portland Cement shall not contain more than 8% tricalcium aluminate and more than 12% tetracalcium aluminoferrite.

B. Blended Cement

1. Blended cements shall be Type IP (Portland Fly Ash Cement) or Type IS (Portland Slag Cement) conforming to ASTM C595.

2. Type IP cement shall be an interground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.

3. Type IS cement shall be an interground blend of Portland Cement and slag cement in which the slag constituent is between 35% and 50% of the weight of the total blend.

4. Fly ash and slag cement used in the production of blended cements shall meet the requirements of Articles 2.02 and 2.03, respectively.

5. When reactive aggregates as defined in Article 2.05 are used in concrete mix, the total alkalies in the Portland Cement (calculated as the percentage of Na₂O plus 0.658 times the percentage of K₂O) shall not exceed 0.85%. The percentage of fly ash or slag cement shall be set to meet provisions of Article 2.05.F.2.

C. Different types of cement shall not be mixed nor shall they be used alternately except when authorized in writing by the Engineer. Different brands of cement or the same brand from different mills may be used alternately. A resubmittal will be required if different cements are proposed during the Project.

D. Cement shall be stored in a suitable weather-tight building so as to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.

2.02 FLY ASH

A. Fly ash shall meet the requirements of ASTM C618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C618.

B. For fly ash to be used in the production of type IP cement, the Pozzolan Activity Index shall
be greater than 75% as specified in Table 3 of ASTM C595.

C. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the fly ash constituent shall be between 15% and 25% of the total weight of the combined Portland Cement and fly ash. The percentage of fly ash shall be set to meet the provisions of Article 2.05.F.2.

D. For concrete to be used in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix is mandatory.

E. Additional fly ash shall not be included in concrete mixed with Type IS or IP cement.

2.03 SLAG CEMENT

A. Slag cement shall meet the requirements of ASTM C989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C989.

B. Where reactive aggregates as defined in Article 2.05 are used in concrete mix, the slag cement constituent shall be between 35% and 40% of the total weight of the combined Portland Cement and slag. The percentage of slag cement shall be set to meet the provisions of Article 2.05.F.2.

C. For concrete to be used in environmental concrete structures, i.e. process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix is mandatory.

D. Additional slag cement shall not be included in concrete mixed with type IS or IP cement.

2.04 WATER

A. Water used for mixing concrete shall be clear, potable and free from deleterious substances such as objectionable quantities of silty organic matter, alkali, salts and other impurities.

B. Water shall not contain more than 100 PPM chloride.

C. Water shall not contain more than 500 PPM dissolved solids.

D. Water shall have a pH in the range of 4.5 to 8.5.

E. Water shall meet requirements of ASTM C1602.

2.05 AGGREGATES

A. All aggregates used in normal weight concrete shall conform to ASTM C33.

B. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C33.
C. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C33 unless otherwise specified.

D. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C136.

E. Aggregates shall be tested for soundness in accordance with ASTM C88. The loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using magnesium sulfate.

F. Non-reactive aggregates shall meet the following requirements:
   1. A petrographic analysis in accordance with ASTM C295 shall be performed to identify the constituents of the fine and coarse aggregate. Non-reactive aggregates shall meet the following limitations:
      (1) Optically strained, microfractured, or microcrystalline quartz, 5.0%, maximum.
      (2) Chert or chalcedony, 3.0%, maximum.
      (3) Tridymite or cristobalite, 1.0%, maximum.
      (4) Opal, 0.5%, maximum.
      (5) Natural volcanic glass in volcanic rocks, 3.0%, maximum.
   2. Proposed concrete mix including proposed aggregates shall be evaluated by ASTM C1567. Mean mortar bar expansions at 16 days shall be less than 0.08%. Tests shall be made using exact proportion of all materials proposed for use on the job in design mix submitted.

G. All aggregates shall be considered reactive unless they meet the requirements previously specified herein for non-reactive aggregates. Aggregates with a lithology essentially similar to sources in the same region found to be reactive in service shall be considered reactive regardless of the results of the tests previously specified herein.

H. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed.

2.06 ADMIXTURES

A. Air entraining agent shall be added to all concrete unless noted otherwise. The agent shall consist of a neutralized vinsol resin solution or a purified hydrocarbon with a cement catalyst which will provide entrained air in the concrete in accordance with ASTM C260. The admixture proposed shall be selected in advance so that adequate samples may be obtained and the required tests made. Air content of concrete, when placed, shall be within the ranges given in the concrete mix design.
B. The following admixtures are required or used for water reduction, slump increase, and/or adjustment of initial set. Admixtures permitted shall confirm to the requirements of ASTM C494. Admixtures shall be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air-entraining admixtures.

1. Water reducing admixture shall conform to ASTM C494, Type A and shall contain no more than 0.05% chloride ions. Acceptable products are “Eucon Series” by the Euclid Chemical Company, “Pozzolith Series” by BASF, and “Plastocrete Series” by Sika Corporation.

2. High range water reducer shall be sulfonated polymer conforming to ASTM C494, Type F or G. The high range water reducer shall be added to the concrete at either the batch plant or at the job site and may be used in conjunction with a water reducing admixture. The high range water reducer shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day’s operation of the job site system. Concrete shall be mixed at mixing speed for a minimum of 100 mixer revolutions after the addition of the high range water reducer. Acceptable products are “Eucon 37” or Plastol 5000 by the Euclid Chemical Company, “Rheobuild 1000 or Glenium Series” by BASF, and “Daracem 100 or Advaflow Series” by W.R. Grace.

3. A non-chloride, non-corrosive accelerating admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C494, Type C or E, and shall not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year’s duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Acceptable products are “Accelguard 80/90 or NCA” by the Euclid Chemical Company and “Daraset” by W.R. Grace.

4. A water reducing retarding admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C494, Type D and shall not contain more than 0.05% chloride ions. Acceptable products are “Eucon NR or Eucon Retarder 100” by the Euclid Chemical Company, “Pozzolith Retarder” by BASF, and “Plastiment” by Sika Corporation.

C. Admixtures containing calcium chloride, thiocyanate or more than 0.05 percent chloride ions are not permitted. The addition of admixtures to prevent freezing is not permitted.

D. The Contractor shall submit manufacturer’s data including the chloride ion content of each admixture and certification from the admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned prior to mix design review by the Engineer.

2.07 CONCRETE MIX DESIGN

A. The proportions of cement, aggregates, admixtures and water used in the concrete mixes
shall be based on the results of field experience or preferably laboratory trial mixes in conformance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318 and ACI 350. When trial mixes are used they shall also conform to Article 3.01 of this Section of the Specifications. If field experience records are used, concrete strength results shall be from concrete mixed with all of the ingredients proposed for use on job used in similar proportions to mix proposed for use on job. Contractor shall submit verification confirming this stipulation has been followed. Field experience records and/or trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.

B. Structural concrete shall conform to the following requirements. Cementitious materials refer to the total combined weight of all cement, fly ash, and slag cement contained in the mix.

1. Compressive Strength (28-Day)
   a. Concrete Class A 4,500 psi (minimum)
      6,500 psi (maximum)
   b. Class B 3,000 psi (minimum)

2. Maximum water/cementitious materials ratio, by weight
   a. Concrete Class A 0.42
   b. Class B 0.50

3. Slump range 4” nominal unless high range water reducing admixture is used.
   3” max. before addition of high range water reducing admixture.

4. Air Content
   a. Class A 6% ±1.5%
   b. Class B 3% Max

PART 3 -- EXECUTION

3.01 TRIAL MIXES

A. When trial mixes are used to confirm the quality of a proposed concrete mix in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of
ACI 318 and ACI 350, an independent testing laboratory designated and retained by the Contractor and acceptable to the Engineer shall test a trial batch of each of the preliminary concrete mixes submitted by the Contractor. The trial batches shall be prepared using the aggregates, cement and admixtures proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain enough samples to satisfy the following requirements stated herein. Tests on individual materials stated in PART 2 -- PRODUCTS should already be performed before any trial mix is done. The cost of laboratory trial batch tests for each specified concrete mix will be borne by the Contractor and the Contractor shall furnish and deliver the materials to the testing laboratory at no cost to the Owner.

B. The independent testing laboratory shall prepare a minimum of fifteen (15) standard test cylinders in accordance with ASTM C31 in addition to conducting slump (ASTM C143), air content (C231) and unit weight (C138) tests. Compressive strength test on the cylinders shall subsequently be performed by the same laboratory in accordance with ASTM C39 as follows: Test 3 cylinders at age 7 days; test 3 cylinders at age 21 days; test 3 cylinders at age 28 days and test 3 cylinders at 56 days. The cylinders shall be carefully identified as "Trial Mix, Contract No. ______, Product ________." If the average 28-day compressive strength of the trial mix is less than that specified, or if any single cylinder falls below the required strength by more than 500 psi, the mix shall be corrected, another trial batch prepared, test cylinders taken, and new tests performed as before. Any such additional trial batch testing required shall be performed at no additional cost to the Owner. Adjustments to the mix shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor.

3.02 PRODUCTION OF CONCRETE

A. All concrete shall be machine mixed. Hand mixing of concrete will not be permitted. The Contractor may supply concrete from a ready mix plant or from a site mixed plant. In selecting the source for concrete production the Contractor shall carefully consider its capability for providing quality concrete at a rate commensurate with the requirements of the placements so that well bonded, homogenous concrete, free of cold joints, is assured.

B. Ready-Mixed Concrete

1. At the Contractor’s option, ready-mixed concrete may be used meeting the requirements for materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C94.

2. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver’s cab. The counters shall be actuated at the time of starting mixers at mixing speeds.

3. Each batch of concrete shall be mixed in a truck mixer for not less than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials
including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

4. Truck mixers and their operation shall be such that the concrete throughout the mixed batch, as discharged, is within acceptable limits of uniformity with respect to consistency, mix and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than 1 inch when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

5. Ready-mixed concrete shall be delivered to the site for the work and discharge shall be completed before the drum has been revolved 300 revolutions and within the time requirements stated in Article 3.03 of this Section.

6. Each and every concrete delivery shall be accompanied by a delivery ticket containing at least the following information:

   a. Date and truck number
   b. Ticket number
   c. Mix designation of concrete
   d. Cubic yards of concrete
   e. Cement brand, type and weight in pounds
   f. Weight in pounds of fine aggregate (sand)
   g. Weight in pounds of coarse aggregate (stone)
   h. Air entraining agent, brand, and weight in pounds and ounces
   i. Other admixtures, brand, and weight in pounds and ounces
   j. Water, in gallons, stored in attached tank
   k. Water, in gallons, maximum that can be added without exceeding design water/cement ratio
   l. Water, in gallons, actually used (by truck driver)
   m. Time of loading
   n. Time of delivery to job (by truck driver)

7. Any truck delivering concrete to the job site, which is not accompanied by a delivery ticket showing the information previously specified herein will be rejected and such truck shall immediately depart from the job site.

8. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the Engineer.

C. Site Mixed Concrete
1. Scales for weighing concrete ingredients shall be accurate when in use within ±0.4 percent of their total capacities. Standard test weights shall be available to permit checking scale accuracy.

2. Operation of batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances:

   a. Cement, fly ash, or slag cement ± 1 percent
   b. Water ± 1 percent
   c. Aggregates ± 2 percent
   d. Admixtures ± 3 percent

3. Each batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to prevent batched ingredients from entering the mixer before the previous batch has been completely discharged.

4. The concrete shall be mixed in a batch mixer capable of thoroughly combining the aggregates, cement, and water into a uniform mass within the specified mixing time, and of discharging the concrete without harmful segregation. The mixer shall bear a manufacturer's rating plate indicating the rate capacity and the recommended revolutions per minute and shall be operated in accordance therewith.

5. Mixers with a rate capacity of 1 cu. yd. or larger shall conform to the requirements of the Plant Mixer Manufacturers' Division of the Concrete Plant Manufacturers' Bureau.

6. Except as follows, batches of 1 cu. yd. or less shall be mixed for not less than 1 minute. The mixing time shall be increased 15 seconds for each cubic yard or fraction thereof of additional capacity.

7. Shorter mixing time may be permitted provided performance tests made in accordance with of ASTM C94 indicate that the time is sufficient to produce uniform concrete.

8. Controls shall be provided to ensure that the batch cannot be discharged until the required mixing time has elapsed. At least three-quarters of the required mixing time shall take place after the last of the mixing water has been added.

9. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Mixer blades shall be replaced when they have lost 10 percent of their original height.

10. Air-entraining admixtures and other chemical admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured.
by volume if so recommended by the manufacturer.

11. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.

12. Addition of retarding admixtures shall be completed within 1 minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Retarding admixtures shall not be used unless approved by the Engineer.

13. Concrete shall be mixed only in quantities for immediate use and within the time and mixing requirements of ASTM C94.

3.03 CONCRETE PLACEMENT

A. No concrete shall be placed prior to approval of the concrete mix design. Concrete placement shall conform to the recommendations of ACI 304.

B. Prior to concrete placement, all reinforcement shall be securely and properly fastened in its correct position. Formwork shall be clean, oiled and form ties at construction joints shall be retightened. All bucks, sleeves, castings, hangers, pipe, conduits, bolts, anchors, wire, and any other fixtures required to be embedded therein shall be in place. Forms for openings to be left in the concrete shall be in place and anchored by the Contractor. All loose debris in bottoms of forms or in keyways shall be removed and all debris, water, snow, ice and foreign matter shall be removed from the space to be occupied by the concrete. The Contractor shall notify the Engineer in advance of placement, allowing sufficient time for a concurrent inspection and for any corrective measures which are subsequently required.

C. On horizontal joints where concrete is to be placed on hardened concrete, flowing concrete containing a high range water reducing admixture or cement grout shall be placed with a slump not less than 8 inches for the initial placement at the base of the wall. Concrete or cement grout shall meet all strength and service requirements specified herein for applicable class of concrete. This concrete shall be worked well into the irregularities of the hard surface.

D. All concrete shall be placed during the daylight hours except with the consent of the Engineer. If special permission is obtained to carry on work during the night, adequate lighting must be provided.

E. When concrete arrives at the project with slump below that suitable for placing, as indicated by the Specifications, water may be added to bring the concrete within the specified slump range provided that the design water-cement ratio is not exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Water may be added only to full trucks. On-site tempering shall not relieve the Contractor from furnishing a concrete mix that meets all specified requirements.

F. Concrete shall be conveyed as rapidly as practicable to the point of deposit by methods which prevent the separation or loss of the ingredients. It shall be so deposited that
rehandling will be unnecessary. Discharge of the concrete to its point of deposit shall be completed within 90 minutes after the addition of the cement to the aggregates. In hot weather, or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed the requirements stated in Article 3.07 of this Section.

G. Where concrete is conveyed to position by chutes, a practically continuous flow in the chute shall be maintained. The angle and discharge arrangement of the chute shall be such as to prevent segregation of the concrete ingredients. The delivery end of the chute shall be as close as possible to the point of deposit and in no case shall the free pour from the delivery end of the chute exceed five feet, unless approved otherwise by Engineer.

H. Special care must be exercised to prevent splashing of forms or reinforcement with concrete, and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the general level of the concrete already in place must be removed before the work proceeds. Concrete shall be placed in all forms in such way as to prevent any segregation.

I. Placing of concrete shall be so regulated that the pressure caused by the wet concrete shall not exceed that used in the design of the forms.

J. All concrete for walls shall be placed through openings in the form spaced at frequent intervals or through tremies (heavy duct canvas, rubber, etc.), equipped with suitable hopper heads. Tremies shall be of variable lengths so the free fall shall not exceed five (5) feet and a sufficient number shall be placed in the form to ensure the concrete is kept level at all times.

K. When placing concrete which is to be exposed, sufficient illumination shall be provided in the interior of the forms so the concrete, at places of deposit, is visible from deck and runways.

L. Concrete shall be placed so as to thoroughly embed all reinforcement, inserts, and fixtures.

M. When forms are removed, surfaces shall be even and dense, free from aggregate pockets or honeycomb. To achieve this, concrete shall be consolidated using mechanical vibration, supplemented by forking and spading by hand in the corners and angle of forms and along form surfaces while the concrete is plastic under the vibratory action. Consolidation shall conform to ACI 309.

N. Mechanical vibration shall be applied directly to the concrete, unless otherwise approved by the Engineer. The bottom of vibrators used on floor slabs must not be permitted to ride the form supporting the slab. Vibration shall be applied at the point of deposit and in the area of freshly placed concrete by a vertical penetration of the vibrator. Vibrators shall not be used to move concrete laterally within the forms.

O. The intensity of vibration shall be sufficient to cause settlement of the concrete into place and to produce monolithic joining with the preceding layer. It shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures with a vibrator transmitting not less than 7,500 impulses per minute. Since the duration of vibration per square foot of surface is dependent on the frequency (impulses per minute),
size of vibrator, and slump of concrete, the length of time must therefore be determined in the field. Vibration, however, shall not be continued in any one location to the extent that pools of grout are formed.

P. Care shall be taken to prevent cold joints when placing concrete in any portion of the work. The concrete placing rate shall be such as to ensure that each layer is placed while the previous layer is soft or plastic, so that the two layers can be made monolithic by penetration of the vibrators. Maximum thickness of concrete layers shall be 18 inches. The surface of the concrete shall be level whenever a run of concrete is stopped.

Q. To prevent featheredges, construction joints located at the tops of horizontal lifts near sloping exposed concrete surfaces shall be inclined near the exposed surface, so the angle between such inclined surface and the exposed concrete surface will be not less than 50°.

R. In placing unformed concrete on slopes, the concrete shall be placed ahead of a non-vibrated slip-form screed extending approximately 2-1/2 feet back from its leading edge. The method of placement shall provide a uniform finished surface with the deviation from the straight line less than 1/8 inch in any concrete placement. Concrete ahead of the slip-form screed shall be consolidated by internal vibrators so as to ensure complete filling under the slip-form. Prior to placement of concrete on sloped walls or slabs, the Contractor shall submit a plan specifically detailing methods and sequence of placements, proposed concrete screed equipment, location of construction joints and waterstops, and/or any proposed deviations from the aforementioned to the Engineer for review and approval.

S. Concrete shall not be placed during rains sufficiently heavy or prolonged to wash mortar from coarse aggregate on the forward slopes of the placement. Once placement of concrete has commenced in a block, placement shall not be interrupted by diverting the placing equipment to other uses.

3.04 PLACING FLOOR SLABS ON GRADE

A. The subgrade for slabs on ground shall be well drained and of adequate and uniform loadbearing nature. The in-place density of the subgrade soils shall be at least the minimum required by the specifications. No foundation, slab, or pavement concrete shall be placed until the depth and character of the foundation soils have been inspected and approved by the materials testing consultant.

B. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing it shall be raised and maintained above 50° long enough to remove all frost from the subgrade.

C. The subgrade shall be moist at the time of concreting. If necessary, it shall be dampened with water in advance of concreting, but there shall be no free water standing on the subgrade nor any muddy or soft spots when the concrete is placed.

D. Thirty-pound felt paper shall be provided between edges of slab-on-grade and vertical and horizontal concrete surfaces, unless otherwise indicated on the Drawings.

E. Contraction joints shall be provided in slabs-on-grade at locations indicated on the Drawings. Contraction joints shall be installed as per Section 03290 – Joints in Concrete.
F. Floor slabs shall be screeded level or pitched to drain as indicated on the Drawings. Finishes shall conform with requirements of Section 03350 – Concrete Finishes.

3.05 ORDER OF PLACING CONCRETE

A. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. Where required on the Drawings and wherever else practical, the placing of such units shall be done in a strip pattern in accordance with ACI 302.1. A minimum of 72 hours shall pass prior to placing concrete directly adjacent to previously placed concrete.

3.06 CONCRETE WORK IN COLD WEATHER

A. Cold weather concreting procedures shall conform to the requirements of ACI 306.

B. The Engineer may prohibit the placing of concrete at any time when air temperature is 40°F or lower. If concrete work is permitted, the concrete shall have a minimum temperature, as placed, of 55°F for placements less than 12” thick, 50°F for placements 12” to 36” thick, and 45°F for placements greater than 36” thick. The temperature of the concrete as placed shall not exceed the aforementioned minimum values by more than 20°F, unless otherwise approved by the Engineer.

C. All aggregate and water shall be preheated. Precautions shall be taken to avoid the possibility of flash set when aggregate or water are heated to a temperature in excess of 100°F in order to meet concrete temperature requirements. The addition of admixtures to the concrete to prevent freezing is not permitted. All reinforcement, forms, and concrete accessories with which the concrete is to come in contact shall be defrosted by an approved method. No concrete shall be placed on frozen ground.

3.07 CONCRETE WORK IN HOT WEATHER

A. Hot weather concreting procedures shall conform to the requirements of ACI 305.

B. When air temperatures exceed 85°F, or when extremely dry conditions exist even at lower temperatures, particularly if accompanied by high winds, the Contractor and his concrete supplier shall exercise special and precautionary measures in preparing, delivering, placing, finishing, curing and protecting the concrete mix. The Contractor shall consult with the Engineer regarding such measures prior to each day’s placing operation and the Engineer reserves the right to modify the proposed measures consistent with the requirements of this Section of the Specifications. All necessary materials and equipment shall be on hand an in position prior to each placing operation.

C. Preparatory work at the job site shall include thorough wetting of all forms, reinforcing steel and, in the case of slab pours on ground or subgrade, spraying the ground surface on the preceding evening and again just prior to placing. No standing puddles of water shall be permitted in those areas which are to receive the concrete.

D. The temperature of the concrete mix when placed shall not exceed 90°F.
E. Temperature of mixing water and aggregates shall be carefully controlled and monitored at the supplier's plant, with haul distance to the job site being taken into account. Stockpiled aggregates shall, if necessary, be shaded from the sun and sprinkled intermittently with water. If ice is used in the mixing water for cooling purposes, it must be entirely melted prior to addition of the water to the dry mix.

F. Delivery schedules shall be carefully planned in advance so that concrete is placed as soon as practical after it is properly mixed. For hot weather concrete work (air temperature greater than 85°F), discharge of the concrete to its point of deposit shall be completed within 60 minutes from the time the concrete is batched.

G. The Contractor shall arrange for an ample work force to be on hand to accomplish transporting, vibrating, finishing, and covering of the fresh concrete as rapidly as possible.

3.08 QUALITY CONTROL

A. Field Testing of Concrete

1. The Contractor shall coordinate with the Engineer's project representative the on-site scheduling of the materials testing consultant’s personnel as required for concrete testing.

2. Concrete for testing shall be supplied by the Contractor at no additional cost to the Owner, and the Contractor shall provide assistance to the materials testing consultant in obtaining samples. The Contractor shall dispose of and clean up all excess material.

B. Consistency

1. The consistency of the concrete will be checked by the materials testing consultant by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Engineer and/or the materials testing consultant may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for any delays, material or labor costs due to such eventualities.

2. Slump tests shall be made in accordance with ASTM C143. Slump tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

3. Concrete with a specified nominal slump shall be placed having a slump within 1" (higher or lower) of the specified slump. Concrete with a specified maximum slump shall be placed having a slump less than the specified slump.

C. Unit Weight

1. Samples of freshly mixed concrete shall be tested for unit weight by the materials testing consultant.
testing consultant in accordance with ASTM C138.

2. Unit weight tests will be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.

D. Air Content

1. Samples of freshly mixed concrete will be tested for entrained air content by the materials testing consultant in accordance with ASTM C231.

2. Air content tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

3. In the event test results are outside the limits specified, additional testing shall occur. Admixture quantity adjustments shall be made immediately upon discovery of incorrect air entrainment.

E. Compressive Strength

1. Samples of freshly mixed concrete will be taken by the materials testing consultant and tested for compressive strength in accordance with ASTM C172, C31 and C39, except as modified herein.

2. In general, one sampling shall be taken for each placement in excess of five (5) cubic yards, with a minimum of one (1) sampling for each day of concrete placement operations, or for each one hundred (100) cubic yards of concrete, or for each 5,000 square feet of surface area for slabs or walls, whichever is greater.

3. Each sampling shall consist of at least five (5) 6x12 cylinders or (8) 4x8 cylinders. Each cylinder shall be identified by a tag, which shall be hooked or wired to the side of the container. The materials testing consultant will fill out the required information on the tag, and the Contractor shall satisfy himself that such information shown is correct.

4. The Contractor shall be required to furnish labor to the Owner for assisting in preparing test cylinders for testing. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the Contractor. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds and such that all specimen are shielded from direct sunlight and/or radiant heating sources. No concrete requiring inspection shall be delivered to the site until such storage curing box has been provided. Specimens shall remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours.
5. The Contractor shall be responsible for maintaining the temperatures of the curing box during the initial curing of test specimens with the temperature preserved between 60°F and 80°F as measured by a maximum-minimum thermometer. The Contractor shall maintain a written record of curing box temperatures for each day curing box contains test specimens. Temperature shall be recorded a minimum of three times a day with one recording at the start of the work day and one recording at the end of the work day.

6. When transported, the cylinders shall not be thrown, dropped, allowed to roll, or be damaged in any way.

7. Compression tests shall be performed in accordance with ASTM C39. For 6x12 cylinders, two test cylinders will be tested at seven days and two at 28 days. For 4x8 cylinders, three test cylinders will be tested at seven days, three at 28 days. The remaining cylinders will be held to verify test results, if needed.

F. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 214, ACI 318, and ACI 350.

2. The strength level of concrete will be considered satisfactory if all of the following conditions are satisfied.
   a. Every arithmetic average of any three consecutive strength tests equals or exceeds the minimum specified 28-day compressive strength for the mix (see Article 2.07).
   b. No individual compressive strength test results falls below the minimum specified strength by more than 500 psi.
   c. No more than 10% of the compressive tests have strengths greater than the maximum strength specified.

3. In the event any of the conditions previously listed herein are not met, the mix proportions shall be corrected for the next concrete placing operation.

4. In the event that condition 2B is not met, additional tests in accordance with Article 3.08, paragraph H shall be performed.

5. When a ratio between 7-day and 28-day strengths has been established by these tests, the 7-day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths. Should the 7-day test strength from any sampling be more than 10% below the established minimum strength, the Contractor shall:
   a. Immediately provide additional periods of curing in the affected area from which the deficient test cylinders were taken.
   b. Maintain or add temporary structural support as required.
c. Correct the mix for the next concrete placement operation, if required to remedy the situation.

6. All concrete which fails to meet the ACI requirements and these Specifications is subject to removal and replacement at no additional cost to the Owner.

G. When non-compliant concrete is identified, test reports shall be sent immediately to the Engineer for review.

H. Additional Tests

1. When ordered by the Engineer, additional tests on in-place concrete shall be provided and paid for by the Contractor.

2. In the event the 28-day test cylinders fail to meet the minimum strength requirements as outlined in Article 3.08, paragraph F, the Contractor shall have concrete core specimens obtained and tested from the affected area immediately.

a. Three cores shall be taken for each sample in which the strength requirements were not met.

b. The drilled cores shall be obtained and tested in conformance with ASTM C42. The tests shall be conducted by a materials testing consultant approved by the Engineer.

c. The location from which each core is taken shall be approved by the Engineer. Each core specimen shall be located, when possible, so its axis is perpendicular to the concrete surface and not near formed joints or obvious edges of a unit of deposit.

d. The core specimens shall be taken, if possible, so no reinforcing steel is within the confines of the core.

e. The diameter of core specimens should be at least 3 times the maximum nominal size of the coarse aggregate used in the concrete, but must be at least 2 inches in diameter.

f. The length of specimen, when capped, shall be at least twice the diameter of the specimen.

g. The core specimens shall be taken to the laboratory and when transported, shall not be thrown, dropped, allowed to roll, or damaged in any way.

h. Two (2) copies of test results shall be mailed directly to the Engineer. The concrete in question will be considered acceptable if the average compressive strength of a minimum of three test core specimens taken from a given area equal or exceed 85% of the specified 28-day strength and if the lowest core strength is greater than 75% of the specified 28-day strength.
3. In the event that concrete placed by the Contractor is suspected of not having proper air content, the Contractor shall engage a materials testing consultant approved by the Engineer, to obtain and test samples for air content in accordance with ASTM C457.

4. Concrete placed with compressive strengths greater than the maximum strength specified shall be removed and replaced or repaired as deemed necessary by the Engineer.

3.09 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until Final Acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Care shall be exercised to avoid jarring forms or placing any strain on the ends of projecting reinforcing bars. Any concrete found to be damaged, which may have been originally defective, or which becomes defective at any time prior to the Final Acceptance of the completed Work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at no additional cost to the Owner.

B. Areas of honeycomb shall be chipped back to sound concrete and repaired as directed by the Engineer.

C. Concrete formwork blowouts or unacceptable deviations in tolerances for formed surfaces due to improperly constructed or misaligned formwork shall be repaired as directed by the Engineer. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and redressed as directed by the Engineer.

D. Areas of concrete in which cracking, spalling, or other signs of deterioration develop prior to Final Acceptance shall be removed and replaced, or repaired as directed by the Engineer. This stipulation includes concrete that has experienced cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an epoxy injection system approved by the Engineer. Non-structural cracks shall be repaired using a hydrophilic resin pressure injected grout system approved by the Engineer, unless other means of repair are deemed necessary and approved by the Engineer. Extensive repair or replacement will be considered for concrete placed having compressive strengths greater than maximum strength specified. All repair work shall be performed at no additional cost to the Owner.

E. Concrete which fails to meet the strength requirements as outlined in Article 3.08, paragraph F, will be analyzed by the Engineer as to its adequacy based upon loading conditions, resultant stresses and exposure conditions for the particular area of concrete in question. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at no additional cost to the Owner. The method of strengthening or extent of replacement shall be directed by the Engineer.
SECTION 03350

CONCRETE FINISHES

PART 1 -- GENERAL

1.01 THE REQUIREMENT
   A. Furnish all materials, labor, and equipment required to provide finishes of all concrete
      surfaces specified herein and shown on the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE
   A. Section 01300 – Submittals
   B. Section 03100 – Concrete Formwork
   C. Section 03300 – Cast-in-Place Concrete
   D. Section 03600 – Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS
   A. Without limiting the generality of the other requirements of the specifications, all work herein
      shall conform to the applicable requirements of the following documents. All referenced
      specifications, codes, and standards refer to the most current issue available at the time of
      Bid.
      1. ACI 301 – Specifications for Structural Concrete for Buildings
      2. ACI 318 – Building Code Requirements for Structural Concrete

1.04 SUBMITTALS
   A. Submit the following in accordance with Section 01300 – Submittals.
      1. Manufacturer’s literature on all products specified herein.

PART 2 -- PRODUCTS

2.01 CONCRETE FLOOR SEALER
   A. Floor sealer shall be Diamond Clear VOX or Super Diamond Clear VOX by the Euclid
      Chemical Company or MasterKure CC 300 SB by BASF Master Builder Solutions.
2.02 CONCRETE LIQUID DENSIFIER AND SEALANT

A. Concrete liquid densifier and sealant shall be a high performance, deeply penetrating concrete densifier and sealant. Product shall be odorless, colorless, VOC-compliant, non-yellowing silicate based solution designed to harden, dustproof and protect concrete floors subjected to heavy vehicular traffic and to resist black rubber tire marks on concrete surfaces. The product must contain a minimum solids content of 20% of which 50% is silicate. Acceptable products shall be Diamond Hard by the Euclid Chemical Company, Seal Hard by L&M Construction Chemicals, or MasterKure HD 210 WB by BASF Master Builder Solutions.

2.03 NON-METALLIC FLOOR HARDENER

A. The specified non-metallic mineral aggregate hardener shall be formulated, processed, and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a factory-blended mixture of specifically processed graded mineral aggregate, selected Portland cement, and necessary plasticizing agents. Acceptable products shall be Surflex by the Euclid Chemical Company, Harcol by Sonneborn, Maximent by BASF, or Mastercon by BASF.

2.04 NON-OXIDIZING HEAVY DUTY METALLIC FLOOR HARDENER

A. Non-oxidizing heavy duty metallic floor hardener shall be formulated, processed, and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specifically processed non-rusting aggregate, selected Portland cement, and necessary plasticizing agents. Product shall be Diamond-Plate by the Euclid Chemical Company, or Masterplate by BASF Construction Chemicals.

2.05 NON-SLIP FLOORING AGGREGATE

A. Non-slip flooring aggregate for non-slip floors shall be non-metallic. Non-slip flooring aggregate shall be Frictex NS by BASF Construction Chemicals, A-H Alox by Anti-Hydro, or Non-Slip by the Euclid Chemical Company.

PART 3 -- EXECUTION

3.01 FINISHES ON FORMED CONCRETE SURFACES

A. After removal of forms, the finishes described below shall be applied in accordance with Article 3.05 – Concrete Finish Schedule. Unless the finish schedule specifies otherwise, all surfaces shall receive at least a Type I finish. The Engineer shall be the sole judge of acceptability of all concrete finish work.

1. **Type I – Rough**: All fins, burrs, offsets, marks and all other projections left by the forms shall be removed. Projections, depressions, etc. below finished grade required to be removed will only be those greater than 1/4-inch. All holes left by removal of ends of ties, and all other holes, depressions, bugholes, air/blow holes or voids shall be filled solid with cement grout after first being thoroughly wetted and then struck off flush. The only holes below grade to be filled will be tie holes and
any other holes larger than 1/4-inch in any dimension. Honeycombs shall be chipped back to solid concrete and repaired as directed by the Engineer. All holes shall be filled with tools, such as sponge floats and trowels, that will permit packing the hole solidly with cement grout. Cement grout shall consist of one part cement to three parts sand, epoxy bonding agent (for tie holes only) and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of cement grout shall match the adjacent wall surface.

2. **Type II – Grout Cleaned:** Where this finish is required, it shall be applied after completion of Type I finish. After the concrete has been predampened, a slurry consisting of one part cement (including an appropriate quantity of white cement in order to produce a color matching the surrounding concrete) and 1-1/2 parts sand passing the No. 16 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats. Mix proportions shall be submitted to the Engineer after a sample of the work is established and accepted. Any surplus shall be removed by scraping and then rubbing with clean burlap.

3. **Type III – Smooth Rubbed:** Where this finish is required, it shall be applied after the completion of the Type I finish. No rubbing shall be done before the concrete is thoroughly hardened and the mortar used for patching is firmly set. A smooth, uniform surface shall be obtained by wetting the surface and rubbing it with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities requires it, the general surface of the concrete shall not be cut into. Corners and edges shall be slightly rounded by the use of the carborundum stone. Brush finishing or painting with grout or neat cement will not be permitted. A 100 square foot example shall be established at the beginning of the project to establish acceptability.

3.02 **SLAB AND FLOOR FINISHES**

A. The finishes described below shall be applied to floors, slabs, flow channels and top of walls in accordance with Article 3.05 – Concrete Finish Schedule. The Engineer shall be the sole judge of acceptability of all such finish work.

1. **Type "A" – Screeded:** This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required. When a Type "F" finish is subsequently to be applied, the surface of the screeded concrete shall be roughened with a concrete rake to 1/2-inch minimum deep grooves prior to final set.

2. **Type "B" – Wood or Magnesium Floated:** This finish shall be obtained after completion of a Type "A" finish by working a previously screeded surface with a wood or magnesium float or until the desired texture is reached. Floating shall begin when the water sheen has disappeared and when the concrete has sufficiently hardened so that a person's foot leaves only a slight imprint. If wet spots occur, water shall be removed with a squeegee. Care shall be taken to prevent the formation of laitance and excess water on the finished surface. All edges shall be edged with a 1/8-inch tool as directed by the Engineer. The finished surface shall be true, even, and free from blemishes and any other irregularities.
3. **Type "C" – Cork Floated:** This finish shall be similar to Type "B" but slightly smoother than that obtained with a wood float. It shall be obtained by power or band floating with cork floats.

4. **Type "D" – Steel Troweled:** This finish shall be obtained after completion of a Type "B" finish. When the concrete has hardened sufficiently to prevent excess fine material from working to the surface, the surface shall be compacted and smoothed with not less than two thorough and complete steel troweling operations. In areas which are to receive a floor covering such as tile, resilient flooring, or carpeting, the applicable Specification Sections and Contract Drawings shall be reviewed for the required finishes and degree of flatness. In areas that are intermittently wet such as pump rooms, only one troweling operation is required to provide some trowel marks for slip resistance. All edges shall be edged with a 1/8-inch tool as directed by the Engineer. The finish shall be brought to a smooth, dense surface, free from defects and blemishes.

5. **Type "E" – Broom or Belt:** This finish shall provide the surface with a transverse scored texture by drawing a broom or burlap belt across the surface immediately after completion of a Type "B" finish. All edges shall be edged with a 1/8-inch tool as directed by the Engineer.

6. **Type "F" – Swept in Grout Topping:** This finish shall be applied after a completion of a Type "A" finish. The concrete surface shall be properly cleaned, washed, and coated with a mixture of water and Portland Cement. Cement grout in accordance with Section 03600 – Grout shall then be plowed and swept into neat conformance with the blades or arms of the apparatus by turning or rotating the previously positioned mechanical equipment. Special attention shall be paid to true grades, shapes and tolerances as specified by the manufacturer of the equipment. Before beginning this finish, the Contractor shall notify the Engineer and the equipment manufacturer of the details of the operation and obtain approval and recommendations.

7. **Type “G” – hardened Finish:** This finish shall be applied after completion of a Type "B" or Type "C" finish and prior to application of a Type "D" finish. Hardeners shall be applied in strict accordance with the manufacturer’s requirements. Hardeners shall be applied using a mechanical spreader. The hardener shall be applied in two shakes with the first shake comprising 2/3 of the total amount. Type “D” finish shall be applied following completion of application of the hardener.

   a. Non-metallic floor hardener shall be applied where specifically required on the Contract Drawings at the rate of 1.0 pounds/square foot.

   b. Non-oxidizing heavy duty metallic floor hardener shall be applied at the loading docks and where specifically required on the Contract Drawings or specified herein at the rate of 1.5 pounds/square foot.

8. **Type "H" – Non-Slip Finish:** This finish shall be provided by applying a non-slip flooring aggregate concurrently with the application of a Type "D" finish. Application procedure shall be in accordance with manufacturer's instructions. Finish shall be applied where specifically required on the Contract Drawings or specified herein.
9. **Type "J" – Raked Finish**: This finish shall be provided by raking the surface as soon as the condition of the concrete permits by making depressions of ±1/4-inch.

### 3.03 CONCRETE SEALERS

A. Concrete sealers shall be applied where specifically required on the Contract Drawings or specified herein.

B. Sealers shall be applied after installation of all equipment, piping, etc. and after completion of any other related construction activities. Application of sealers shall be in strict accordance with manufacturer’s requirements.

C. Sealers shall be applied to all floor slabs not painted and not intended to be immersed.

D. Floor slabs subjected to vehicular traffic shall be sealed with the concrete liquid densifier and sealer.

E. All other floor slabs to receive sealer shall be sealed with concrete floor sealer.

### 3.04 FINISHES ON EQUIPMENT PADS

A. Formed surfaces of equipment pads shall receive a Type III finish.

B. Top surfaces of equipment pads, except those surfaces subsequently required to receive grout and support equipment bases, shall receive a Type "D" finish, unless otherwise noted. Surfaces which will later receive grout shall, before the concrete takes its final set, be made rough by removing the sand and cement that accumulates on the top to the extent that the aggregate will be exposed with irregular indentations in the surface up to 1/2 inch deep.

### 3.05 CONCRETE FINISH SCHEDULE

<table>
<thead>
<tr>
<th>Item</th>
<th>Type of Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete surfaces indicated to receive textured coating (as noted on Drawings and in Section 09800, Special Coatings)</td>
<td>I</td>
</tr>
<tr>
<td>Inner face of walls of tanks, flow channels, wet wells, perimeter walls, and miscellaneous concrete structures: From 1 feet below water surface to bottom of wall</td>
<td>II</td>
</tr>
<tr>
<td>From top of wall to 1 feet below water surface</td>
<td>II</td>
</tr>
<tr>
<td>Exterior concrete walls below grade</td>
<td>I</td>
</tr>
<tr>
<td>Exterior exposed concrete walls, ceilings, beams, manholes, hand holes, miscellaneous structures and columns (including top of wall) to one foot below grade. All other exposed concrete surfaces not specified elsewhere</td>
<td>II</td>
</tr>
<tr>
<td>All interior exposed concrete walls and vertical surfaces</td>
<td>III</td>
</tr>
<tr>
<td>Interior exposed ceiling, including beams</td>
<td>III</td>
</tr>
<tr>
<td>Item</td>
<td>Type of Finish</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Floors of process equipment tanks or basins, wetwells, flow channels and slabs to receive roofing material or waterproof membranes</td>
<td>B</td>
</tr>
<tr>
<td>All interior finish floors of buildings and structures and walking surfaces which will be continuously or intermittently wet</td>
<td>D</td>
</tr>
<tr>
<td>All interior finish floors of buildings and structures which are not continuously or intermittently wet</td>
<td>D</td>
</tr>
<tr>
<td>Floors to receive tile, resilient flooring, or carpeting</td>
<td>D</td>
</tr>
<tr>
<td>Exterior concrete sidewalks, steps, ramps, decks, slabs on grade and landings exposed to weather</td>
<td>E</td>
</tr>
<tr>
<td>Floors of process equipment tanks indicated on Drawings to receive grout topping</td>
<td>F</td>
</tr>
<tr>
<td>Garage, storage area floors, and loading docks</td>
<td>G</td>
</tr>
<tr>
<td>Precast concrete form panels, hollow core planks, double tees</td>
<td>J</td>
</tr>
</tbody>
</table>

- END OF SECTION -
SECTION 03370
CONCRETE CURING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Protect all freshly deposited concrete from premature drying and from the weather elements. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03100 – Concrete Formwork
B. Section 03300 – Cast-In-Place Concrete
C. Section 03350 – Concrete Finishes

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ACI 301 – Specifications for Structural Concrete for Buildings
2. ACI 304 – Guide for Measuring, Mixing, Transporting, and Placing Concrete
3. ACI 305 – Hot Weather Concreting
4. ACI 306 – Cold Weather Concreting
5. ACI 308 – Standard Practice for Curing Concrete
6. ASTM C171 – Standard Specifications for Sheet Materials for Curing Concrete
7. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
8. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:

1. Proposed procedures for protection of concrete under wet weather placement conditions
2. Proposed normal procedures for protection and curing of concrete
3. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions
4. Proposed method of measuring concrete surface temperature changes
5. Manufacturer’s literature and material certification for proposed curing compounds

PART 2 -- PRODUCTS

2.01 LIQUID MEMBRANE-FORMING CURING COMPOUND

A. Clear curing and sealing compound shall be a clear styrene acrylate type complying with ASTM C1315, Type 1, Class A with a minimum solids content of 30 percent. Moisture loss shall not be greater than 0.40 kg/m² when applied at 300 square feet per gallon. Manufacturer’s certification is required. Acceptable products are Super Diamond Clear VOX by the Euclid Chemical Company, MasterKure CC 300 SB by BASF Master Builder Solutions, and Cure & Seal 30 Plus by Symons Corporation.

B. Where specifically approved by Engineer on slabs to receive subsequent applied finishes, compound shall conform to ASTM C309. Acceptable products are Kurez DR VOX or Kurez W VOX by the Euclid Chemical Company. Install in strict accordance with manufacturer’s requirements.

2.02 EVAPORATION REDUCER

A. Evaporation reducer shall be MasterKure ER 50 by BASF or Euco-Bar by the Euclid Chemical Company.

PART 3 -- EXECUTION

3.01 PROTECTION AND CURING

A. All freshly placed concrete shall be protected from the elements, flowing water, and from defacement of any nature during construction operations.

B. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a five-day period thereafter except for high early strength concrete, for which the
period shall be at least the first three days after placement. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted.

C. Walls that will be exposed on one side with either fluid or earth backfill on the opposite side shall be continuously wet cured for a minimum of five days. Use of a curing compound will not be acceptable for applications of this type.

D. The Contractor shall use one of the following methods to ensure that the concrete remains in a moist condition for the minimum period stated above.

1. Ponding or continuous fogging or sprinkling
2. Application of mats or fabric kept continuously wet
3. Continuous application of steam (under 150 degrees Fahrenheit)
4. Application of sheet materials conforming to ASTM C171
5. If approved by the Engineer, application of a curing compound in accordance with Article 3.04.

E. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in Article 3.01, Paragraph D.

F. Any of the curing procedures used in Article 3.01, Paragraph D may be replaced by one of the other curing procedures listed in Article 3.01, Paragraph D after the concrete is one day old. However, the concrete surface shall not be permitted to become dry at any time.

3.02 CURING CONCRETE UNDER COLD WEATHER CONDITIONS

A. Suitable means shall be provided for a minimum of 72 hours after placing concrete to maintain it at or above the minimum as-placed temperatures specified in Section 03300 – Cast-In-Place Concrete for concrete work in cold weather. During the 72-hour period, the concrete surface shall not be exposed to air more than 20 degrees Fahrenheit above the minimum as-placed temperatures.

B. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures. This retardation is magnified when using concrete made with blended cements or containing fly ash or ground granulated blast furnace slag. Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete.

C. The methods of protecting the concrete shall be approved by the Engineer and shall be such as will prevent local drying. Equipment and materials approved for this purpose shall be on the site in sufficient quantity before the work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection. All such thermometers shall be furnished by the Contractor in quantity and type which the Engineer directs.
D. Curing procedures during cold weather conditions shall conform to the requirements of ACI 306.

3.03 CURING CONCRETE UNDER HOT WEATHER CONDITIONS

A. When air temperatures exceed 85 degrees Fahrenheit, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. If ordered by the Engineer, temporary sun shades and/or windbreakers shall be erected to guard against such developments, including generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.

B. Immediately after screeding, horizontal surfaces shall receive an application of evaporation reducer. Apply in accordance with manufacturer's instructions. Final finish work shall begin as soon as the mix has stiffened sufficiently to support the workmen.

C. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing consisting of Method 1 or 2 listed in Article 3.01, Paragraph D is mandatory for at least the first 24 hours. Method 2 may be used only if the finished surface is not marred or blemished during contact with the coverings.

D. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least six (6) additional days using one of the methods listed in Article 3.01, Paragraph D.

E. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305.

3.04 USE OF CURING COMPOUND

A. Curing compound shall be used only where specifically approved by the Engineer. Curing compound shall never be used for curing exposed walls with fluid or earth backfill on the opposite side. A continuous wet cure for a minimum of five days is required for these applications. Curing compound shall not be used on surfaces exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.

B. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.

C. The compound shall be applied in accordance with the manufacturer's recommendations after water sheen has disappeared from the concrete surface and after finishing operations. Maximum coverage for the curing and sealing compound shall be 300 square feet per gallon for trowel finishes and 200 square feet per gallon for floated or broom surfaces. Maximum coverage for compounds placed where subsequent finishes will be applied shall be 200 square feet per gallon. For rough surfaces, apply in two directions at right angles to each other.

3.05 EARLY TERMINATION OF CURING
A. Moisture retention measures may be terminated earlier than the specified times only when at least one of the following conditions is met:

1. The strength of the concrete reaches 85 percent of the specified 28-day compressive strength in laboratory-cured cylinders representative of the concrete in-place, and the temperature of the in-place concrete has been constantly maintained at 50 degrees Fahrenheit or higher.

2. The strength of concrete reaches the specified 28-day compressive strength as determined by accepted nondestructive methods or laboratory-cured cylinder test results.

- END OF SECTION -
PART 1 -- GENERAL

1.01 REQUIREMENTS

A. The Contractor shall construct all precast concrete items as required in the Contract Documents, including all appurtenances necessary to make a complete installation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02604 – Utility Structures
B. Section 03200 – Reinforcing Steel
C. Section 03300 – Cast-in-Place Concrete
D. Section 03350 – Concrete Finishes
E. Section 03370 – Concrete Curing
F. Section 03600 – Grout
G. Section 05010 – Metal Materials
H. Section 05035 – Galvanizing
I. Section 05050 – Metal Fastening
J. Section 05830 – Bearing Devices and Anchoring

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the end of the Bid.

1. 2009 International Building Code
2. ACI 318 Building Code Requirements for Structural Concrete
3. PCI Std. MNL-116 Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products
4. PCI Design Handbook
1.04 SUBMITTALS

A. The Contractor shall submit the following for review in accordance with Section 01300 – Submittals:

1. Shop drawings for all precast concrete items showing all dimensions, locations, and type of lifting inserts, and details of reinforcement and joints

2. A list of the design criteria used by the manufacturer for all manufactured, precast items

3. Design calculations, showing at least the design loads and stresses on the item, shall be submitted. Calculations shall be signed and sealed by a Professional Engineer registered in the State of Alabama.

4. Certified reports for all lifting inserts, indicating allowable design loads

5. Information on lifting and erection procedures

1.05 QUALITY ASSURANCE

A. All manufactured precast concrete units shall be produced by an experienced manufacturer regularly engaged in the production of such items. All manufactured precast concrete and site-cast units shall be free of defects, spalls, and cracks. Care shall be taken in the mixing of materials, casting, curing, and shipping to avoid defects, spalls, and cracks. The Engineer may elect to examine the units at the casting yard or upon arrival of the same at the site. The Engineer shall have the option of rejecting any or all of the precast work if it does not meet with the requirements specified herein or on the Drawings. All rejected work shall be replaced at no additional cost to the Owner.

B. Plant production and engineering must be under direct supervision and control of an engineer who possesses a minimum of five years experience in precast concrete work.

PART 2 -- PRODUCTS

2.01 CONCRETE

A. Concrete materials including portland cement, aggregates, water, and admixtures shall conform to Section 03300 – Cast-in-Place Concrete.

B. For non-prestressed concrete items, minimum compressive strength of concrete at 28 days shall be 4,000 psi unless otherwise specified.

2.02 GROUT

A. Grout for joints between panels shall be a cement grout in conformance with Section 03600 – Grout.
B. Minimum compressive strength of grout at 7 days shall be 3,000 psi.

2.03 REINFORCING STEEL
   A. Reinforcing steel used for precast concrete construction shall conform to Section 03200 – Reinforcing Steel.

2.04 STEEL INSERTS
   A. Steel inserts shall be in accordance with Section 05010 – Metal Materials.
   B. All steel inserts protruding from or occurring at the surface of precast units shall be galvanized in accordance with Section 05035 – Galvanizing.

2.05 WELDING
   A. Welding shall conform to Section 05050 – Metal Fastening.

2.06 BEARING PADS
   A. Neoprene bearing pads shall conform to Section 05830 – Bearing Devices and Anchoring.
   B. Plastic bearing pads shall be multi-monomer plastic strips which are non-leaching and support construction loads with no visible overall expansion, manufactured specifically for the purpose of bearing precast concrete.

PART 3 -- EXECUTION

3.01 FABRICATION AND CASTING
   A. All precast members shall be fabricated and cast to the shapes, dimensions, and lengths shown on the Drawings and in compliance with PCI MNL-116. Precast members shall be straight, true, and free from dimensional distortions, except for camber and tolerances permitted later in this clause. All integral appurtenances, reinforcing, openings, etc. shall be accurately located and secured in position with the formwork system. Form materials shall be steel and the systems shall be free from leakage during the casting operation.
   B. All cover of reinforcing shall be the same as detailed on the Drawings.
   C. The Contractor shall coordinate the communication of all necessary information concerning openings, sleeves, or inserts to the manufacturer of the precast members.
   D. Concrete shall be finished in accordance with Section 03350 – Concrete Finishes. Grout all recesses due to cut tendons which will not otherwise be grouted during erection.
   E. Curing of precast members shall be in accordance with Section 03370 – Concrete Curing. Use of a membrane curing compound will not be allowed.
   F. The manufacturer shall provide lifting inserts or other approved means of lifting members.
3.02 HANDLING, TRANSPORTING, AND STORING

A. Precast members shall not be transported away from the casting yard until the concrete has reached the minimum required 28-day compressive strength and a period of at least 5 days has elapsed since casting, unless otherwise permitted by the Engineer.

B. No precast member shall be transported from the plant to the job site prior to approval of that member by the plant inspector. This approval will be stamped on the member by the plant inspector.

C. During handling, transporting, and storing, precast concrete members shall be lifted and supported only at the lifting or supporting points as indicated on the shop drawings.

D. All precast members shall be stored on solid, unyielding, storage blocks in a manner to prevent torsion, objectionable bending, and contact with the ground.

E. Precast concrete members shall not be used as storage areas for other materials or equipment.

F. Precast members damaged while being handled or transported will be rejected or shall be repaired in a manner approved by the Engineer.

3.03 ERECTION

A. Erection shall be carried out by the manufacturer or under his supervision using labor, equipment, tools, and materials required for proper execution of the work.

B. Contractor shall prepare all bearing surfaces to a true and level line prior to erection. All supports of the precast members shall be accurately located and of required size and bearing materials.

C. Installation of the precast members shall be made by leveling the top surface of the assembled units keeping the units tight and at right angles to the bearing surface.

D. Connections which require welding shall be properly made in accordance with Section 05050 – Metal Fastening.

E. Grouting between adjacent precast members and along the edges of the assembled precast members shall be accomplished as indicated on the Drawings, care being taken to solidly pack such spaces and to prevent leakage or droppings of grout through the assembled precast members. Any grout which seeps through the precast members shall be removed before it hardens.

F. In no case shall concentrated construction loads, or construction loads exceeding the design loads, be placed on the precast members. In no case shall loads be placed on the precast members prior to the welding operations associated with erection, and prior to placing of topping (if required).
G. No Contractor, subcontractor or any of his employees shall arbitrarily cut, drill, punch, or otherwise tamper with the precast members.

H. Precast members damaged while being erected will be rejected or shall be repaired in a manner approved by the Engineer.

- END OF SECTION -
SECTION 03600

GROUT

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish all materials, labor, and equipment required to provide all grout used in concrete work and as bearing surfaces for base plates, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Requirements of related work are included in Division 1 and Division 2 of these Specifications.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. CRD-C 621 Corps of Engineers Specification for Non-shrink Grout

2. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm cube Specimens)

3. ASTM C144 Standard Specification for Aggregate for Masonry Mortar

4. ASTM C531 Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacings

5. ASTM C579 Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings


1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals.
1. Certified test results verifying the compressive strength and shrinkage and expansion requirements specified herein

2. Manufacturer’s literature containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of grout used in the work.

1.05 QUALITY ASSURANCE

A. Field Tests

1. Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the Engineer to ensure continued compliance with these Specifications. The specimens will be made by the Engineer or its representative.

a. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at 7 days, 28 days and any additional time period as appropriate.

b. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C579, Method B, at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at 7 days and any other time period as appropriate.

2. The cost of all laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Engineer in obtaining specimens for testing. The Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The Contractor shall supply all materials necessary for fabricating the test specimens, at no additional cost to the Owner.

3. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

PART 2 -- PRODUCTS

2.01 MATERIALS

A. Cement Grout

1. Cement grout shall be composed of Portland Cement and sand in the proportion specified in the Contract Documents and the minimum amount of water necessary to obtain the desired consistency. If no proportion is indicated, cement grout shall consist of one part Portland Cement to three parts sand. Water amount shall be as required to achieve desired consistency without compromising strength
requirements. White Portland Cement shall be mixed with the Portland Cement as required to match color of adjacent concrete.

2. The minimum compressive strength at 28 days shall be 4,000 psi.

3. For beds thicker than 1-1/2 inch and/or where free passage of grout will not be obstructed by coarse aggregate, 1-1/2 parts of coarse aggregate having a top size of 3/8 inch should be added. This stipulation does not apply for grout being swept in by a mechanism. These applications shall use a plain cement grout without coarse aggregate regardless of bed thickness.

4. Sand shall conform to the requirements of ASTM C144.

B. Non-Shrink Grout

1. Non-shrink grout shall conform to CRD-C 621 and ASTM C1107, Grade B or C when tested at a maximum fluid consistency of 30 seconds per CDC 611/ASTM C939 at temperature extremes of 45 degrees Fahrenheit and 90 degrees Fahrenheit and an extended working time of 15 minutes. Grout shall have a minimum 28-day strength of 7,000 psi. Non-shrink grout shall be Euco N-S by the Euclid Chemical Company, Sikagrout 212 by Sika Corporation, Conspec 100 Non-Shrink Non-Metallic Grout by Conspec, or Masterflow 555 Grout by BASF Master Builder Solutions.

C. Epoxy Grout

1. Epoxy grout shall be Sikadur 32 Hi-Mod by Sika Corporation, Duralcrete LV by Tamms Industries, Euco #452 Series by Euclid Chemical, or MasterEmaco ADH 1090 RS by BASF Master Builder Solutions.

2. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer’s instructions.

D. Epoxy Base Plate Grout

1. Epoxy base plate grout shall be Sikadur 42, Grout-Pak by Sika Corporation or Masterflow 648 by BASF Master Builder Solutions.

2.02 CURING MATERIALS

A. Curing materials shall be as specified in Section 03370 – Concrete Curing for cement grout and as recommended by the manufacturer for prepackaged grouts.

PART 3 -- EXECUTION

3.01 GENERAL

A. The different types of grout shall be used for the following applications unless noted otherwise in the Contract Documents. Where grout is called for in the Contract Documents
which does not fall under any of the following applications, non-shrink grout shall be used unless another type is specifically referenced.

1. Cement grout shall be used for grout toppings and for patching of fresh concrete.

2. Non-shrink grout shall be used for grouting beneath base plates of structural metal framing.

3. Epoxy grout shall be used for bonding new concrete to hardened concrete.

4. Epoxy base plate grout shall be used for precision seating of base plates including base plates for all equipment such as engines, mixers, pumps, vibratory and heavy impact machinery, etc.

B. New concrete surfaces to receive cement grout shall be as specified in Section 03350 – Concrete Finishes and shall be cleaned of all dirt, grease and oil-like films. Existing concrete surfaces shall likewise be cleaned of all similar contamination and debris, including chipping or roughening the surface if a laitance or poor concrete is evident. The finish of the grout surface shall match that of the adjacent concrete. Curing and protection of cement grout shall be as specified in Section 03370 – Concrete Curing.

C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

D. The Contractor, through the manufacturer of a non-shrink grout and epoxy grout, shall provide on-site technical assistance upon request, at no additional cost to the Owner.

3.02 CONSISTENCY

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow.

3.03 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

3.04 GROUT INSTALLATION

A. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted and be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer. For grouting beneath base plates, grout shall be poured from one side only and thence flow across to the open side to avoid air-entrapment.
SECTION 05010
METAL MATERIALS

PART 1 -- GENERAL

1.01 THE REQUIREMENT
   A. Metal materials not otherwise specified shall conform to the requirements of this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE
   A. Materials for fasteners are included in Section 05050 – Metal Fastening.
   B. Requirements for specific products made from the materials specified herein are included in other Sections of the Specifications. See the Section for the specific item in question.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS
   A. ASTM A36 Standard Specification for Structural Steel
   D. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
   F. ASTM A276 Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes
   H. ASTM A446 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
   I. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
   J. ASTM A501 Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
K. ASTM A529  Standard Specification for Structural Steel with 42,000 psi (290 Mpa) Minimum Yield Point (1/2 in. (12.7 mm) Maximum Thickness)

L. ASTM A536  Standard Specification for Ductile Iron Castings

M. ASTM A570  Standard Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality

N. ASTM A572  Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

O. ASTM A666  Standard Specification for Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar for Structural Applications

P. ASTM A992  Standard Specification for Structural Steel Shapes


T. ASTM B138  Standard Specification for Manganese Bronze Rod, Bar, and Shapes


V. ASTM B221  Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

W. ASTM B308  Standard Specification for Aluminum-Alloy Standard Structural Shapes, Rolled or Extruded

X. ASTM B574  Standard Specification for Nickel-Molybdenum-Chromium Alloy Rod


Z. ASTM F593  Standard Specification for Stainless Steel Fasteners

1.04 SUBMITTALS

A. Material certifications shall be submitted along with any Shop Drawings for metal products and fabrications required by other Sections of the Specifications.

1.05 QUALITY ASSURANCE

A. Owner may engage the services of a testing agency to test any metal materials for conformance with the material requirements herein. If the material is found to be in conformance with the Specifications, the cost of testing will be borne by the Owner. If
the material does not conform to the Specifications, the cost of testing shall be paid by
the Contractor and all materials not in conformance, as determined by the Engineer,
shall be replaced by the Contractor at no additional cost to the Owner. In lieu of
replacing materials, the Contractor may request further testing to determine
conformance, but any such testing shall be paid for by the Contractor regardless of the
outcome of such testing.

PART 2 -- PRODUCTS

2.01 CARBON AND LOW ALLOY STEEL

A. Material types and ASTM designations shall be as follows:

1. Structural Fabrications       A992, A572 Grade 50, or A36
2. Sheet Steel                  A570 Grade C
3. Steel Angles and Plates      A36
4. Bars and Rods                A36 or A307 Grade A
5. Pipe – Structural Use        A53 Type E or S, Grade B
6. Tubes                       A500 Grade B or A501
7. Cold-Formed Structural Studs and Joists
   (18–22 gauge)                A446 Grade C
   Cold-Formed Structural Studs and Joists
   (12–16 gauge)                A446 Grade D

2.02 STAINLESS STEEL

A. All stainless steel fabrications exposed to underwater service shall be Type 316. All
other stainless steel fabrications shall be Type 304, unless noted otherwise.

B. Material types and ASTM designations shall be as follows:

1. Plates and Sheets             ASTM A167 or A666 Grade A
2. Structural Shapes             ASTM A276
3. Fasteners (Bolts, etc.)       ASTM F593

2.03 ALUMINUM

A. All aluminum shall be alloy 6061-T6, unless otherwise noted or specified herein.

B. Material types and ASTM designations shall be as follows:

1. Structural Shapes             ASTM B308
2. Castings
   ASTM B26, B85, or B108
3. Extruded Bars
   ASTM B221 – Alloy 6061
4. Extruded Rods, Shapes, and Tubes
   ASTM B221 – Alloy 6063
5. Plates
   ASTM B209 – Alloy 6061
6. Sheets
   ASTM B221 – Alloy 3003

C. All aluminum shall be provided with mill finish unless otherwise noted.

D. Where bolted connections are indicated, aluminum shall be fastened with stainless steel bolts.

E. Aluminum in contact with dissimilar materials shall be insulated with an approved dielectric.

2.04 CAST IRON

A. Material types and ASTM designations shall be as follows:

1. Gray
   ASTM A48 Class 30B
2. Malleable
   ASTM A47
3. Ductile
   ASTM A536 Grade 60-40-18

2.05 BRONZE

A. Material types and ASTM designations shall be as follows:

1. Rods, Bars, and Sheets
   ASTM B138 – Alloy B Soft

2.06 HASTELLOY

A. All Hastelloy shall be Alloy C-276.

PART 3 -- EXECUTION

(NOT USED)

- END OF SECTION -
SECTION 05035

GALVANIZING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Where galvanizing is called for in the Contract Documents, the galvanizing shall be performed in accordance with the provisions of this Section, unless otherwise noted.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Further requirements for galvanizing specific items may be included in other Sections of the Specifications. See Section for the specific item in question.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. 2009 International Building Code

2. ASTM A123 – Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip


4. ASTM A780 – Standard Practice of Repair of Damaged Hot-Dip Galvanized Coatings

5. ASTM A924 – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:

1. Certification that the item(s) are galvanized in accordance with the applicable ASTM standards specified herein. This certification may be included as part of any material certification that may be required by other Sections of the Specifications.
PART 2 -- PRODUCTS

2.01 GALVANIC COATING

A. Material composition of the galvanic coating shall be in accordance with the applicable ASTM standards specified herein.

PART 3 -- EXECUTION

3.01 FABRICATED PRODUCTS

A. Products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strips, 1/8 inch thick and heavier, which are to be galvanized shall be galvanized in accordance with ASTM A123. Products shall be fabricated into the largest unit which is practicable to galvanize before the galvanizing is done. Fabrication shall include all operations necessary to complete the unit such as shearing, cutting, punching, forming, drilling, milling, bending, and welding. Components of bolted or riveted assemblies shall be galvanized separately before assembly. When it is necessary to straighten any sections after galvanizing, such work shall be performed without damage to the zinc coating. The galvanizer shall be a member of American Galvanizers Association.

B. Components with partial surface finishes shall be commercial blast cleaned prior to pickling.

C. Sampling and testing of each lot shall be performed prior to shipment from the galvanizer’s facility per ASTM A123.

3.02 HARDWARE

A. Iron and steel hardware which is to be galvanized shall be galvanized in accordance with ASTM A153.

3.03 ASSEMBLED PRODUCTS

A. Assembled steel products which are to be galvanized shall be galvanized in accordance with ASTM A123. All edges of tightly contacting surfaces shall be completely sealed by welding before galvanizing.

3.04 SHEETS

A. Iron or steel sheets which are to be galvanized shall be galvanized in accordance with ASTM A924.

3.05 REPAIR OF GALVANIZING

A. Galvanized surfaces that are abraded or damaged at any time after the application of zinc coating shall be repaired by thoroughly wire brushing the damaged areas and removing all loose and cracked coating, after which the cleaned areas shall be painted with two (2) coats of zinc-rich paint meeting the requirements of Federal Specification DOD-P-21035A and shall be thoroughly mixed prior to application. Zinc-rich paint shall not be tinted. The total
thickness of the two (2) coats shall not be less than 6 mils. In lieu of repairing by painting with zinc-rich paint, other methods of repairing galvanized surfaces in accordance with ASTM A780 may be used, provided the proposed method is acceptable to the Engineer.

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SECTION 05050
METAL FASTENING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish all materials, labor, and equipment required to provide all metal welds and
   fasteners not otherwise specified, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05010 – Metal Materials
B. Section 05035 – Galvanizing
C. Section 05061 – Stainless Steel

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work
   herein shall conform to the applicable requirements of the following documents. All
   referenced specifications, codes, and standards refer to the most current issue available
   at the time of Bid.

   1. 2009 International Building Code
   2. AC 193 Acceptance Criteria for Mechanical Anchors in
      Concrete Elements
   3. AC 308 Acceptance Criteria for Post-Installed Adhesive
      Anchors in Concrete Elements
   4. ACI 318 Building Code Requirements for Structural
      Concrete
   5. ACI 355.2 Qualifications of Post-Installed Mechanical Anchors in
      Concrete
   6. ACI 355.4 Qualifications of Post-Installed Adhesive Anchors in
      Concrete
   7. AISC 348 The 2009 RCSC Specification for Structural Joints
   8. AISC Code of Standard Practice
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<td>25</td>
<td>ASTM F1554 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength</td>
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### 1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:
1. Shop Drawings providing the fastener’s manufacturer and type and certification of the fastener’s material and capacity

2. Manufacturer’s installation instructions

3. Copy of valid certification for each person who is to perform field welding

4. Certified weld inspection reports, when required

5. Welding procedures

6. Installer qualifications

7. Certification of Installer training

8. Inspection reports

9. Results of anchor proof testing

1.05 QUALITY ASSURANCE

A. Fasteners not manufactured in the United States shall be tested and certification provided with respect to specified quality and strength standards. Certifications of origin shall be submitted for all U.S. fasteners supplied on the project.

B. Installer Qualifications: Drilled-in anchors shall be installed by an Installer with at least three years of experience performing similar installations. Installer shall be certified as an Adhesive Anchor Installer in accordance with ACI-CRSI Adhesive Anchor Installation Certification Program.

C. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer’s representative for the Installer on the project. Training shall consist of a review of the complete installation process for drilled-in anchors, to include but not be limited to the following:

1. Hole drilling procedure

2. Hole preparation and cleaning technique

3. Adhesive injection technique and dispenser training/maintenance

4. Rebar doweling preparation and installation

5. Proof loading/torquing

D. All steel welding shall be performed by welders certified in accordance with AWS D1.1. All aluminum welding shall be performed by welders certified in accordance with AWS D1.2. All stainless steel welding shall be performed by welders certified in
accordance with AWS D1.6. Certifications of field welders shall be submitted prior to performing any field welds.

E. Welds and high strength bolts used in connections of structural steel will be visually inspected in accordance with Article 3.04.

F. The Owner may engage an independent testing agency to perform testing of welded connections and to prepare test reports in accordance with AWS. Inadequate welds shall be corrected or redone and retested to the satisfaction of the Engineer and/or an acceptable independent testing laboratory, at no additional cost to the Owner.

G. Provide a welding procedure for each type and thickness of weld. For welds that are not prequalified, include a Performance Qualification Report. The welding procedure shall be given to each welder performing the weld. The welding procedure shall follow the format in Annex E of AWS D1.1 with relevant information presented.

PART 2 -- PRODUCTS

2.01 ANCHOR RODS (ANCHOR BOLTS)

A. Anchor rods shall conform to ASTM F1554 Grade 36 except where stainless steel or other approved anchor rods are shown on the Drawings. Anchor rods shall have hexagonal heads and shall be supplied with hexagonal nuts meeting the requirements of ASTM A563 Grade A.

B. Where anchor rods are used to anchor galvanized steel or are otherwise specified to be galvanized, anchor rods and nuts shall be hot-dip galvanized in accordance with ASTM F1554.

C. Where pipe sleeves around anchor rods are shown on the Drawings, pipe sleeves shall be cut from Schedule 40 PVC plastic piping meeting the requirements of ASTM D1785.

2.02 HIGH STRENGTH BOLTS

A. High strength bolts and associated nuts and washers shall be in accordance with ASTM A325 or ASTM A490. Bolts, nuts and washers shall meet the requirements of AISC 348 “The 2009 RCSC Specification for Structural Joints”.

B. Where high strength bolts are used to connect galvanized steel or are otherwise specified to be galvanized, bolts, nuts, and washers shall be hot-dip galvanized in accordance with ASTM A325.

2.03 STAINLESS STEEL BOLTS

A. Stainless steel bolts shall conform to ASTM F593. All underwater fasteners, fasteners in confined areas containing fluid, and fasteners in corrosive environments shall be Type 316 stainless steel unless noted otherwise. Fasteners for aluminum and stainless steel
members not subject to the previously-listed conditions shall be Type 304 stainless steel unless otherwise noted.

B. Stainless steel bolts shall have hexagonal heads with a raised letter or symbol on the bolts indicating the manufacturer and shall be supplied with hexagonal nuts meeting the requirements of ASTM F594. Nuts shall be of the same alloy as the bolts.

2.04 CONCRETE ANCHORS

A. General

1. Where concrete anchors are called for on the Drawings, one of the following types listed shall be used, except where one of the following types listed is specifically called for on the Drawings, only that type shall be used. The determination of anchors equivalent to those listed as follows shall be on the basis of test data performed by an approved independent testing laboratory. There are two types used:

   a. Expansion anchors shall be mechanical anchors of the wedge, sleeve, drop-in or undercut type.

   b. Adhesive anchors shall consist of threaded rods or bolts anchored with an adhesive system into hardened concrete. Adhesive anchors shall be two part injection type using the manufacturer’s static mixing nozzle and shall be supplied as an entire system.

2. Expansion anchors shall not be used to hang items from above or in any other situations where direct tension forces are induced in anchor.

3. Unless otherwise noted, all concrete anchors which are submerged or are used in hanging items or have direct tension induced upon them, or which are subject to vibration from equipment such as pumps and generators, shall be adhesive anchors.

4. Adhesive anchors shall conform to the requirements of ACI 355.4 or alternately to AC 308. Expansion or mechanical anchors shall conform to the requirements of ACI 355.2 or alternately to AC 193. Anchors in Seismic Design Categories C through F shall conform to IBC 2009 1908.1.9 as applicable, including seismic test requirements in accordance with ASTM E488.

5. Fire Resistance: All anchors installed within fire resistant construction shall either be enclosed in a fire-resistant envelope, be protected by approved fire-resistive materials, be used to resist wind and earthquake loads only, or anchor non-structural elements.

B. Concrete Anchor Design:
An anchor design consists of specifying anchor size, quantity, spacing, edge distance and embedment to resist all applicable loads. Where an anchor design is indicated on the Drawings, it shall be considered an engineered design and anchors shall be installed to the prescribed size, spacing, embedment depth and edge distance. If all parts of an anchor design are provided on the Drawings except embedment depth, the anchors will be considered an engineered design and the Contractor shall provide the embedment depth as indicated in Paragraph B.3 unless otherwise directed by the Engineer. Where an anchor design is not indicated by the Engineer on the Drawings, the Contractor shall provide the anchor design per the requirements listed as follows.

1. **Structural Anchors**: All concrete anchors shall be considered structural anchors if they transmit load between structural elements; transmit load between non-structural components that make up a portion of the structure and structural elements; or transmit load between life-safety related attachments and structural elements. Examples of structural concrete anchors include but are not limited to column anchor bolts, anchors supporting non-structural walls, sprinkler piping support anchors, anchors supporting heavy, suspended piping or equipment, anchors supporting barrier rails, etc. For structural anchors, the Contractor shall submit an engineered design with signed and sealed calculations performed by an Engineer currently registered in the State of Alabama. Structural anchors shall be of a type recommended by the anchor manufacturer for use in cracked concrete and shall be designed by the Contractor in accordance with ACI 318 Appendix D.

2. **Non-Structural Anchors**: All other concrete anchors may be considered non-structural concrete anchors. The Contractor shall perform an engineered design for non-structural anchors. The Engineer may request the Contractor provide anchor design details for review, but submission of a signed, sealed design is not required. Non-structural anchors shall be designed by the contractor for use in uncracked concrete.

3. Minimum anchor embedment shall be as indicated on the Drawings or determined by the Contractor’s engineered design. Concrete anchors shall be embedded no less than the manufacturer’s standard embedment (expansion or mechanical anchors) or to provide a minimum allowable bond strength equal to the allowable yield capacity of the rod/bolt (adhesive anchors).

C. **Structural Anchors**:

1. **Mechanical Anchors**:

   a. **Wedge Anchors**: Wedge anchors shall be Kwik Bolt TZ by Hilti, Inc., TruBolt + by ITW Redhead, Strong-Bolt or Strong-Bolt 2 by Simpson Strong-Tie Co., or Powerstud SD-1 or Powerstud SD-2 by Powers Fasteners.

   b. **Screw Anchors**: Screw anchors shall be Kwik HUS-EZ or KWIK HUS-EZ-II by Hilti, Inc., Titen HD by Simpson Strong-Tie Co., or Wedge-Bolt + by
Powers Fasteners. Bits specifically provided by manufacturer of chosen system shall be used for installation of anchors.

c. **Sleeve Anchors:** Sleeve anchors shall be HSL-3 Heavy Duty Sleeve Anchor by Hilti, Inc. or Power-Bolt + by Powers Fasteners.

d. **Undercut Anchors:** Undercut anchors shall be HDA Undercut Anchor by Hilti, Inc., Torq-Cut Undercut Anchor by Simpson Strong-Tie Co., or Atomic + Undercut Anchor by Powers Fasteners.

2. **Adhesive Anchors:**


b. Structural adhesive anchor systems shall be IBC compliant and capable of resisting short term wind and seismic loads (Seismic Design Categories A through F) as well as long-term and short-term sustained static loads in both cracked and uncracked concrete in all Seismic Design Categories. Structural adhesive anchor systems shall comply with the latest revision of ICC-ES Acceptance Criteria AC308, and shall have a valid ICC-ES report in accordance with the applicable building code. **No or equal products will be considered unless prequalified and approved by the Engineer and Owner.**

D. **Non-Structural Anchors:** In addition to the acceptable non-structural anchors listed as follows, all structural anchors previously listed may also be used as non-structural anchors.

1. **Mechanical Anchors:**

a. **Wedge Anchors:** Wedge anchors shall be Kwik Bolt 3 by Hilti, Inc. or TruBolt by ITW Redhead.

b. **Screw Anchors:** Screw anchors shall be Kwik HUS by Hilti, Inc., Wedge-Bolt by Powers Fasteners, or Large Diameter Tapcon (LDT) Anchor by ITW Redhead. Bits specifically provided by manufacturer of chosen system shall be used for installation of anchors.

c. **Sleeve Anchors:** Sleeve anchors shall be HSL Heavy Duty Sleeve Anchors by Hilti, Inc., Power-Bolt by Powers Fasteners, or Dynabolt Sleeve Anchor by ITW Redhead.

d. **Drop-In Anchors:** Drop-in anchors shall be Drop-In by Simpson Strong-Tie Co., HDI Drop-In Anchor by Hilti, Inc., or Multi-Set II Drop-In Anchor by ITW Redhead.
e. **Undercut Anchors:** Undercut anchors shall be HDA Undercut Anchor by Hilti, Inc or equal.

2. **Adhesive Anchors:**

   a. Adhesive anchors shall be Epcon A7 or Epcon C6 by ITW Redhead, HIT-HY 200 by Hilti, Inc., SET Epoxy Tie or AT by Simpson Strong-Tie Co., or Powers AC 100+ Gold or T308+ Epoxy by Powers Fasteners.

   b. Non-structural adhesive anchors systems shall be IBC compliant and capable of resisting short-term wind and seismic (Seismic Design Categories A and B) as well as long term and short term sustained static loads in uncracked concrete.

   c. Non-structural adhesive anchor embedment depth of the rod/bolt shall provide a minimum allowable bond strength that is equal to the allowable yield capacity of the rod/bolt unless noted otherwise on the Drawings.

   d. No or equal products will be considered unless prequalified and approved by the Engineer and Owner.

E. **Concrete Anchor Rod/Bolt Materials:**

   1. Concrete anchors used to anchor structural steel shall be a threaded steel rod per manufacturer’s recommendations for proposed adhesive system, but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted otherwise. Where steel to be anchored is galvanized, concrete anchors shall also be galvanized unless otherwise indicated on the Drawings.

   2. Concrete anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater concrete anchors shall be Type 316 stainless steel.

   3. Nuts, washers, and other hardware shall be of a material to match the anchors.

2.05 **MASONRY ANCHORS**

A. Anchors for fastening to solid or grout-filled masonry shall be adhesive anchors as previously specified herein for concrete anchors.

B. Anchors for fastening to hollow masonry or brick shall be adhesive anchors consisting of threaded rods or bolts anchored with an adhesive system dispensed into a screen tube inserted into the masonry. The adhesive system shall use a two-component adhesive mix and shall inject into the screen tube with a static mixing nozzle. Thoroughly clean drill holes of all debris and drill dust with nylon (not wire) brush prior to installation of adhesive and anchor. Contractor shall follow manufacturer’s installation instructions. The adhesive system shall be Epcon System A7 or C6 as manufactured by ITW Ramset/Redhead, HIT HY-70 System as manufactured by Hilti, Inc., SET Epoxy-Tie or
AT Acrylic-Tie as manufactured by Simpson Strong-Tie Co., or AC100+ Gold by Powers Fasteners.

C. Masonry anchors used to anchor steel shall be a threaded steel rod per manufacturer's recommendations for proposed adhesive system, but shall not have a yield strength (fy) less than 58 ksi nor an ultimate strength (fu) less than 72.5 ksi, unless noted otherwise. Where steel to be anchored is galvanized, masonry anchors shall also be galvanized.

D. Masonry anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater anchors shall be Type 316 stainless steel.

2.06 WELDS

A. Electrodes for welding structural steel and all ferrous steel shall comply with AWS Code, using E70 series electrodes for shielded metal arc welding (SMAW), or F7 series electrodes for submerged arc welding (SAW).

B. Electrodes for welding aluminum shall comply with the Aluminum Association Specifications and AWS D1.2.

C. Electrodes for welding stainless steel and other metals shall comply with AWS D1.6.

2.07 WELDED STUD CONNECTORS

A. Welded stud connectors shall conform to the requirements of AWS D1.1 Type C.

2.08 EYEBOLTS

A. Eyebolts shall conform to ASTM A489 unless noted otherwise.

2.09 HASTELLOY FASTENERS

A. Hastelloy fasteners and nuts shall be constructed of Hastelloy C-276.

2.10 ANTISEIZE LUBRICANT

A. Antiseize lubricant shall be C5-A Anti-Seize by Loctite Corporation, Molykote P-37 Anti-Seize Paste by Dow Corning, or 3M Anti-Seize by 3M.

PART 3 -- EXECUTION

3.01 MEASUREMENTS

A. The Contractor shall verify all dimensions and review the Drawings and shall report any discrepancies to the Engineer for clarification prior to starting fabrication.

3.02 ANCHOR INSTALLATION
A. Anchor Rods, Concrete Anchors, and Masonry Anchors

1. Anchor rods shall be installed in accordance with AISC "Code of Standard Practice" by setting in concrete while it is being placed and positioned by means of a rigidly held template. Overhead adhesive anchors, and base plates or elements they are anchoring, shall be shored as required and securely held in place during anchor setting to prevent movement during anchor installation. Movement of anchors during curing is prohibited.

2. The Contractor shall verify that all concrete and masonry anchors have been installed in accordance with the manufacturer's recommendations and that the capacity of the installed anchor meets or exceeds the specified safe holding capacity.

3. Concrete anchors shall not be used in place of anchor rods without Engineer's approval.

4. All stainless steel threads shall be coated with antiseize lubricant.

B. High Strength Bolts

1. All bolted connections for structural steel shall use high strength bolts. High strength bolts shall be installed in accordance with AISC 348 "The 2009 RCSC Specification for Structural Joints". All bolted joints shall be Type N, snug-tight, bearing connections in accordance with AISC Specifications unless noted otherwise on the Drawings.

C. Concrete Anchors

1. Concrete at time of anchor installation shall be a minimum age of 21 days.

2. Concrete anchors designed by the Contractor shall be classified as structural or non-structural based on the requirements previously indicated.

3. Concrete Anchor Testing:
   a. At all locations where concrete anchors meet the requirements for structural anchors at least 25 percent of all concrete anchors installed shall be proof tested to the value indicated on the Drawings, with a minimum of one tested anchor per anchor group. If no test value is indicated on the Drawings but the installed anchor meets the requirements for structural anchors, the Contractor shall notify the Engineer to allow verification of whether anchor load proof testing is required.
b. Contractor shall submit a plan and schedule indicating locations of anchors to be tested, load test values and proposed anchor testing procedure (including a diagram of the testing equipment proposed for use) to the Engineer for review prior to conducting any testing. Testing of anchors shall be in accordance with ASTM E488 for the static tension test. If additional tests are required, inclusion of these tests shall be as stipulated on Contract Drawings.

c. Where Contract Documents indicate anchorage design to be the Contractor’s responsibility and the anchors are considered structural per the previously-listed criteria, the Contractor shall submit a plan and schedule indicating locations of anchors to be proof tested and load test values, sealed by a Professional Engineer currently registered in the State of Alabama. The Contractor’s engineer shall also submit documentation indicating the Contractor’s testing procedures have been reviewed and the proposed procedures are acceptable. Testing procedures shall be in accordance with ASTM E488.

d. Concrete anchors shall have no visible indications of displacement or damage during or after the proof test. Concrete cracking in the vicinity of the anchor after loading shall be considered a failure. Anchors exhibiting damage shall be removed and replaced. If more than 5 percent of tested anchors fail, then 100 percent of anchors shall be proof tested.

e. Proof testing of concrete anchors shall be performed by an independent testing laboratory hired directly by the Contractor and approved by the Engineer. The Contractor shall be responsible for costs of all testing, including additional testing required due to previously failed tests.

4. All concrete anchors shall be installed in strict conformance with the manufacturer’s printed installation instructions. A representative of the manufacturer shall be on site when required by the Engineer.

5. All holes shall be drilled with a carbide bit unless otherwise recommended by the manufacturer. No cored holes shall be allowed unless specifically approved by the Engineer. If coring holes is allowed by the manufacturer and approved by the Engineer, cored holes shall be roughened in accordance with manufacturer requirements. Thoroughly clean drill holes of all debris and drill dust with compressed air followed by a wire brush prior to installation of adhesive and threaded rod/bolt unless otherwise recommended by the manufacturer. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Where depth of hole exceeds the length of the static mixing nozzle, a plastic extension hose shall be used to ensure proper adhesive injection from the back of the hole. Injection of adhesive into the hole shall utilize a piston plug to minimize the formation of air pockets. Wipe rod free from oil that may be present from shipping or handling.

D. Other Bolts
1. All dissimilar metal shall be connected with appropriate fasteners and shall be insulated with a dielectric or approved equal.

2. All stainless steel bolts shall be coated with antiseize lubricant.

3.03 WELDING

A. All welding shall comply with AWS Code for procedures, appearance, quality of welds, qualifications of welders and methods used in correcting welded work.

B. Welded stud connectors shall be installed in accordance with AWS D1.1.

3.04 INSPECTION

A. High strength bolting will be visually inspected in accordance with AISC 348 "The 2009 RCSC Specification for Structural Joints". Rejected bolts shall be either replaced or retightened as required.

B. Field welds will be visually inspected in accordance with AWS Codes. Inadequate welds shall be corrected or redone as required in accordance with AWS Codes.

C. Post-installed concrete anchors shall be inspected as required by ACI 318.

3.05 CUTTING OF EMBEDDED REBAR

A. The Contractor shall not cut embedded rebar cast into structural concrete during installation of post-installed fasteners without prior approval of the Engineer.

- END OF SECTION -
PART 1 -- GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish, install and erect the stainless steel work as shown on the Contract Drawings and specified herein.

B. Stainless steel work shall be furnished complete with all accessories, mountings and appurtenances of the type of stainless steel and finish as specified or required for a satisfactory installation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals

B. Section 05010 – Metal Materials

C. Section 05050 – Metal Fastening

D. Section 05500 – Metal Fabrications

1.03 REFERENCES

A. ASTM A193 - Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

B. ASTM A194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.

C. ASTM A262 - Practice for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steel.

D. ASTM A276 - Stainless and Heat-Resisting Steel Bars and Shapes.

E. ASTM A314 - Stainless and Heat-Resisting Steel Billets and Bars for Forging.

F. ASTM A380 - Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems.

G. ASTM A473 - Stainless and Heat-Resisting Steel Forgings.

H. ASTM A666 - Austenitic Stainless Steel, Sheet, Strip, Plate and Flat Bar.

I. ASTM A774 - Stainless Steel Pipe Fittings
J. ASTM A778 - Stainless Steel Pipe
K. ASTM F593 - Stainless Steel Bolts, Hex Cap Screws and Studs.
L. ASTM F594 - Stainless Steel Nuts.
M. ANSI/ASME B1.1 - Unified Inch Screw Thread (UN and UNR Thread Form).

1.04 TESTS

A. All stainless steel materials including stainless test welds, shall be checked for compliance with tests for susceptibility to intergranular attack. Such tests shall be Practices A, B and E of ASTM A262. Detailed procedures for the tests shall be submitted to the Engineer for approval prior to start of work. Practice A shall be used only for acceptance of materials but not for rejection of materials, and shall be used for screening material intended for testing in Practice B and Practice E. The maximum acceptable corrosion rate under Practice B shall be 0.004 inch per month, rounded off to the third decimal place. If the certified mill report indicates that such test has been satisfactorily performed, the fabricator may not be required to repeat the test. Material passing Practice E shall be acceptable.

B. Sample selection for the susceptibility to intergranular attack tests shall be as follows:

1. One (1) sample per heat treatment lot for plates and forgings
2. One (1) sample per each Welding Procedure Qualification regardless of the joint design
3. If tests indicate a reduction in corrosion resistance, welding procedure shall be adjusted or heat treatment determined as needed to restore required corrosion resistance.
4. The samples so chosen shall have received all the post-weld heat treatments identical to the finished part.

1.05 SUBMITTALS

A. The Contractor shall prepare and submit for approval shop drawings for all stainless steel fabrication in accordance with Section 01300 – Submittals.

B. Submittals shall include, but not be limited to, the following:

1. Certified test reports for susceptibility to intergranular attack
2. Affidavit of compliance with type of stainless steel shown on the Contract Drawings or specified herein
3. Certified weld inspection reports
4. Cleaning and handling of stainless steel in accordance with Article 3.04 – Cleaning and Handling

C. Samples of finish on each type of stainless steel to be furnished shall be submitted to the Engineer upon request.

1.06 QUALITY ASSURANCE

A. Shop inspections may be made by the Engineer. The Contractor shall give ample notice to the Engineer prior to the beginning of any stainless steel fabrication work so that inspection may be provided. The Contractor shall furnish all facilities for the inspection of materials and workmanship in the shop, and the inspectors shall be allowed free access to the necessary parts of the works.

B. Inspectors shall have the authority to reject any materials or work which does not meet the requirements of the Contract Drawings or the Specifications.

C. Inspection at the shop is intended as a means of facilitating the work and avoiding errors, but is expressly understood that it will in no way relieve the Contractor from his responsibility for furnishing proper materials or workmanship.

1.07 HANDLING, STORAGE AND DELIVERY

A. Mechanical damage (e.g., scratches and gouges) to the stainless steel material shall not be permitted and is cause for rejection. Care shall be taken in the material handling since such mechanical damage will result in the passive oxide film being "punctured" leading to a possible lower resistance to the initiation of corrosion than the surrounding chemically-passivated surface.

B. Stainless steel plates and sheets shall be stored vertically in racks and not be dragged out of the racks or over one another. Racks shall be protected to prevent iron contamination.

C. Heavy stainless steel plates shall be carefully separated and chocked with wooden blocks so that the forks of a fork-lift could be inserted between plates without mechanically damaging the surface.

D. Stainless steel plates and sheets laid out for use shall be off the floor and be divided by wooden planks to prevent surface damage and to facilitate subsequent handling.

E. Plate clamps, if used, shall be used with care as the serrated faces can dig in, indent and gouge the surface.

F. Stainless steel fabrications shall be loaded in such a manner that they may be transported and unloaded without being overstressed, deformed or otherwise damaged.

G. Stainless steel fabrications and packaged materials shall be protected from corrosion and deterioration and shall be stored in a dry area. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with approved effective and durable covers.
H. Stainless steel fabrications shall not be placed in or on a structure in a manner that might cause distortion or damage to the fabrication. The Contractor shall repair or replace damaged stainless steel fabrications or materials as directed by the Engineer.

1.08 FIELD MEASUREMENTS

A. The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of the work.

B. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

PART 2 -- PRODUCTS

2.01 MATERIALS AND FINISHES

A. Stainless steel shall be Type 304 unless it is used for underwater service. Stainless steel for underwater service shall be Type 316. Minimum mechanical finish shall be No. 4 as stated in Table 2 unless otherwise noted on the Contract Drawings.

B. The basic mill forms (sheet, strip, plate and bar) are classified by size as shown on Table 1. Tables 2, 3 and 4 identify finishes and conditions in which sheet, bar and plate are available.

C. Tables 2, 3 and 4 show numbered finishes and conditions for sheet, bar and plate. While there are no specific designations for polished finishes on bar or plate, the sheet finish designations are used to describe the desired effect. This also applies to finishes on ornamental tubing.

D. There are three standard finishes for strip, which are broadly described by the finishing operations employed:

1. No. 1 Strip Finish is approximately the same as No. 2D Sheet Finish. It varies in appearance from dull gray matte to a fairly reflective surface, depending largely on alloy composition and amount of cold reduction.

2. No. 2 Strip Finish is approximately the same as a No. 2B sheet finish. It is smoother, more reflective than No. 1, and likewise varies with alloy composition.

3. Bright annealed finish is a highly reflective finish that is retained by final annealing in a controlled atmosphere furnace.
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Thickness</td>
</tr>
<tr>
<td>Sheet</td>
<td>Coils and cut length:</td>
<td>under 3/16”</td>
</tr>
<tr>
<td></td>
<td>Mill finishes Nos. 1, 2D and 2B</td>
<td>under 3/16”</td>
</tr>
<tr>
<td></td>
<td>Polished finishes Nos. 3, 4, 6, 7 &amp; 8</td>
<td>--</td>
</tr>
<tr>
<td>Strip</td>
<td>Cold finished, coils or cut lengths</td>
<td>under 3/16”</td>
</tr>
<tr>
<td></td>
<td>Polished finishes Nos. 3, 4, 6, 7 &amp; 8</td>
<td>under 3/16”</td>
</tr>
<tr>
<td>Plate</td>
<td>Flat rolled or forged</td>
<td>3/16” and over</td>
</tr>
<tr>
<td>Bar</td>
<td>Hot finished rounds, squares, octagons and hexagons</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Hot finished flats</td>
<td>1/8” to 8” incl.</td>
</tr>
<tr>
<td></td>
<td>Cold finished rounds, squares, octagons and hexagons</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Cold finished flats</td>
<td>1/8” to 4-1/2”</td>
</tr>
<tr>
<td>Wire</td>
<td>Cold finishes only: (in coil)</td>
<td>under 3/16”</td>
</tr>
<tr>
<td>Pipe &amp;</td>
<td>Round, square, octagon, hexagon and flat wire</td>
<td>under 3/16”</td>
</tr>
<tr>
<td>Tubing</td>
<td>Several different classifications, with differing specifications, are available.</td>
<td>--</td>
</tr>
<tr>
<td>Extrusion</td>
<td>Not considered “standard” shapes. Currently limited in size to approximately 6-1/2” diameter or structural.</td>
<td>--</td>
</tr>
</tbody>
</table>
## Table 2

### Standard Mechanical Sheet Finishes

<table>
<thead>
<tr>
<th><strong>Unpolished or Rolled Finishes:</strong></th>
<th><strong>Polished Finishes:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. 1</strong> A rough dull surface which results from hot rolling to the specified thickness followed by annealing and descaling.</td>
<td><strong>No. 4</strong> A polished surface obtained by finishing with a 120-150 mesh abrasive, following initial grinding with coarser abrasives. This is a general purpose bright finish with a visible &quot;grain&quot; which prevents mirror reflection.</td>
</tr>
<tr>
<td><strong>No. 2D</strong> A dull finish which results from cold rolling followed by annealing and descaling, and may perhaps get a final light roll pass through unpolished rolls. A 2D finish is used where appearance is of no concern.</td>
<td><strong>No. 6</strong> A dull satin finish having lower reflectivity than No. 4 finish. It is produced by Tampico brushing the No. 4 finish in a medium of abrasive and oil. It is used for architectural applications and ornamentation where a high luster is undesirable, and to contrast with brighter finishes.</td>
</tr>
<tr>
<td><strong>No. 2B</strong> A bright cold-rolled finish resulting in the same manner as No. 2D finish, except that the annealed and descaled sheet receives a final light roll pass through polished rolls. This is the general purpose cold-rolled finish that can be used as is, or as a preliminary step to polishing.</td>
<td><strong>No. 7</strong> A high reflective finish that is obtained by buffing finely ground surfaces but not to the extent of completely removing the &quot;grit&quot; lines. It is used chiefly for architectural and ornamental purposes.</td>
</tr>
<tr>
<td><strong>Polished Finishes:</strong></td>
<td><strong>No. 8</strong> The most reflective surface, which is obtained by polishing with successively finer abrasives and buffing extensively until all grit lines from preliminary grinding operations are removed. It is used for applications such as mirrors and reflectors.</td>
</tr>
<tr>
<td><strong>No. 3</strong> An intermediate polish surface obtained by finishing with a 100 grit abrasive. Generally used where a semi-finished polished surface is required. A No. 3 finish usually receives additional polishing during fabrication.</td>
<td></td>
</tr>
</tbody>
</table>
Table 3

Conditions and Finishes for Bar

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Surface Finishes¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot worked only</td>
<td>(a) Scale not removed (excluding spot conditioning)</td>
</tr>
<tr>
<td></td>
<td>(b) Rough turned²</td>
</tr>
<tr>
<td></td>
<td>(c) Pickled or blast cleaned and pickled.</td>
</tr>
<tr>
<td>Annealed or otherwise heat treated.</td>
<td>(a) Scale not removed (excluding spot conditioning)</td>
</tr>
<tr>
<td></td>
<td>(b) Rough turned</td>
</tr>
<tr>
<td></td>
<td>(c) Pickled or blast cleaned and pickled</td>
</tr>
<tr>
<td></td>
<td>(d) Cold drawn or cold rolled</td>
</tr>
<tr>
<td></td>
<td>(e) Centerless ground</td>
</tr>
<tr>
<td></td>
<td>(f) Polished</td>
</tr>
<tr>
<td>Annealed and cold worked to high tensile strength³</td>
<td>(d) Cold drawn or cold rolled</td>
</tr>
<tr>
<td></td>
<td>(e) Centerless ground</td>
</tr>
<tr>
<td></td>
<td>(f) Polished</td>
</tr>
</tbody>
</table>

¹ Surface finishes (b), (e) and (f) are applicable to round bars only.

² Bars of the 4xx series stainless steels which are highly hardenable, such as Types 414, 420, 420F, 431, 440A, 440B and 440C, are annealed before rough turning. Other hardenable grades, such as Types 403, 410, 416 and 416Se, may also require annealing depending on their composition and size.

³ Produced in Types 302, 303Se, 304 and 316.
Table 4
Conditions and Finishes for Plate

<table>
<thead>
<tr>
<th>Condition and Finish</th>
<th>Description and Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot rolled</td>
<td>Scale not removed. Not heat treated. Plates not recommended for final use in this condition.(^4)</td>
</tr>
<tr>
<td>Hot rolled, annealed or heat treated</td>
<td>Scale not removed. Use of plates in this condition is generally confined to heat resisting applications. Scale impairs corrosion resistance.(^1)</td>
</tr>
<tr>
<td>Hot rolled, annealed or heat treated, blast cleaned or pickled</td>
<td>Condition and finish commonly preferred for corrosion resisting and most heat resisting applications.</td>
</tr>
<tr>
<td>Hot rolled, annealed, descaled and temper passed</td>
<td>Smoother finish for specialized applications.</td>
</tr>
<tr>
<td>Hot rolled, annealed, descaled cold rolled, annealed, descaled, optionally temper passed</td>
<td>Smooth finish with greater freedom from surface imperfection than previously specified herein.</td>
</tr>
<tr>
<td>Hot rolled, annealed or heat treated, surface cleaned and polished</td>
<td>Polished finishes refer to Table 2.</td>
</tr>
</tbody>
</table>

\(^4\) Surface inspection is not practicable on plates which have not been pickled or otherwise descaled.

PART 3 -- EXECUTION

3.01 FABRICATION

A. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where practicable. Joints exposed to the weather shall be formed to exclude water.

B. As far as practicable, all fabricated units shall be fitted and assembled in the shop, with all cuts and bends made to precision measurements in accordance with details shown on approved shop drawings.

C. Work shall be fabricated so that it is installed in a manner that will provide for expansion and contraction, prevent the shearing of bolts, screws and other fastenings, ensure rigidity, and provide close fitting of sections.

D. All finished and/or machined faces shall be true to line and level. Stainless steel sections shall be well formed to shape and size with sharp lines and angles; curved work shall be sprung evenly to curves.

E. All work shall be fitted together at the shop as far as possible and delivered complete
and ready for erection. Proper care shall be exercised in handling all work so as not to injure the finished surfaces.

3.02 WELDING

A. Welding shall be done in a manner that will prevent buckling and in accordance with Specification 05050 – Metal Fastening, and as modified hereinafter.

B. All welds exposed in the work shall be ground smooth and finished to match the finish of the adjacent stainless steel surfaces.

C. Select weld rods that provide weld filler metal having corrosion resistant properties as nearly identical or better than the base metal to insure preservation of the corrosion-resistant properties. Provide heat treatment at welds where testing of weld procedure indicates it is required to restore the corrosion resistance.

D. Thermal conductivity of stainless steel is about half that of other steels; and the following methods may be used to accommodate this situation:

1. Use lower weld current setting.

2. Use skip-weld techniques to minimize heat concentration.

3. Use back-up chill bars or other cooling techniques to dissipate heat.

E. Edges of the stainless steel to be welded shall be cleaned of contaminants.

3.03 FASTENERS

A. Stainless steel fasteners shall be used for joining stainless steel work.

B. Stainless steel fasteners shall be made of alloys that are equal to or more corrosion resistant than the materials they join.

3.04 CLEANING AND HANDLING

A. All stainless steel surfaces shall be precleaned, descaled, passivated and inspected before, during and after fabrication in accordance with the applicable sections of ASTM A380 and as detailed in the procedures to be submitted to the Engineer for approval prior to start of work. Degreasing and passivation of stainless steel articles shall be conducted as the last step after fabrication.

B. Measures to protect cleaned surfaces shall be taken as soon as final cleaning is completed and shall be maintained during all subsequent handling, storage and shipping.
1. The Contractor shall submit for approval specific procedures listing all the steps to be followed in detecting contamination and in descaling, cleaning, passivation and protecting of all stainless steel.

2. Area showing clear indications of contamination shall be recleaned, repassivated and reinspected.

C. At approved stages in the shop operations, contaminants such as scale, embedded iron, rust, dirt, oil, grease and any other foreign matter shall be removed from the metal, as directed or approved by the Engineer. The adequacy of these operations shall be checked by the Engineer. Operations in the shop shall be conducted so as to avoid contamination of the stainless steel and to keep the metal surfaces free from dirt and foreign matter.

D. In order to prevent incipient corrosion during fabrication, special efforts shall be made at all times to keep all stainless steel surfaces from coming in contact with other metals.

1. Stainless steel and stainless steel welds shall be cleaned with clean sand free of iron, stainless steel wool, stainless steel brushes, or other approved means and shall be protected at all times from contamination by any materials, including carbon steel, that shall impair its resistance to corrosion.

2. Approved methods of cutting, grinding and handling shall be used to prevent contamination. If air-arc, or carbon-arc cutting is used, additional metal shall be removed by approved mechanical means so as to provide clean, weldable edges. All grinding of stainless steel shall be performed with aluminum oxide or silicon carbide grinding wheels bonded with resin or rubber. Grinding wheels used on carbon steel shall not be used on stainless steel.

3. Sand, grinding wheels, brushes and other materials used for cleaning stainless steel shall be checked periodically by the Engineer for contaminants. Cleaning aids found to contain contaminants shall not be used on the work.

3.05 INSTALLATION

A. All stainless steel fabrications shall be erected square, plumb and true, accurately fitted, adequately anchored in place, set at proper elevations and positions.

B. All inserts, anchor rods and all other miscellaneous work specified in the Detailed Specifications or shown on the Contract Drawings or required for the proper completion of the work, which are embedded in concrete, shall be properly set and securely held in position in the forms before the concrete is placed.

C. All stainless steel fabrications shall be installed in conformance with details shown on the Contract Drawings or on the approved shop drawings.

-END OF SECTION -
PART 1 -- GENERAL

1.01 REQUIREMENT

A. Furnish all materials, labor, and equipment required to provide all metal fabrications not specifically included in other Sections, complete and in accordance with the requirements of the Contract Documents.

B. Work shall include but may not be limited to lintels and guard posts.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05010 – Metal Materials

B. Section 05035 – Galvanizing

C. Section 05050 – Metal Fastening

D. Certain specific items are included in other Sections of the Specifications. See the Section for the specific item in question.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. 2009 International Building Code

2. AISC – Specification for Structural Steel Buildings

3. AISI – Specifications for the Design of Cold-Formed Steel Structural Members

4. Aluminum Association Specifications for Aluminum Structures

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:

1. Complete fabrication and erection drawings of all metalwork specified herein
2. Other submittals as required in accordance with Section 05010 – Metal Materials, and Section 05050 – Metal Fastening

PART 2 -- PRODUCTS

2.01 METAL MATERIALS

A. Metal materials used in metal fabrications shall conform to Section 05010 – Metal Materials, unless noted otherwise.

2.02 METAL FASTENING

A. All welds and fasteners used in metal fabrication shall conform to Section 05050 – Metal Fastening, unless noted otherwise.

2.03 GUARD POSTS (BOLLARDS)

A. Guard posts shall be 6-inch diameter, Schedule 40 galvanized steel pipe in accordance with ASTM A53.

B. Guard posts shall be concrete-filled and crowned as detailed on the Drawings.

PART 3 -- EXECUTION

3.01 FABRICATION

A. All measurements and dimensions shall be based on field conditions and shall be verified by the Contractor prior to fabrication. Such verification shall include coordination with adjoining work.

B. All fabricated work shall be shop-fitted together as much as practicable and delivered to the field complete and ready for erection. All miscellaneous items such as stiffeners, fillets, connections, brackets, and other details necessary for a complete installation shall be provided.

C. All work shall be fabricated and installed in a manner that will provide for expansion and contraction; prevent shearing of bolts, screws, and other fastenings; ensure rigidity; and provide a close fit of sections.

D. Finished members shall conform to the lines, angles, and curves shown on the Drawings and shall be free from distortions of any kind.

E. All shearings shall be neat and accurate, with parts exposed to view neatly finished. Flame cutting is allowed only when performed utilizing a machine.
F. All shop connections shall be welded unless otherwise indicated on the Drawings or specified herein. Bolts and welds shall conform to Section 05050 – Metal Fastening. All fastenings shall be concealed where practicable.

G. Fabricated items shall be shop painted when specified in the appropriate Section of the Specifications.

3.02 INSTALLATION

A. Assembly and installation of fabricated system components shall be performed in strict accordance with manufacturer's recommendations.

B. All miscellaneous metalwork shall be erected square, plumb and true, and shall be accurately fitted, adequately anchored in place, and set at proper elevations and positions.

C. Metal work shall be field painted when as specified as directed by the Owner and/or Engineer.

- END OF SECTION -
PART 1 -- GENERAL

1.01 REQUIREMENT
   A. Furnish all materials, labor, and equipment required to provide all castings in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE
   A. Section 02604 – Utility Structures
   B. Section 05010 – Metal Materials

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS
   A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
      1. 2009 International Building Code

1.04 SUBMITTALS
   A. Submit the following in accordance with Section 01300, Submittals.
      1. Complete fabrication and erection drawings of all castings specified herein.
      2. Other submittals as required in accordance with Section 05010 – Metal Materials, and Section 05050 – Metal Fastening.

PART 2 -- PRODUCTS

2.01 METAL MATERIALS
   A. Metal materials used for castings shall conform to Section 05010 – Metal Materials, unless noted otherwise.

2.02 METAL FASTENING
   A. All welds and fasteners used for castings shall conform to Section 05050 – Metal Fastening, unless noted otherwise.
2.03 IRON CASTINGS

A. General - Iron Castings shall include, but not be limited to frames, covers, and grates for trench drains, catch basins, and inlets.

1. Castings shall be of gray iron of uniform quality, free from defects, smooth and well cleaned by shotblasting.

2. Catalog numbers on the Drawings are provided only to show required types and configuration. All covers shall be cast with raised letters as designated on the Drawings.

3. Castings shall be as manufactured by Dewey Brothers, or Neenah Foundry Company.

B. Covers and Grates

1. Covers and grates shall be provided with matching frames. Cover shall fit flush with the surrounding finished surface. The cover shall not rock or rattle when loading is applied.

2. Round covers and frames shall have machined bearing surfaces.

3. Design loadings:
   a. Where located within a structure, a minimum design loading of 300 psf shall be used, unless noted otherwise.
   b. At all locations not within a structure, the design loading shall be a standard AASHTO H-20 truck loading, unless otherwise noted.

C. Watertight gasketing, bolting, locking devices, patterns, lettering, pickholes, vents, or self-sealing features shall be as detailed on the Drawings.

PART 3 -- EXECUTION

3.01 FABRICATION

A. All measurements and dimensions shall be based on field conditions and shall be verified by the Contractor prior to fabrication. Such verification shall include coordination with adjoining work.

B. All fabricated work shall be shop fitted together as much as practicable, and delivered to the field, complete and ready for erection. All miscellaneous items such as stiffeners, fillets, connections, brackets, and other details necessary for a complete installation shall be provided.

C. Finished members shall conform to the lines, angles, and curves shown on the Drawings and shall be free from distortions of any kind.
3.02 INSTALLATION

A. Assembly and installation of fabricated system components shall be performed in strict accordance with manufacturer’s recommendations.

B. All castings shall be erected square, plumb and true, accurately fitted, adequately anchored in place, and set at proper elevations and positions.

- END OF SECTION -
SECTION 05830

BEARING DEVICES AND ANCHORING

PART 1 -- GENERAL

1.01 THE REQUIREMENTS

A. The Contractor shall furnish and install bearing plates, pads, expansion devices, anchor rods and bolts, and/or other devices used in conjunction with bearings and anchoring of bearing devices and assemblies at supports in accordance with this item and in conformity with the Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05010 – Metal Materials

B. Section 05035 – Galvanizing

C. Section 05050 – Metal Fastening

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of these Specifications, all work specified hereunder shall conform to the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

1. RMA Rubber Handbook

A4-F3-T.063-B2, Grade 2, Method B

2. ASTM A240

Standard Specification for Heat Resisting Chromium and Chromium - Nickel Stainless Steel Plate and Sheet

3. ASTM A480

Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip

4. ASTM D395, Method B

Standard Test for Rubber Property – Compression Set

5. ASTM D412

Standard Test for Rubber Properties In Tension

6. ASTM D471

Standard Test for Rubber Property - Effect of Liquids

7. ASTM D573

Standard Test for Rubber-Deterioration In Air Oven
8. ASTM D575, Method A  Standard Test for Rubber Properties In Compression Method A
9. ASTM D624, Die C  Standard Test for Rubber Property - Tear Resistance
10. ASTM D746  Standard Test for Britteness Temperature of Plastics and Elastomers by Impact
11. ASTM D792  Standard Test for Specific Gravity and Density of Plastics by Displacement
12. ASTM D1149  Standard Test for Rubber Deterioration - Surface Ozone Cracking In a Chamber (Flat Specimens)
14. ASTM D2240  Standard Test for Rubber Property - Durometer Hardness
15. ASTM D2256  Standard Test for Breaking Load (Strength) and Elongation of Yarn by the Single-Strand Method
17. ASTM D4895  Standard Specification for PTFE Resin Produced From Dispersion

1.04 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01300 – Submittals:

1. Certification of compliance that the materials furnished under this section meet and conform to the property and physical requirements, including all testing, as stated herein and as referenced. Specifically, the certification shall state compliance with the applicable standards (ASTM, ANSI, etc.) for fabrication and testing.

2. Shop Drawings for all materials, including installation and adjustment instructions. Included with the Shop Drawings shall be all material certifications, mill test results, working drawings, etc., which are required by this and other applicable sections of the Specifications.

PART 2 -- PRODUCTS

2.01 ELASTOMERIC BEARING PADS

A. The elastomer portion of pads shall be new neoprene compound. Pads shall be cast under heat and pressure and may be individually molded or cut from pressure-cast stock.
Variations from the dimensions shown on the Drawings shall not be more than the following:

- thickness, ±1/16 inch
- width, -1/8 to +1/4 inch
- length, -1/8 to +1/4 inch

Tolerances, dimensions, finish and appearance, flash, and rubber-to-metal bonding shall conform to the requirements of A 4-F3-T.063-B2, Grade 2, Method B, in accordance with the RMA Rubber Handbook. Pads shall be furnished in one piece and shall not be laminated unless otherwise specified. Pads shall be furnished in identifiable packages.

B. Adhesive for use with elastomer pads shall be an epoxy-resin compound compatible with the elastomer having a sufficient shear strength to prevent slippage between pads and adjacent bearing surfaces. Adhesive shall be 20°F Contact Cement by Miracle Adhesives Corporation, Neoprene Adhesive 77-198 by IGI Adhesives, Sikodur 31 Hi-Mod Gel by Sika Corporation, or DP-605 NS Urethane Adhesive by 3M Adhesive Systems.

C. Laminated pads shall consist of alternate laminations of elastomer and hot-rolled steel sheets molded together as a unit. Outer metal laminations shall be 3/16 inch, and inner laminations shall be 14 gage. Outer laminations of elastomer shall be 1/4 inch, and inner laminations shall be of equal thickness (at least 3/8 but not more than 1/2 inch), depending on the number of laminations and thickness of the pad. Edges of metal laminations shall have a coverage of approximately 1/8 inch of elastomer. The top and bottom bearing surfaces shall each have an integral sealing rib approximately 1/8 inch in width, in addition to the specified total thickness, and 3/16 inch in width around their peripheries. The bond between the elastomer and metal shall be such that failure shall occur in the elastomer and not between the elastomer and steel when tested for separation. Variations from specified dimensions for individual laminations shall not be more than those specified herein. The total thickness of the complete pad shall not vary more than ±1/8 inch.

D. Material having a nominal durometer hardness of 70 and 50 shall be used for nonlaminated pads and laminated pads, respectively. Test samples will be prepared from finished pads. Samples of each thickness will be taken from 2 full-size pads from each shipment of 300 pads or less, with 1 additional pad for each additional increment of 300 pads or fraction thereof. When tested using the ASTM methods designated, samples shall comply with the following physical requirements.

1. **Original Physical Properties**: Test results for tear resistance, tensile strength, and ultimate elongation shall not be more than 10 percent below the following specified values:

<table>
<thead>
<tr>
<th>Property</th>
<th>Nominal 50</th>
<th>Hardness 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. tear resistance, ASTM D624, Die C (lb/in of thickness)</td>
<td>180</td>
<td>200</td>
</tr>
<tr>
<td>Hardness, ASTM D2240 (points)</td>
<td>50±5</td>
<td>70±5</td>
</tr>
<tr>
<td>Min. tensile strength, ASTM D412</td>
<td>2,500</td>
<td>2,500</td>
</tr>
<tr>
<td>(average psi of longitudinal and transverse)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. ultimate elongation (%)</td>
<td>400</td>
<td>300</td>
</tr>
</tbody>
</table>
The compressive deflection tested in accordance with ASTM D575, Method A, shall be as follows:

a. **Laminated Pads:** The maximum compression deflection shall be 5 and 7 percent of the total rubber thickness at loads of 500 and 800 pounds per square inch, respectively. The maximum shear resistance shall be 50 pounds per square inch of the plan area at 25 percent shear deformation at -20°F. Test pads shall be subjected to a compressive load of 1.5 times the maximum design load without visible damage to the bearing.

b. **Nonlaminated Pads:** When loaded within 300 to 800 pounds per square inch, material shall show a compressive deflection within 20 percent of that given in the charts of Method A, interpolating for actual measured hardness.

2. **Changes in Original Physical Properties:** When pads are oven aged 70 hours at 212°F in accordance with ASTM D573, changes shall not be more than the following:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardness (points change)</td>
<td>0 to +15</td>
</tr>
<tr>
<td>Tensile strength (% change)</td>
<td>±15</td>
</tr>
<tr>
<td>Ultimate elongation (% change)</td>
<td>-40</td>
</tr>
</tbody>
</table>

3. **Extreme Temperature Characteristics:** Compression set under constant deflection, ASTM D395, Method B, 22 hours at 212°F, shall not be more than 35 percent. With the low-temperature brittleness test, ASTM D746, breaks shall not occur above -20°F.

4. **Ozone Cracking Resistance:** Upon exposure to 100 parts per million of ozone in air by volume at a strain of 20 percent and a temperature of 100±2°F in a test otherwise in accordance with ASTM D1149, cracks shall not develop within 100 hours. Samples shall be wiped with solvent before the test to remove traces of surface impurities.

5. **Oil Swell:** The volume change shall not be more than +120 percent when tested in accordance with ASTM D471 with ASTM Oil No. 3, 70 hours at 212°F.

2.02 **TFE BEARING SURFACES**

A. TFE resin shall be virgin material conforming to the requirements of ASTM D4894 or D4895. The specific gravity shall be 2.13 to 2.19. The melting point shall be 623±2°F.

B. Filler material shall be milled glass fibers, carbon, or other approved inert filler materials.

C. Adhesive material shall be an epoxy resin conforming to FS MMM-A-134, FEB film, or equal.
D. When tested in accordance with ASTM D4894 or D4895, finished unfilled TFE sheets shall have a tensile strength of at least 2,800 pounds per square inch and an elongation of at least 200 percent.

E. Filled TFE sheets shall contain inert filler material uniformly blended with TFE resin. Finished filled TFE sheets containing glass fiber or carbon shall conform to the following:

<table>
<thead>
<tr>
<th>ASTM Method</th>
<th>15% Glass Fibers</th>
<th>25% Carbon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. tensile strength</td>
<td>D4894/D4895</td>
<td>2,000 psi</td>
</tr>
<tr>
<td>Min. elongation</td>
<td>D4894/D4895</td>
<td>150%</td>
</tr>
<tr>
<td>Min. specific gravity</td>
<td>D792</td>
<td>2.20</td>
</tr>
<tr>
<td>Melting point</td>
<td>D4894/D4895</td>
<td>327±10°C</td>
</tr>
</tbody>
</table>

F. Fabric containing TFE fibers shall be manufactured from oriented multifilament TFE fluorocarbon fibers and other fibers as required by specific designs. When tested in accordance with ASTM D2256, the tensile strength of TFE fibers shall be at least 24,000 pounds per square inch and the elongation shall be at least 75 percent.

G. Where TFE sheets are to be epoxy bonded, one surface of the sheet shall be factory treated by an approved manufacturer using the sodium naphthalene or sodium ammonia process.

H. Stainless steel mating surfaces shall be at least 16 gage in thickness and shall conform to the requirements of ASTM A240, Type 304. The mating surface shall be a true plane surface with a Brinnell hardness of at least 125 and a surface finish of an at least No. 8 mirror finish in accordance with ASTM A480. Stainless steel mating surfaces shall be polished or rolled as necessary to conform to the friction requirements specified herein. The stainless steel shall be attached to the sole plate by means of a seal weld around the entire perimeter of the facing material.

I. The coefficient of friction for the completed bearing assembly shall not be more than the following:

<table>
<thead>
<tr>
<th>Material</th>
<th>Bearing Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500 psi (3.447 MPa)</td>
</tr>
<tr>
<td>Unfilled TFE, fabric containing TFE fibers, TFE perforated metal composite</td>
<td>0.08</td>
</tr>
<tr>
<td>Filled TFE</td>
<td></td>
</tr>
<tr>
<td>Interlocked bronze and filled TFE structures</td>
<td>0.10</td>
</tr>
</tbody>
</table>

2.03 PREFORMED FABRIC BEDDING MATERIAL
A. Material shall be composed of multiple layers of 8-ounce cotton duck impregnated and bound with high-quality natural rubber or its equivalent and equally suitable materials compressed into resilient pads of uniform thickness. The number of plys shall be such as to produce the specified thickness after compression and vulcanizing. Finished pads shall withstand compression loads perpendicular to the plane of the laminations of at least 10,000 pounds per square inch without a detrimental reduction in thickness or extrusion.

2.04 ANCHOR RODS
A. Anchor bolts shall be as specified in Section 05050 – Metal Fastening.

2.05 PIPE SLEEVES AND COLLARS
A. Pipe sleeves and collars shall be cut from Schedule 40 PVC pipe meeting the requirements of ASTM D1785, unless otherwise noted on the Drawings.

PART 3 -- EXECUTION

3.01 STEEL PLATES, SHAPES, AND BARS
A. Unless galvanizing is indicated on the Drawings, items shall be painted in accordance with the Drawings and as directed by the Owner and/or Engineer.
B. If galvanizing is indicated on the Drawings, steel bearing assemblies for both structural steel beams and girders and prestressed concrete members shall be galvanized as specified in Section 05035 – Galvanizing. Except for attachments of bearing plates to beams, all fabrication and welding of bearing plate assemblies shall be performed before the steel is galvanized. All joints of welded parts shall be sealed with weld material. Welds made for attaching bearing plates to beams or girders shall be cleaned and given 2 coats of zinc rich paint having a minimum total coating thickness of 3 mils.

3.02 BRONZE PLATES
A. Sliding surfaces of bronze plates shall be polished.

3.03 COPPER-ALLOY PLATES
A. Finishing of rolled copper-alloy plates will not be required provided their surfaces are plane, true, and smooth.

3.04 SELF-LUBRICATING PLATES
A. Plates shall be fabricated from cast bronze or rolled copper alloy.
B. Sliding surfaces of plates shall be provided with annular grooves or cylindrical recesses or a combination thereof, which shall be filled with a lubricating compound. The lubricating compound shall be compressed into recesses under sufficient pressure to form a nonplastic lubricating inset. The inset shall comprise at least 25 percent of the total area of the plate.
The frictional coefficient shall not be more than 0.10. The compound shall be free from material that will cause abrasive or corrosive action on metal surfaces and able to withstand extremely high pressures and atmospheric elements over long periods of time.

C. Items shall be the standard products of the manufacturer of such materials for the application.

D. Prior to assembly, the steel surface that will bear on the self-lubricating bearing plate shall be thoroughly lubricated with additional antioxidant lubricant furnished by the manufacturer. Coatings shall be removed before application of antioxidant lubricant.

3.05 ELASTOMERIC PADS

A. Care shall be taken in fabricating pads and related metal parts so that effects detrimental to their proper performance, such as uneven bearing and excessive bulging, will not occur.

3.06 PLACEMENT OF BEARING PLATES AND PADS

A. Bearing areas shall be finished to a true level plane which shall not vary perceptibly from a straightedge placed in any direction across the area.

B. Bearing plates or pads shall be set level in exact position and shall have a uniform bearing over the entire area. Provision shall be made to keep plates or pads in the correct position during erection of beams or placement of concrete.

C. Elastomeric pads and other flexible bearing materials shall be placed directly on masonry surfaces finished to a roughness equivalent to that of a No. 36 to No. 46 grit. Pads, bearing areas, or bridge seats and metal bearing plates shall be thoroughly cleaned and free from oil, grease, and other foreign materials. Metal bearing plates or bottoms of prefabricated beams that are to bear on elastomeric pads shall be coated with epoxy and then surfaced with a No. 36 to No. 46 silicon carbide or aluminum oxide grit. Bearing areas shall be finished to equivalent roughness.

D. Metal bearing plates shall be bedded on seats as follows:

1. The seat bearing areas shall be thoroughly swabbed with approved paint, and three layers of duck, 12 to 15 ounce per square yard, shall be placed on it, each layer being thoroughly swabbed with paint on its top surface.

2. Superstructure shoes or pedestals shall be placed in position while paint is plastic. As an alternate to duct and paint, preformed fabric bedding material at least 1/8 inch in thickness may be used when called for on the Drawings or approved in writing by the Engineer.

3.07 PLACEMENT OF ANCHOR RODS
A. All necessary anchor rods and bolts (anchors) shall be accurately set either in the concrete as they are being placed, in formed holes, or in holes cored after the concrete has set. If set in the concrete, the rods and bolts shall be accurately positioned by means of templates and rigidly held in position while the concrete is being placed. Holes may be formed by inserting or casting in the fresh concrete oiled wooden plugs, metal pipe or plastic sleeves, or other approved devices and withdrawing them after the concrete has partially set or left in place as indicated on the Drawings or approved by the Engineer. Holes so formed shall be at least 3 inches in diameter or at least 2.5 times the diameter of the rod or bolt. If cored, holes shall be at least 2.5 times the diameter of the anchor used or as indicated on the Drawings. Equipment used for coring concrete shall have been approved by the Engineer. Impact tools will not be permitted. Reinforcing steel shall be placed to provide adequate space to core rod/bolt holes without cutting the reinforcing steel. For cored holes, anchor rods and bolts shall be adequately held in place at the centroid of the hole or as specified on the Drawings by using approved pre-fabricated equalizers designed to allow grout to penetrate and fill the hole completely and spaced as approved by the Engineer.

B. During freezing conditions, anchor holes shall be protected from water accumulations at all times.

C. Anchors which are to be placed in holes of sufficient and specified diameter after the concrete has set shall be bonded to the concrete with a non-shrink high-strength Portland cement grout in accordance with Section 03600 – Grout or shall be adhesive anchors in accordance with Section 05050 – Metal Fastening. The type of anchoring system and grout shall be as indicated on the Drawings. The grout or adhesive shall completely fill the holes. Anchors shall be tested for sufficient pull-out capacity as indicated in applicable Sections of the Specifications or as indicated on the Drawings.

D. Anchors that are not designed to project through bearing plates shall be checked for proper projection above the masonry bearing area immediately prior to placement of bearing plates and beams. Nuts on anchor rods at expansion ends shall be adjusted to permit free movement of the span.

E. Angles for anchor assemblies to be attached to sides of concrete beams shall not be installed until beams have received their full dead load and supporting falsework has been removed.

- END OF SECTION -
SECTION 07900

JOINT FILLERS, SEALANTS AND CAULKING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Furnish labor, materials, equipment and appliances required for the complete execution of Work shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals
B. Section 03250 – Concrete Accessories
C. Section 03290 – Joints in Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ASTM C920 Elastomeric Joint Sealants
2. ASTM D1056 Flexible Cellular Materials - Sponge or Expanded Rubber
3. SWRI Sealant and Caulking Guide Specification

1.04 SUBMITTALS

A. In accordance with the procedures and requirements set forth in Section 01300 – Submittals, submit the following:

1. Manufacturers literature and installation instructions
2. Color samples of each type of sealant

1.05 QUALITY ASSURANCE

A. Applicator shall be a company specializing in the installation of sealants with a minimum of five years experience.

1.06 DELIVERY, STORAGE AND HANDLING
A. Deliver materials in unopened labeled packages.

B. Store materials in location protected from freezing or damages.

C. Reject and remove from the site materials within broken or damaged packaging.

**PART 2 -- PRODUCTS**

2.01 MATERIALS

A. Sealants

1. **Type 1**: Multi-component, non-sag, low-modulus polyurethane rubber sealant meeting ASTM C920, Type M, Grade NS, Class 25, use NT, M, A, and O. Capable of withstanding 50% in extension or compression such as Sikaflex-2C NS/SL by Sika Corporation, Sonolastic NP-2 by Sonneborn, or DynaTrol II by Pecora Corporation.

2. **Type 2**: Single component polyurethane sealant meeting ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A, and O. Capable of withstanding 25% in extension or compression such as Sikaflex 1A by Sika Corporation, DynaTrol 1-XL by Pecora Corporation, or Sonolastic NP-1 by BASF Construction Chemicals.

3. **Type 3**: Single component, low-modulus moisture curing silicone meeting ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, and A. Capable of withstanding 50% extension and compression such as Pecora 890 by Pecora Corporation or Sonolastic Omni Seal by BASF Construction Chemicals.

4. **Type 4**: Single component, mildew resistant, moisture-curing silicone meeting ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, and A such as Pecora 898 by Pecora Corporation or Sonolastic Omni Plus by BASF Construction Chemicals.

5. **Type 5**: Single component, acrylic latex meeting ASTM C834 such as AC-20+ Silicone by Pecora Corporation or Sonneborn Sonolac by BASF Construction Chemicals.

6. **Type 6**: High grade butyl sealant meeting Federal Specification TT-S-00-1657 such as BC-158 by Pecora Corporation or equal.

7. **Type 7**: Multi-component chemical resistant polysulfide sealant conforming to ASTM C920, Type M, Grade NS, Class 25 such as Deck-O-Seal by W.R. Meadows, Tammsflex by DuraJoint Concrete Accessories, or Synthacalk GC2+ by Pecora Corporation.

8. **Type 8**: Nonsag, Multi Component, traffic grade polyurethane sealant meeting ASTM C920, Type 19, Grade NS, Class 25, use T, M, A, and O such as DynaTread by Pecora Corporation or Sonolastic Ultra by BASF Construction Chemicals.
B. **Primer:** Non-staining primer recommended by sealant manufacturer for the substrates on this project.

C. **Backer Rod:** Closed cell foam, nonreactive with caulking materials, non-oily, and approved by the sealant manufacturer. Minimum density shall be 2.00 pounds per cubic foot. Use no asphalt or bitumen-impregnated fiber with sealants.

D. **Joint Cleaner:** Recommended by sealant or caulking compound manufacturer.

E. **Bond Breaker:** Either polyethylene film or plastic tape as recommended by the sealant manufacturer.

F. **Color:** Where manufacturer’s standard colors do not closely match materials being sealed, provide a custom color.

**PART 3 -- EXECUTION**

3.01 **QUALITY CONTROL**

A. Coordinate work with details shown on approved shop drawings prepared by other trades.

B. Verify conditions in the field.

C. Schedule work to follow closely the installation of other trades.

D. Apply sealants and related items in temperatures and dry conditions recommended by the manufacturers.

E. Do not paint sealant, unless recommended by sealant and paint manufacturer.

3.02 **PREPARATION**

A. Protect finished surfaces adjoining by using masking tape or other suitable materials.

B. Clean and prime joints before starting any caulking or sealing work.

C. Thoroughly clean joints and spaces of mortar and other foreign materials. Cleaning agent shall be Xylol or similar non-contaminating solvent to remove any film from metal surfaces. Masonry or concrete surfaces shall be brushed or air jet cleaned.

D. **Joint Requirements**

1. All joints and spaces to be sealed in exterior work shall be less than 1/2 inch deep and not less than 1/4 inch wide. If joints in masonry are less than that specified herein, the mortar shall be cut out to the required width and depth. All joints and spaces to receive sealant shall be completely prepared and thoroughly dry before installation of sealant.

2. Unless otherwise specified, joints and spaces which are open to a depth of 1/2 inch or greater shall be solidly filled with back-up material to within 1/4 inch of the...
surface. Back-up material shall be packed tightly and made continuous throughout the length of the joints. Bond breaker shall be applied as required. If joints are less than 1/4 inch deep, the back-up material may be omitted, a bond breaker substituted and the joint completely filled with sealant. The back-up material shall not project beyond the 1/4 inch depth of the open space in any joint. The following width-to-depth ratio table shall be adhered to, unless otherwise recommended by manufacturer.

<table>
<thead>
<tr>
<th>Joint Width</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 inch</td>
<td>1/4 inch</td>
<td>1/4 inch</td>
</tr>
<tr>
<td>Over 1/4 inch to 1/2 inch</td>
<td>1/4 inch</td>
<td>Equal to width</td>
</tr>
<tr>
<td>Over 1/2 inch to 1 inch</td>
<td>1/2 inch</td>
<td>Equal to width</td>
</tr>
<tr>
<td>Over 1 inch to 2 inch</td>
<td>1/2 inch</td>
<td>1/2 of width</td>
</tr>
</tbody>
</table>

3.03 APPLICATION

A. Exercise care before, during, and after installation so as not to damage any material by tearing or puncturing. All finished work shall be approved before covering with any other material or construction.

B. Apply sealant by an approved type of gun except where the use of a gun is not practicable, suitable hand tools shall be used. Avoid applying the compound to any surface outside of the joints or spaces to be sealed. Mask areas where required to prevent overlapping of sealant.

C. All joints shall be waterproof and weathertight.

D. Point sealed joints to make a slightly concave joint, the edges of which are flush with the surrounding surfaces. Exposed joints in the interior side of the door and other frames shall be neatly pointed flush or to match adjacent jointing work.

E. Adjacent materials which have been soiled shall be cleaned immediately and the work left in neat and clean condition.

F. Comply with sealant manufacturer's written instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.

3.04 ADJUSTMENT AND CLEANING

A. Remove misplaced sealant compounds promptly using methods and materials recommended by the manufacturer, as the work progresses.

B. Allow sealants to cure and remove protective edging, of doors, louvers, saddles windows etc. as directed by the Engineer.

3.05 SCHEDULE

**Schedule of Sealants**
<table>
<thead>
<tr>
<th>Application</th>
<th>Sealant</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical and horizontal expansion and construction joints in concrete structures unless noted otherwise herein or on Drawings.</td>
<td>Type 1</td>
<td>To closely match adjacent surfaces or mortar and as selected by the Owner.</td>
</tr>
<tr>
<td>Vertical and horizontal joints bordered on both sides by masonry, precast concrete, natural stone or other porous building material, unless noted otherwise herein or on Drawings.</td>
<td>Type 2</td>
<td>To closely match adjacent surfaces or mortar and as selected by the Owner.</td>
</tr>
<tr>
<td>Vertical and horizontal joints bordered on both sides by painted metals, anodized aluminum, mill finished aluminum, PVC, glass or other non-porous building material.</td>
<td>Type 3</td>
<td>To closely match adjacent surfaces and as selected by the Owner.</td>
</tr>
<tr>
<td>Masonry expansion and control joints less than 1¼” wide.</td>
<td>Type 2</td>
<td>To closely match adjacent surfaces and as selected by the Owner.</td>
</tr>
<tr>
<td>Masonry expansion and control joints equal or greater than 1¼ inches wide and not to exceed 2”.</td>
<td>Type 1</td>
<td>To closely match adjacent surfaces and as selected by the Owner.</td>
</tr>
<tr>
<td>Interior – wood trim and finish joints.</td>
<td>Type 5</td>
<td>Color to be selected by Owner</td>
</tr>
<tr>
<td>Sanitary areas, joints in ceramic tile, around plumbing fixtures, countertops, and back splashes. See Note 1.</td>
<td>Type 4</td>
<td>To closely match adjacent surfaces and as selected by the Owner.</td>
</tr>
<tr>
<td>Perimeter sealing of doors, windows, louvers, piping, ducts, and electrical conduit. See Note 2.</td>
<td>Type 2 OR Type 3</td>
<td>To closely match adjacent surfaces and as selected by the Owner.</td>
</tr>
<tr>
<td>Below thresholds.</td>
<td>Type 6</td>
<td>Manufacturer’s standard</td>
</tr>
<tr>
<td>Submerged in liquids. See Note 4.</td>
<td>Type 1</td>
<td>Manufacturer’s standard</td>
</tr>
<tr>
<td>Horizontal Joints exposed to vehicular or pedestrian traffic.</td>
<td>Type 8</td>
<td>To closely match adjacent surfaces.</td>
</tr>
<tr>
<td>Other joints indicated on the drawings or customarily sealed but not listed.</td>
<td>Type recommended by manufacturer</td>
<td>To closely match adjacent surfaces and as selected by the Owner.</td>
</tr>
</tbody>
</table>

Note 1. Sealant for Laboratory Countertop shall be as recommended by countertop manufacturer.
Note 2. Provide UL approved sealants for penetrations thru fire-rated walls.

Note 3. Sealants which will come in contact with potable water shall meet the requirements of NSF 61.

Note 4. Where sealant will be immersed in liquid chemicals verify compatibility prior to installation of sealant.

- END OF SECTION -
SECTION 15000

BASIC MECHANICAL REQUIREMENTS

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install to the required line and grade, all piping together with all fittings and appurtenances, required for a complete installation. All piping located outside the face of structures or building foundations and all piping embedded in concrete within a structure or foundation shall be considered exterior piping.

B. The Contractor shall furnish and install fittings, couplings, connections, sleeves, adapters, harness rods and closure pieces as required to connect pipelines of dissimilar materials and/or sizes herein included under this Section and other concurrent Contracts for a complete installation.

C. The Contractor shall furnish all labor, materials, equipment, tools, and services required for the furnishing, installation and testing of all piping as shown on the Drawings, specified in this Section and required for the Work. Piping shall be furnished and installed of the material, sizes, classes, and at the locations shown on the Drawings and/or designated in this Section. Piping shall include all fittings, adapter pieces, couplings, closure pieces, harnessing rods, hardware, bolts, gaskets, wall sleeves, wall pipes, hangers, supports, and other associated appurtenances for required connections to equipment, valves, or structures for a complete installation.

D. The work shall include, but not be limited to, the following:

1. Connections to existing pipelines

2. Test excavations necessary to locate or verify existing pipe and appurtenances

3. Installation of all new pipe and materials required for a complete installation

4. Cleaning, testing and disinfecting as required

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – General Requirements

B. Division 2 – Sitework

C. Division 5 – Metals

1.03 MATERIAL CERTIFICATION AND SHOP DRAWINGS

A. The Contractor shall furnish to the Owner (through the Engineer) a Material Certification stating that the pipe materials and specials furnished under this Section conform to all
applicable provisions of the corresponding Specifications. Specifically, the Certification shall state compliance with the applicable standards (ASTM, AWWA, etc.) for fabrication and testing.

B. Shop Drawings for major piping (2-inches in diameter and greater) shall be prepared and submitted in accordance with Section 01300 – Submittals. In addition to the requirements of Section 01300 – Submittals, the Contractor shall submit laying schedules and detailed Drawings in plan and profile for all piping as specified and shown on the Drawings.

C. Shop Drawings shall include, but not be limited to, complete piping layout, pipe material, sizes, class, locations, necessary dimensions, elevations, supports, hanger details, pipe joints, and the details of fittings including methods of joint restraint. No fabrication or installation shall begin until Shop Drawings are approved by the Engineer.

PART 2 – PRODUCTS

2.01 GENERAL

A. Where manufacturers are named for a particular mechanical component, it is intended as a guide to acceptable quality and performance and does not exempt such mechanical components from the requirements of these Specifications or Drawings.

B. All specials and every length of pipe shall be marked with the manufacturer's name or trademark, size, class, and the date of manufacture. Special care in handling shall be exercised during delivery, distribution, and storage of pipe to avoid damage and unnecessary stresses. Damaged pipe will be rejected and shall be replaced at the Contractor's expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.

C. Testing of pipe before installation shall be as described in the corresponding ASTM or AWWA Specifications and in the applicable standard specifications listed in the following sections. Testing after the pipe is installed shall be as specified in Article 3.05 herein.

D. Joints in piping shall be of the type as shown on the Drawings or as specified in other Sections of the Specifications as applicable.

E. The Contractor shall verify existing above ground and buried piping tie-in connections before fabricating new piping assemblies. The Contractor shall verify size, type, and location of all existing buried piping and appurtenances by excavating test pits as required of all buried connections and crossings which may affect the Contractor's work prior to ordering pipe and fittings to determine sufficient information for ordering materials. The Contractor shall take whatever measurements that are required to complete the work as shown or specified.

F. All changes in directions or elevations shall be made with fittings, unless otherwise shown.

2.02 FLEXIBLE COUPLINGS
A. Flexible couplings for joining existing pipes to new pipes, including both main line pipes and service laterals, shall be specifically designed and rated for joining sewer pipes composed of different materials, such as Fernco 1002 Series for joining clay pipe to cast iron or plastic pipe, and/or having varying diameters.

B. All couplings shall have Type 304 stainless steel clamps, one on each side.

C. All couplings shall have Type 304 stainless steel shear rings.

D. All couplings shall be as manufactured by Fernco, Mission, or Engineer-approved equal.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. All piping shall be installed by skilled workmen and in accordance with the best standard practice for piping installation as shown on the Drawings, specified or recommended by the pipe manufacturer. Proper tools and appliances for the safe and convenient handling and installing of the pipe and fittings shall be used. Great care shall be taken to prevent any pipe coating from being damaged on the inside or outside of the pipe and fittings. All pieces shall be carefully examined for defects, and no piece shall be installed which is known to be cracked, damaged, or otherwise defective. If any defective pieces should be discovered after having been installed, it shall be removed and replaced with a sound one in a satisfactory manner by the Contractor and at his own expense. Pipe and fittings shall be thoroughly cleaned before they are installed and shall be kept clean until they are accepted in the complete work. All piping shall be installed in such a manner that it will be free to expand and contract without injury to itself or to structures and equipment to which it is connected. All piping shall be erected to accurate lines and grades with no abrupt changes in line or grade and shall be supported and braced against movement, temporary, or permanent.

B. All excavation shall be made in such a manner and to such widths as will provide ample room for properly installing the pipe and permit thorough compaction of backfill around the pipe. The minimum trench widths shall be in strict accordance with the Details on Drawing D02. All excavation and trenching shall be done in strict accordance with these specifications and all applicable parts of the OSHA Regulations, 29CFR 1926, Subpart P.

C. ALL EXCAVATION REQUIRED BY THIS CONTRACT SHALL BE UNCLASSIFIED. NO ADDITIONAL PAYMENT WILL BE MADE FOR ROCK EXCAVATION REQUIRED FOR THE INSTALLATION OF PIPE OR STRUCTURES SHOWN ON THE DRAWINGS.

D. Enlargements of the trench shall be made as needed to give ample space for operations at pipe joints. The width of the trench shall be limited to the maximum dimensions shown on the Drawings, except where a wider trench is needed for the installation of and work within sheeting and bracing. Except where otherwise specified, excavation slopes shall be flat enough to avoid slides which will cause disturbance of the subgrade, damage to adjacent areas, or endanger the lives or safety of persons in the vicinity.
E. Hand excavation shall be employed wherever, in the opinion of the Engineer, it is necessary for the protection of existing utilities, poles, trees, pavements, or obstructions.

F. No greater length of trench in any location shall be left open, in advance of pipe laying, than shall be authorized or directed by the Engineer and, in general, such length shall be limited to approximately one hundred (100) feet. The Contractor shall excavate the trenches to the full depth, width and grade indicated on the Drawings including the relevant requirements for bedding. The trench bottoms shall then be examined by the Engineer as to the condition and bearing value before any pipe is laid or bedding is placed.

G. JOINT DEFLECTION SHALL NOT EXCEED 75 PERCENT OF THE MANUFACTURERS RECOMMENDED DEFLECTION. Excavation and backfilling shall conform to the requirements of Section 02200 – Earthwork and as specified herein. Maximum trench widths shall conform to the Details on Drawing D02.

H. Following proper preparation of the trench subgrade, pipe and fittings shall be carefully lowered into the trench so as to prevent dirt and other foreign substances from gaining entrance into the pipe and fittings. Proper facilities shall be provided for lowering sections of pipe into trenches. UNDER NO CIRCUMSTANCES SHALL ANY OF THE MATERIALS BE DROPPED OR DUMPED INTO THE TRENCH.

I. Water shall be kept out of the trench until jointing and backfilling are completed. When work is not in progress, open ends of pipe, fittings, and valves shall be securely closed so that no water, earth, or other substance will enter the pipes, fitting, or valves. Pipe ends left for future connections shall be valved, plugged, or capped, and anchored as required.

J. All piping shall be installed in such a manner that it will be free to expand and/or contract without injury to itself or to structures and equipment to which it is connected. All piping shall be erected to accurate lines and grades with no abrupt changes in line or grade and shall be supported and braced against movement, temporary, or permanent. All exposed piping shall be installed with vertical and horizontal angles properly related to adjoining surfaces or pipes to give the appearance of good workmanship. Pipes crossing within a vertical distance of less than or equal to one (1) foot shall be encased and supported with concrete at the point of crossing to prevent damage to the adjacent pipes as shown on the Drawings.

K. The full length of each section of pipe shall rest solidly upon the bed of the trench, with recesses excavated to accommodate bells, couplings, joints, and fittings. Before joints are made, each pipe shall be well bedded on a solid foundation; and no pipe shall be brought into position until the preceding length has been thoroughly bedded and secured in place. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid by the Contractor at his own expense. Pipe shall not be laid in water or when trench conditions are unsuitable for work.

L. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall in general agree with manufacturer's recommendations.

M. AT THE CLOSE OF EACH WORK DAY THE END OF THE PIPELINE SHALL BE TIGHTLY SEALED WITH A CAP OR PLUG SO THAT NO WATER, DIRT, OR OTHER FOREIGN
SUBSTANCE MAY ENTER THE PIPELINE AND THIS PLUG SHALL BE KEPT IN PLACE UNTIL PIPE LAYING IS RESUMED.

N. During the laying of pipe, each pipe manufacturer shall provide his own supervisor to instruct the Contractor's pipe laying personnel in the correct procedure to be followed.

O. For gravity sewer installations, the Contractor shall use a laser device to maintain the trench and pipe alignment. The laser device shall be re-checked for correct elevation and pipe alignment prior to pipe installation if the device is left in the pipe overnight. Corrected invert elevations at each manhole and any adjustments will be coordinated and approved by the Engineer.

P. ALL PIPING SHALL HAVE BEDDING TYPE AS SHOWN ON THE DRAWINGS, UNLESS OTHERWISE SPECIFIED HEREIN.

Q. AT THE CLOSE OF WORK EACH DAY PIPELINE TRENCHES SHALL BE COMPLETELY BACKFILLED. IN PAVED AREAS THE SURFACE MAY BE TEMPORARILY RESTORED WITH BASE IN LIEU OF REPAVING DAILY. IF TEMPORARY BASE ROCK IS INSTALLED, IT SHALL BE INSTALLED TO AN ELEVATION NO MORE THAN 1-INCH BELOW THE EXISTING PAVEMENT. THE TEMPORARY BASE ROCK SHALL BE THE REQUIREMENT FOR ROAD BASE MATERIAL SPECIFIED. ALL EXCESS BASE ROCK INSTALLED FOR TEMPORARY ACCESS SHALL BE REMOVED PRIOR TO PAVING. UNDER NO CONDITIONS SHALL ANY PIPELINE TRENCH BE LEFT OPEN DURING NON-WORKING HOURS.

R. Flexible couplings shall be installed in accordance with the manufacturer's guidelines, including those related to pre-cleaning, installation direction, nut torque, etc..

3.02 DUCTILE IRON PIPE

A. Ductile iron pipe (DIP) shall be installed in accordance with the requirements of the Ductile Iron Pipe Handbook published by the Ductile Iron Pipe Research Association, and AWWA C600.

B. Where it is necessary to cut ductile iron pipe in the field, such cuts shall be made carefully in a neat workmanlike manner using approved methods to produce a clean square cut. The outside of the cut end shall be conditioned for use by filing or grinding a small taper, at an angle of approximately 30 degrees. All cut ends shall be coated per Specification 15006 Ductile Iron Pipe, Article 2.01, Paragraph A.

C. UNLESS OTHERWISE APPROVED BY THE ENGINEER, FIELD WELDING OF DUCTILE IRON WILL NOT BE PERMITTED.

3.03 JOINTS IN PIPING

A. Restrained joints shall be provided as shown on the Drawings. Restrained joints shall be made up similar to that for push-on joints.

B. Push-on joints include a single rubber gasket which fits into the bell end of the pipe. The gasket shall be wiped clean, flexed and then placed in the socket. Any bulges in the gasket
which might interfere with the entry of the plain end of the pipe shall be removed. A thin film of lubricant shall be applied to the gasket surface which will come into contact with the spigot end of the pipe. The lubricant shall be furnished by the pipe manufacturer. The plain end of the pipe, which is tapered for ease of assembly, shall be wiped clean and a thick film of lubricant applied to the outside. The pipe shall be aligned and carefully entered into the socket until it just makes contact with the gasket. The joint assembly shall be completed by entering the pipe past the gasket until it makes contact with the bottom of the socket. The pipe shall be pulled "home" with an approved jack assembly as recommended by the pipe manufacturer. If assembly is not accomplished by reasonable force, the plain end shall be removed and the condition corrected.

C. Solvent or adhesive welded joints in plastic piping shall be accomplished in strict accordance with the pipe manufacturer's recommendations, including necessary field cuttings, sanding of pipe ends, joint support during setting period, etc. Care shall be taken that no droppings or deposits of adhesive or material remain inside the assembled piping. Solvent or adhesive material shall be compatible with the pipe itself, being a product approved by the pipe manufacturer.

D. Eccentric reducers shall be installed where air or water pockets would otherwise occur in mains because of a reduction in pipe size.

3.04 FLUSHING AND TESTING

A. All piping shall be properly flushed and tested unless specifically exempted elsewhere in the Specifications or otherwise approved by the Engineer. Gravity sewer piping shall be flushed and tested as specified herein and in Section 02604 – Utility Structures. The Contractor shall furnish and install all means and apparatus necessary for getting the air or water into the pipeline for flushing and testing, including pumps, compressors, equipment, gauges, meters, hoses, any necessary plugs and caps, and any required blow-off piping and fittings, etc., complete with any necessary reaction blocking to prevent pipe movement during the flushing and testing. All pipelines shall be flushed and tested in such lengths or sections as agreed upon among the Owner, Engineer, and Contractor. Test pressures shall be as specified in other Sections of the Specifications as applicable and shall be measured at the lowest point of the pipe segment being tested. The Contractor shall give the Owner and Engineer reasonable notice of the time when he intends to test portions of the pipelines. The Engineer reserves the right, within reason, to request flushing and testing of any section or portion of a pipeline.

B. The Contractor shall provide water for all flushing and testing of liquid conveying pipelines in accordance with Section 01510 – Temporary Utilities. Raw water or non-potable water may be used for flushing and testing liquid pipelines not connected to the potable water system. Only potable water shall be used for flushing and testing the potable water system.

C. At the conclusion of the installation work, the Contractor shall thoroughly clean all new liquid conveying pipe by flushing with water or other means to remove all dirt, stones, pieces of wood, etc., which may have entered the pipe during the construction period. If after this cleaning any obstructions remain, they shall be corrected by the Contractor, at his own expense, to the satisfaction of the Engineer. Liquid conveying pipelines shall be flushed at the rate of at least 2.5 feet per second for a duration suitable to the Engineer or shall be flushed by other methods approved by the Engineer.
D. During testing, the piping shall show no leakage. Any leaks or defective piping disclosed by the leakage test shall be repaired or replaced by the Contractor, at his own expense, and the test repeated until all such piping shows tight.

- END OF SECTION -
SECTION 15002

REINFORCED CONCRETE PIPE

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. Reference Section 15000 – Basic Mechanical Requirements.

PART 2 -- PRODUCTS

2.01 CONCRETE STORM DRAIN PIPE

A. All reinforced concrete storm drain pipe shall be manufactured in accordance with ASTM C76, Wall Type B or C, and shall be Class IV. Minimum pipe laying lengths shall be four (4) feet. Testing shall be in accordance with Section 02604 – Utility Structures. Portland cement shall conform to ASTM C150, Type II. Pipe bedding shall be in accordance with Section 02207 – Aggregate Materials.

B. Joints for the reinforced concrete storm drain pipe shall have bell and spigot ends with flexible plastic gaskets meeting the requirements of AASHTO M198, Type B.

C. All pipe shall be aged at the manufacturing plant for at least fourteen (14) days before delivery to the job site.

PART 3 -- EXECUTION

3.01 CONCRETE STORM DRAIN PIPE

A. The laying of reinforced concrete storm drain pipe shall conform to the applicable sections of the Concrete Pipe Handbook as published by the American Concrete Pipe Association.

- END OF SECTION -
PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. All ductile iron pipe and specials shall be marked with the manufacturer's name or trademark, size, weight, thickness class, the date of manufacture, and the word "Ductile".

B. Ductile iron pipe (DIP) of the sizes shown or specified shall conform to ANSI A21.51 (AWWA C151), Grade 60-42-10 for ductile iron pipe centrifugally cast in metal molds or sand-lined molds. All ductile iron pipe shall conform to ANSI A21.50 (AWWA C150) for thickness design and shall be supplied in 18-foot or 20-foot nominal lengths or as required to meet the requirements of the Drawings. Fittings and specials shall be cast iron or ductile iron, conforming to the requirements of ANSI A21.10 (AWWA C110) or ANSI A21.53 (AWWA C153), and shall have a minimum rated working pressure of 350 psi.

C. Minimum Pressure Class 350 pipe shall be used for flanged spools.

D. Reference Section 15000 – Basic Mechanical Requirements

E. In the absence of a specified test pressure, pipe shall be tested at either a pressure 50 percent greater than the normal operating pressure as determined by the Owner and/or Engineer or 10 psig, whichever is greater.

F. If not otherwise specified in the Specifications or shown on the Drawings, flanged ductile iron pipe shall be a minimum of Class 53 and ductile iron pipe with push-on or restrained joints shall be a minimum of Pressure Class 350.

PART 2 -- PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. The interior of all ductile iron pipe and fittings shall be lined with either Permox-CTF™ as manufactured by The Permite Corporation or Perma-Shield® PL Series 431 as manufactured by Tnemec Company, Inc. Permox-CTF™ shall be white in color, and Perma-Shield® PL Series 431 shall be green in color. The lining shall be free of PAHs (polycyclic aromatic hydrocarbons) and HAPs (hazardous air pollutants). All pipe and fittings shall be lined with a minimum dry film thickness of 40 mils using automated lance assemblies, except for the gasket groove and spigot end up to six inches back from the end of the spigot, which shall be lined with a dry film thickness of 6 mils (nominal) to 10 mils (maximum) of unreduced joint compound. Application shall be by brush, and care shall be taken to ensure the coating is smooth and free of excess buildup in the gasket groove and on the spigot end. APPLICATION OF THE LINING MATERIAL MAY ONLY BE PERFORMED BY APPROVED FIRMS AS DESIGNATED BY THE MANUFACTURER OR ITS AUTHORIZED REPRESENTATIVE. Deviations from this Specification will not be
allowed including, but not limited to, accompanying procedures that may be provided by the manufacturer for the work inherent to this Specification. All ductile iron pipe and fittings shall be checked for dry film thickness in accordance with SSPC-PA2. Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on that date. Pipe/fitting manufacturer shall furnish a certificate stating that lining applicator has complied with all Specification requirements relative to the material and its application and inspection. Surface preparation, number of coats, application of the lining material, and field touch-up shall be in strict accordance with the lining material manufacturer’s recommendations. Holiday inspection shall be conducted using test equipment described in ANSI/AWWA C210, Section 5.3.3.1. In accordance with lining material manufacturer’s recommendations, holiday testing may be performed any time after the coating has reached sufficient cure.

B. All buried DIP and fittings shall have a bituminous coating on the exterior surfaces in accordance with ANSI A21.51 (AWWA C151). All exposed DIP and fittings shall have a shop-applied prime coat.

C. Requirements for various types of joints are described in the following paragraphs. UNLESS OTHERWISE NOTED HEREIN OR ON THE DRAWINGS, ALL EXPOSED DUCTILE IRON PIPING SHALL HAVE FLANGED JOINTS AND ALL BURIED DUCTILE IRON PIPING SHALL HAVE PUSH-ON JOINTS.

D. When a main line pipe is replaced, each service lateral that falls within the limits of the main line pipe replacement shall only be connected to the main line using a factory-fabricated tee or wye on the main line. Using a Romac-type coupling, Inserta Tee, or Inserta Wye to connect a new main line pipe to an existing service lateral is not acceptable.

E. Flanged joints and fittings shall have a minimum pressure rating of 250 psi with 125 lb. American Standard flanges. All flanges and fittings shall conform to the requirements of ANSI B16.1. Flanges shall be ductile iron and shall be of the threaded or screw-on type. The face of the flanges shall be machined after installation of the flange to the pipe. No raised surface shall be allowed on flanges. Flanged pipe shall conform to the requirements of ANSI Specification A21.15, (AWWA C115). Pipe lengths shall be fabricated to meet the requirements of the Drawings.

F. Gaskets shall be the “Ring Gasket” type, 1/8-inch minimum thickness, cloth-inserted rubber, red rubber, or neoprene, and shall be suitable for the service intended. Bolts shall be of the size and length called for, shall be in accordance with the "American Standard", and shall comply with the requirements of the ANSI/AWWA Standards. The bolts for flanged joints shall be a minimum ASTM A307, Grade B carbon steel and shall be in accordance with ANSI A21.10 (AWWA C110). The bolts shall have hexagonal heads and nuts; no washers shall be used.

G. Bell and spigot pipe shall be provided with push-on, O-ring rubber gasket, compression-type joints and shall conform to the requirements of ANSI A21.11 (AWWA C111).

H. Restrained joint pipe shall consist of factory-manufactured bolted retainer rings, ductile iron locking segments held in place by rubber retainers, or ductile iron retaining rings that lock over the bell of the joint and are secured to prevent rotation, and factory-welded retainer beads or rings on the spigot of the pipe. All components of the bolted or snap ring assemblies shall be constructed of corrosion-resistant, high strength, low-alloy steel.
Restrained joint pipe shall be Flex-Ring as manufactured by American Cast Iron Pipe Company, TR FLEX as manufactured by US Pipe, BOLT-LOK or SNAP-LOK as manufactured by Griffin Pipe Products, or TR Flex as manufactured by McWane Ductile.

I. Restrained fittings for pipe systems 16 inches in diameter and greater shall have factory restraint systems identical to the factory restrained joint pipe specified in Paragraph H herein. All fittings shall be a minimum of Pressure Class 350 unless otherwise specified.

J. Restrained fittings for pipe systems 14 inches in diameter and smaller shall be mechanical joint fittings with restraint assemblies such as StarGrip by Star Pipe Products, MEGALUG by EBAA Iron, Inc., ONE-LOK by Sigma, or GripRing by Romac Industries, Inc. All fittings shall be minimum Pressure Class 350 unless otherwise specified. Where threaded rods are allowed, the rods and tabs shall be designed for the specified restraint system design pressure, shall have lengths less than 10 feet between fittings, and shall be painted with two heavy coats of coal tar epoxy after installation.

K. The manufactured systems for thrust restraint previously indicated shall be used where restrained joint ductile iron pipe and fittings are specified or indicated on the Drawings. Bell and spigot pipe with gripping gaskets by one of the four manufacturers named in Paragraph H herein is also an acceptable form of restraint, subject to approval by the Engineer. Thrust restraint and harnessing systems such as threaded rods, friction clamps, or retainer glands shall be used only where specifically specified herein, indicated on the Drawings, or if allowed by the Engineer in isolated applications where conditions warrant and necessitate their use. Concrete thrust blocks may be used in accordance with the schedule indicated on the Drawings, if applicable.

PART 3 -- EXECUTION

3.01 EXAMINATION

A. No pipe or fittings shall be installed that have manufacturing imperfections or damage caused by improper handling.

B. Verify size, pipe condition, and pipe class prior to installation of pipe.

C. The Contractor shall identify the locations of all underground utilities prior to commencing excavation activities. The Contractor shall consult with utility companies to verify the locations of underground utilities.

D. The Contractor shall notify the agency, or company owning any utility line which is damaged, broken, or disturbed. The Contractor shall obtain approval from the Engineer and the utility owner prior to performing any temporary or permanent repairs, or relocation of utilities.

E. The Contractor shall install and operate a dewatering system in accordance with requirements of Section 02200 – Earthwork.
3.02 PREPARATION

A. Inspect pipe and fittings prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are being used.

B. Remove foreign matter and dirt from inside of pipe and fittings and keep clean during and after laying. Wash ends of section clean with wet brush prior to joining sections of pipe.

3.03 INSTALLATION

A. General:

1. Install pipe sections in accordance with manufacturer’s recommendations and as specified in this section.

2. Provide and use proper implements, tools, and facilities for safe and proper prosecution of Work.

3. Lower pipe, fittings, and appurtenances into trench, piece by piece, by means of crane, slings, or other suitable tools and equipment, in such a manner as to prevent damage to pipe materials, protective coatings and linings. Do not drop or dump pipe into trenches.

B. Line and Grade:

1. The Contractor is responsible for accurately placing pipe to the exact line and grade called for on the Plans. The control of vertical and horizontal alignments shall be accomplished by the use of a laser beam instrument. When a laser is used, the elevation and alignment of the pipe shall be checked by transit and level rod every 40 feet for smaller pipe and every joint for pipe 24 inches and larger. Other approved methods of controlling vertical and horizontal alignments may be used if specifically authorized by the Engineer. The pipe section may be adjusted by use of "come-along" of approved design and anchorage. The practice of bumping or snatching (with backhoe or crane, etc.) used to adjust pipe after placement in the trench, will not be permitted. The Contractor shall furnish all labor and materials necessary for controlling the line and grade.

2. Each piece of pipe and special fitting shall be carefully inspected before it is placed, and no defective pipe shall be laid in the trench, the bottom and sides of the trench shall be carefully prepared. Pipe laying shall proceed upgrade, starting at the lower end of the grade and with the bells uphill. Trench bottoms found to be unsuitable for foundations shall be undercut and brought to exact line and grade with pipe cushion, concrete cradles, foundation backfill, or as directed by Engineer.

3. For bell and spigot pipe, bell holes shall be of sufficient size to allow ample room for properly making the pipe joint. Bell holes shall be cut not more than five (5) joints ahead of pipe laying. The bottom of the trench between bell holes shall be carefully graded so that the pipe barrel will rest on a solid foundation for its entire length. Each joint shall be laid so that it will form a close concentric joint with adjoining pipe and so as to avoid sudden offsets or inequalities in the flow line.
4. Water shall not be allowed to run or stand in the trench while pipe laying is in progress or before the trench has been backfilled. The contractor shall not open up at any time more trench than his available pumping facilities are able to dewater. Movement of water that would tend to erode or affect the trench walls will not be allowed.

C. Laying and Jointing:

1. Use gasket lubricant as recommended by gasket manufacturer.

2. Lay pipe upgrade with bell ends pointing in direction of laying.

3. When field cutting or machining pipe is necessary, use only tools and methods recommended by pipe manufacturer and approved by Owner/Owner Representative.

4. After section of pipe has been placed in its approximate position for jointing, clean end of pipe to be joined, inside of joint, and rubber ring immediately before joining pipe.

5. Assemble joint in accordance with recommendations of manufacturer.

6. Apply sufficient pressure in making joint to assure that joint is “home” as defined in standard installation instructions provided by pipe manufacturer. Inside joint space shall not exceed 50 percent of pipe manufacturer’s recommended maximum allowance.

7. Place pipe to specified line and grade to form smooth flow line.

8. Pipe shall not have a sag greater than 1/8 inch. Where the pipe has a sag greater than 1/8 inch it shall be reinstalled to eliminate the sag.

9. Ensure that bottom of pipe is in contact with bottom of trench for full length of each section.

10. Check for alignment and grade after joint has been made.

11. Place sufficient pipe bedding material to secure pipe from movement before next joint is installed.

12. When pipe is laid within movable trench shield, take precautions to prevent pipe joints from pulling apart when moving shield ahead.

13. When laying operations are not in progress, and at close of day’s work close and block open end of last laid section of pipe to prevent entry of foreign material or creep of gasketed joints.

14. Take precautions to prevent “uplift” or floating of line prior to completion of backfill operation.
D. **Connection to Structure or Manhole:**

1. Locate standard pipe joint within 5 feet of outside face of structure.
2. Plug or close off pipe stubbed with watertight plug.

E. **Connection to Main Sewer:** Connection shall be installed at the required location using the specified fittings.

F. **Crossing Waterlines:** Where sewer crosses less than 18 inches below waterline, use ductile iron or PVC pressure pipe for crossing or encase in concrete envelope for a minimum distance of 9 feet on each side of waterline.

G. **Ductile Iron Pipe:**

1. Cutting and Dressing of Ductile Iron Pipe Ends:
   a. Cut at right angles to centerline of pipe to leave smooth end, without damage to pipe.
   b. Use only approved mechanical cutter.
   c. Taper cut end of pipe to be used with rubber gasket joints by grinding or filing 1/8 inch back at an angle of approximately 30 degrees with centerline of pipe.
   d. Remove sharp or rough edges.
   e. Abrade cut ends with grinding wheel and apply lining repair material. Use only compatible repair materials provided by pipe lining manufacturer. Allow repair lining to harden and cure before installation.
   f. Repair liner in accordance with manufacturer’s recommendations.

H. **Polyethylene Encasement:**

1. Encase pipe, fittings, where pipe is to be concrete encased in accordance with AWWA C105/A21.5, Method C.
2. Pull encasement to take out slack and wrap snug around pipe.
3. Secure overlap in place and fold at quarter points of pipe length.
4. Wrap and tape encasement snug around fittings.
5. Encasement within sections of pipe installed in steel casings is not required.

3.04 **TESTING**
A. Contractor shall perform closed-circuit television (CCTV) inspection of all ductile iron pipe mainline sewers and laterals after installation and shall submit the CCTV video files to the Owner and Engineer in accordance with Section 02731 – Sanitary Sewer Television Inspection. If the Owner or Engineer identifies any leaks or other deficiencies in a specific mainline sewer or lateral from their review of the video files, Owner or Engineer will direct the Contractor to perform testing of specific joints in that segment of mainline sewer or lateral in accordance with the latest version of the National Association of Sewer Service Companies (NASSCO) Suggested Standard Specification for Pressure Testing and Grouting of Sewer Pipe Joints, Laterals and Lateral Connections Using the Packer Method with Solution Grouts, modified as follows:

1. Joint Testing Procedure for Mainline Sewer and Laterals Connected to Manholes:
   a. Joint testing pressure shall be equal to 0.5 psi per vertical foot of pipe depth plus 2 psi; however, test pressure shall not exceed 10 psi without the approval of the Engineer.
   b. Contractor shall test joints in laterals which are directly connected to manholes to a distance predetermined by the Engineer. If there is a transition in the laterals connected to manholes, the transition shall be tested. Direct visual observation and measured cable lengths shall be used to position the lateral packer for laterals directly connected to manholes.
   c. Individually air test each sewer pipe joint at the previously-specified pressure in accordance with the following procedure:
      i. The packer shall be positioned within the pipe in such a manner as to straddle the joint to be tested.
      ii. The packer ends shall be expanded so as to isolate the joint from the remainder of the pipe and create a void area between the packer and the pipe joint. The ends of the testing device shall be expanded against the pipe in accordance with the manufacturer’s recommendations.
      iii. After the void pressure is observed to be equal to or greater than the required test pressure, the air flow shall be stopped. If the void pressure drop is greater than 1.0 psi within 15 seconds, the joint shall have failed the test and shall be repaired and retested.
   d. Upon completing the testing of an individual joint, the packer shall be deflated with the void pressure meter continuing to display void pressure. If the void pressure does not drop to 0.0 +/- 0.5 psi, Contractor shall clean, adjust, and/or repair the equipment as necessary to provide for an accurate void pressure reading.

2. Lateral Connection Testing Procedure:
   a. Lateral connection joint testing pressure shall be equal to 0.5 psi per vertical foot of pipe depth plus 2 psi; however, test pressure shall not exceed 10 psi without approval of the Engineer.
b. Air testing lateral connections shall be accomplished by isolating the area to be tested with the lateral connection packer and by applying positive pressure into the isolated void area. A pan and tilt camera shall be used to position the lateral packer for laterals directly connected to the mainline sewer. The lateral bladder shall be inverted from the mainline assembly into the lateral pipe and inflated. The mainline elements shall then be inflated to isolate the lateral connection and the portion of the lateral to be tested. A sensing unit shall monitor the pressure of the packer void and shall accurately transmit a continuous readout of the void pressure to the control panel or to a pressure gauge on the packer recorded by the CCTV camera.

c. The test procedure shall consist of applying a controlled air pressure into each isolated void area. Air shall then be slowly introduced into the void area until a pressure equal to or greater than the required test pressure, but in no cases greater than 2 psi above the required test pressure, is observed on the pressure monitoring equipment. Once the designated pressure in the isolated void is displayed on the meter of the control panel, the application of air pressure shall be stopped and a 15-second waiting period shall commence. The void pressure shall be observed during this period. If the void pressure drop is greater than 2.0 psi within 15 seconds, the lateral shall be considered to have failed the test and shall be repaired and retested.

d. Upon completing the testing of an individual lateral, the lateral packer shall be deflated with the void pressure meter continuing to display void pressure. If the void pressure does not drop to 0.0 +/- 0.5 psi, the equipment shall be adjusted to provide a zero void pressure reading at the monitor.

- END OF SECTION -
SECTION 15008

PVC PIPE

PART 1 -- GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish, install, and test PVC pipe and all appurtenant work, complete and in-place, all in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01300 – Submittals
B. Section 02200 – Earthwork
C. Section 02731 – Sanitary Sewer Television Inspection
D. Section 15000 – Basic Mechanical Requirements
E. Section 15006 – Ductile Iron Pipe

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.


4. ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

5. ASTM D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings


8. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe


10. ASTM F913 Standard Specification for Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe

11. AWWA C110 Ductile-Iron and Gray-Iron Fittings

12. AWWA C153 Ductile-Iron Compact Fittings

13. AWWA C605 Standard for Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings

14. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution

1.04 SUBMITTALS

A. Shop Drawings: The Contractor shall submit the following in accordance with the requirements set forth in Section 01300 – Submittals and Section 15000 – Basic Mechanical Requirements:

1. Complete product data for pipe, fittings, and gaskets

2. PVC pipe manufacturer’s certification of compliance with appropriate reference standards specified herein

3. Certified test reports from a laboratory indicating the pipe was manufactured and tested in accordance with the standards specified herein

1.05 DELIVERY, STORAGE, AND HANDLING

A. The pipe and fittings shall be handled and protected during loading, transporting, and unloading operations in such a manner as to avoid damage. The pipe shall be unloaded with fabric straps or with a forklift; chains shall not be used for unloading pipe. When unloading with a forklift, the fork shall not be placed inside the pipe.

B. The pipe shall be stored on a smooth bed to prevent point loading and shall never be stacked over 8 feet high. Under no circumstances shall the pipe be dropped from the truck or dragged. Extra care shall be given to storage and handling during cold weather.
construction. Pipe and fittings shall be protected from sunlight and weather conditions in accordance with the manufacturer’s recommendations.

C. All pipe and fittings damaged during delivery, storage, and handling will be rejected by the Owner and/or Engineer and shall be removed from the site by the Contractor as directed by the Owner and/or Engineer.

PART 2 -- PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. PVC pipes in sizes between 4 inches and 12 inches, where indicated on the drawings or directed by the Engineer, shall be standard dimension ratio (SDR) 26 (PS115) and shall conform to all the requirements of ASTM D3034 or ASTM F679 and ASTM D1784. The pipe shall be capable of withstanding the overburden pressures determined by the depth of burial in the field.

1. Pipe material shall be made from a clean, virgin, NSF-approved PVC compound meeting cell classification 12454-A per ASTM D1784. All PVC pipe furnished shall be green in color. Standard laying lengths shall be 14 feet (+/-1 inch). Random lengths of not more than 15 percent of the total footage of each size may be shipped in lieu of the standard lengths. Reruns of reclaimed material shall not be accepted.

2. The pipe shall have integral bell and spigot ends with push-on, O-ring rubber gasket, compression-type joints conforming to the requirements of ASTM D3139. Flexible elastomeric gaskets shall conform to the requirements of ASTM F477 or ASTM F913 and shall be as recommended and furnished by the PVC pipe manufacturer.

3. Pipe shall be both UL-approved and FM-approved.

4. Fittings for SDR 26 PVC pipe shall be PVC and shall be designed for the pipe being provided.

B. Alternate Material for Service Lines: PVC pipes in sizes between 4 inches and 6 inches may be C900-Class 235 and shall conform to all the requirements of AWWA C900, ASTM D1784, and ASTM D2241. The pipe shall be a minimum of dimension ratio (DR) 18, for a stiffness of 264 psi or higher, and shall be capable of withstanding the overburden pressures determined by the depth of burial in the field. Pipe dimensions for each nominal size shall be cast iron outside dimension (CIOD).

1. Pipe material shall be made from a clean, virgin, NSF-approved PVC compound meeting cell classification 12454-A per ASTM D1784. All PVC pipe furnished shall be green in color. Standard laying lengths shall be 20 feet (+/-1 inch). Random lengths of not more than 15 percent of the total footage of each size may be shipped in lieu of the standard lengths. Reruns of reclaimed material shall not be accepted.

2. The pipe shall have integral bell and spigot ends with push-on, O-ring rubber gasket, compression-type joints conforming to the requirements of ASTM D3139. Flexible elastomeric gaskets shall conform to the requirements of ASTM F477 or ASTM F913 and shall be as recommended and furnished by the PVC pipe manufacturer.
3. The pipe shall be designed to pass a minimum quick burst test pressure of 755 psi applied in 60 to 70 seconds at 73 degrees Fahrenheit when tested in accordance with ASTM D1599, as referenced in ASTM D2241.

4. Pipe shall be both UL-approved and FM-approved.

5. Fittings for C900 PVC shall be ductile iron, bolted mechanical joint, in accordance with AWWA C110 or AWWA C153, with restraint assemblies in accordance with Section 15006 – Ductile Iron Pipe. Ductile iron fittings shall be manufactured by a named ductile iron pipe manufacturer.

6. Each joint of PVC pipe shall be marked on the barrel with the following in accordance with the marking requirements of AWWA C900:
   a. Nominal size and outside diameter dimension basis (CIOD)
   b. PVC
   c. DR 18
   d. AWWA Pressure Class (PC 235)
   e. AWWA C900 designation
   f. Manufacturer’s name and production code indicating date of manufacture and production shift time

C. PVC pipe shall be as manufactured by the Vulcan Plastics Division of Consolidated Pipe & Supply, Inc., JM Eagle, or North American Pipe Corporation.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. PVC pipe installation shall be in accordance with the manufacturer’s recommendations and AWWA C605 (for C900 PVC pipe) or ASTM D2321 (for SDR 26 PVC pipe).

B. PVC piping shall be installed in full accordance with the manufacturer's specifications and recommendations for the specific installation. No field bending or distortion of the pipe will be permitted.

C. Joining PVC Pipe:
   1. All pipe joints shall be made in accordance with the manufacturer's recommendations, ASTM D3139 (for C900 PVC pipe), ASTM D3212 (for SDR 26 PVC pipe), and as approved by the Owner and/or Engineer.
   2. The inside of all bells and the outside of all spigots shall be wiped to remove all dirt, water, and other foreign matter so that their surfaces are clean and dry when the
pipes are joined. Before making a joint, the interior of the bell of the last pipe installed shall be cleaned and the annular space shall be free from dirt or other matter which would prevent the making of a satisfactory joint. The gasket shall be checked to make sure the gasket is properly seated in the bell groove, and then the outside of the spigot end shall be lubricated with particular attention paid to the bevel. Lubricant coating shall be equivalent to a brush coat of enamel paint. The gasket shall not be removed from the bell. The joint shall be made using a bar and block from the back end making sure the block protects the pipe end from the bar. Trenching equipment shall not be used to bell the pipe. The joint shall be assembled only to the stop mark provided on the spigot end but not over this mark. If undue resistance to insertion of the spigot is encountered or the assembly mark does not reach the flush position, disassemble the joint, check the position of the gasket, and remove any debris.

a. Pipe lubricant shall be compatible with the gasket material as recommended by the pipe manufacturer and approved by NSF International.

D. Backfilling:

1. Prior to backfilling, check to see that the assembly mark is flush with the end of the bell. The pipe shall be bedded true to line and grade with uniform and continuous support from the bedding. Blocking with wood, brick, or any hard object shall not be used to bring the pipe to grade. The pipe shall be placed upon a uniform and flat crushed stone bedding surface. Foundation and bedding shall be constructed as described in Section 02200 – Earthwork to provide even restraint and support in all directions.

2. The initial backfill of crushed stone shall be placed in such a manner to achieve uniform pipe support and loading over the pipe and bedding as described in Section 02200 – Earthwork. The materials shall be simultaneously deposited on each side of the pipe to prevent lateral displacement of the pipe, making certain the materials fill the haunch area. The crushed stone backfill shall be placed as shown on the Excavated Point Repair (Pipe and Tap Connection) detail on Drawing D01.

E. Field-Cutting PVC Pipe:

1. When odd lengths are required, the pipe shall be cut using a hand saw or other methods approved by the Owner and/or Engineer. Cuts shall be made at 90 degrees to the centerline of the pipe so that a framing square placed against the outside of the pipe at the pipe end will not reveal more than a 1/8-inch maximum gap to the inside of the tool arm across the diameter of the pipe in any direction.

2. Contractor shall use a factory-finished spigot end as a guide for correct angle of bevel (15 degrees +0/-2), depth of bevel, and location for insertion mark. The square end may be beveled with a beveling tool, hand rasp, or power sander. Round off any sharp edges on the leading edge of the field-cut beveled end.

3.02 ACCEPTANCE TESTING

A. All testing performed by the Contractor shall be witnessed by the Owner and/or Engineer, who shall be notified a minimum of twenty-four (24) hours in advance of each test.
B. Main line PVC pipe installation shall be CCTV-inspected in accordance with Section 02731 – Sanitary Sewer Television Inspection.

C. Deflection Tests:

1. All main line installations of PVC pipe shall be tested for deflection by the Contractor. No section of sewer shall be tested until a minimum of 30 days have elapsed from the date of completed backfill over the section. The pipe will be observed for evidence of obvious ovality, deflected or offset joints, and other pipe defects.

2. The deflection, or deformation of the pipe due to external loading, shall not exceed 5 percent. All labor, materials, and equipment necessary for cleaning the sewers and performing the deflection testing shall be furnished by the Contractor. Prior to the test, the Contractor’s mandrel must pass a ring gauge test, performed by the Owner and/or Engineer at the site using the Owner’s or Engineer’s ring gauge, to show that the mandrel is properly sized in accordance with the mandrel sizes for 5 percent deflection listed herein.

3. Deflection testing of main line PVC pipes may also be performed by the Owner and/or Engineer, with all associated costs paid by the Owner, at any time during the warranty or Contract Bond period, and the deflection in any pipe shall not exceed 5 percent.

4. Deflection shall be determined by passing an approved go/no go mandrel through the gravity sewer main. Deflection shall be based on the average inside diameter of PVC pipe listed in the following standards:

   a. **C900 PVC**: Table 1 in AWWA C900

   b. **SDR 26 PVC**: Table X1.1 in ASTM D3034 as follows:

<table>
<thead>
<tr>
<th>Nominal Pipe Size (inches)</th>
<th>Average Inside Diameter (inches)</th>
<th>Mandrel 5 Percent Deflection (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>7.715</td>
<td>7.11</td>
</tr>
<tr>
<td>10</td>
<td>9.644</td>
<td>8.87</td>
</tr>
<tr>
<td>12</td>
<td>11.480</td>
<td>10.55</td>
</tr>
<tr>
<td>15</td>
<td>14.053</td>
<td>12.90</td>
</tr>
</tbody>
</table>

   c. If any pipe fails the deflection test performed by the Contractor, Owner, or Engineer, unstable conditions and/or improper bedding will be assumed. The overly deflected pipe shall be removed and replaced by the Contractor at his expense. Re-rounding of overly deflected pipe will not be allowed. Contractor shall excavate and/or remove and replace the installed bedding as required to correct the unstable soil condition and/or improper bedding in accordance with Section 02200 – Earthwork. New replacement pipe shall be connected to existing pipe to remain with new double bell PVC repair couplings (no stop) with a maximum 1-inch gap between the pipes inserted therein. The couplings shall conform to the Specifications herein for PVC pipe and fittings. The Contractor shall furnish the Owner with a new one (1)-
year warranty or Contract Bond guaranteeing the replacement work and materials under the same terms and conditions as the original new warranty or Contract Bond. The new warranty period shall commence from the Owner’s acceptance of the replacement work performed by the Contractor.

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SECTION 15009
HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART 1 -- GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish and install high density polyethylene (HDPE) pipe and all appurtenant work, complete and in-place, all in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01027 – Applications for Payment
B. Section 01300 – Submittals
C. Section 15000 – Basic Mechanical Requirements

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

B. ASTM D746  Standard Test Method for Britteness Temperature of Plastics and Elastomers by Impact
D. ASTM D1238  Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
E. ASTM D1248  Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
F. ASTM D1505  Standard Test Method for Density of Plastics by the Density Gradient Technique
G. ASTM D1603  Standard Test Method for Carbon Black Content in Olefin Plastics
I. ASTM D2657  Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
J. ASTM D2837  
Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

K. ASTM D3261  

L. ASTM D3350  
Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

M. ASTM F714  
Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter

N. ASTM F1473  
Standard Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins

1.04 SUBMITTALS

A. Shop Drawings: The Contractor shall submit the following in accordance with the requirements set forth in Section 01300 – Submittals and Section 15000 – Basic Mechanical Requirements:

1. HDPE Pipe Manufacturer’s Product Data:
   a. The origin of the resin to be used in the manufacture of the pipe, including the supplier’s name, production plant, brand name, and number
   b. Documentation from the resin’s manufacturer showing the results of the following tests for resin identification:
      (1) Density per ASTM D1505
      (2) Melt Flow Index per ASTM D1238
   c. HDPE pipe manufacturer’s quality control manual describing implementation of quality control procedures during pipe manufacturing process

2. HDPE pipe manufacturer’s certification of compliance with the requirements and standards listed herein

3. HDPE pipe manufacturer’s recommendation for handling, storing, and installing pipe and fittings

4. For each shipment of HDPE pipe, the manufacturer’s certification that the pipe was manufactured from the same resin identified

5. Prior to each shipment of HDPE pipe, certified test reports showing the pipe to be shipped was manufactured and tested in accordance with the ASTM standards specified herein.
6. Documentation of certification of all workmen who will be performing field fusion of the HDPE pipe as Certified Fusion Technicians by the pipe manufacturer

1.05 QUALITY ASSURANCE

A. All HDPE pipe and fittings shall be from a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of HDPE pipe and fittings. The pipe shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with this Specification.

B. Finished Product Evaluation:

1. Each length of pipe produced shall be checked by the manufacturer’s production staff for the following items. The results of all measurements shall be recorded on production sheets which shall become part of the manufacturer’s permanent records.

   a. Pipe in process shall be visually checked, inside and out, for cosmetic defects (grooves, pits, hollows, etc.).

   b. Pipe outside diameter shall be measured using a suitable periphery tape to ensure conformance with ASTM F714.

   c. Pipe wall thickness shall be measured at 12 equally spaced locations around the circumference at both ends of the pipe to ensure conformance with ASTM F714.

   d. Pipe length shall be measured.

   e. Pipe marking shall be examined and checked for accuracy.

   f. Pipe ends shall be checked to ensure they are cut square and clean.

C. Stress Regression Testing: The HDPE pipe manufacturer shall provide certification that stress regression testing has been performed on the specific polyethylene resin being utilized in the manufacture of this product. This stress regression testing shall have been performed in accordance with ASTM D2837, and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis (HDB) of 1,600 psi as determined in accordance with ASTM D2837.

1.06 STORAGE AND HANDLING

A. HDPE pipe shall be stored on clean, level ground to prevent undue scratching or gouging. The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. The maximum allowable depth of cuts, scratches, or gouges on the exterior of the pipe is 10 percent of wall thickness. The interior pipe surface shall be free of cuts, gouges, or scratches.

B. HDPE pipe and fittings shall be protected from harmful effects of exposure to sun (UV). Contractor shall provide adequate shade for pipe stored onsite.
PART 2 -- PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

A. Materials used for the manufacture of HDPE pipe and fittings shall be made from a PE 4710 resin compound meeting cell classification 445576E per ASTM D3350. The pipe material shall conform to the following cell classification requirements:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>ASTM Test Procedure Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Density</td>
<td>0.955 g/cm³</td>
<td>D1505</td>
</tr>
<tr>
<td>Melt Flow Index</td>
<td>0.1 g/10 minutes</td>
<td>D1238</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>133,000 psi</td>
<td>D790</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>3,500 psi</td>
<td>D638</td>
</tr>
<tr>
<td>Minimum Slow Crack Growth (SCG) (PENT)</td>
<td>500 hours</td>
<td>F1473</td>
</tr>
<tr>
<td>HDB at 23 degrees Celsius</td>
<td>1,600 psi</td>
<td>D2837</td>
</tr>
<tr>
<td>UV Stabilizer</td>
<td>Minimum 2 percent carbon black</td>
<td>D1603</td>
</tr>
<tr>
<td>Maximum Brittleness Temperature</td>
<td>−130 degrees Fahrenheit</td>
<td>D746</td>
</tr>
<tr>
<td>Minimum Hardness</td>
<td>61 (Shore D)</td>
<td>D2240</td>
</tr>
</tbody>
</table>

B. The HDPE pipe shall be a minimum of SDR11 rated for 200 psi. The pipe shall be ductile iron pipe size (DIPS). Dimensions and workmanship for pipe manufacture shall be in accordance with ASTM F714. All HDPE pipe and fittings furnished shall be green in color.

C. HDPE pipe and fittings shall be as manufactured by JM Eagle, ISCO Industries, or Performance Pipe.

D. HDPE pipe shall be marked either continuously or on intervals not to exceed five (5) feet by indirect printing with the following information:

1. Name and/or trademark of the manufacturer
2. Nominal pipe size
3. Dimension ratio
4. The letters PE followed by the polyethylene grade per ASTM D1248, followed by the HDB in 100's of psi
5. Manufacturing ASTM standard reference(s)
6. Production code from which date and place of manufacture can be determined

E. HDPE pipe is a flexible conduit and shall be designed to transfer imposed loads to the surrounding embedment medium. The pipe and fittings shall be free from all defects including indentations, delaminations, cracks, bubbles, pinholes, inclusions, or occlusions which, due to their nature, degree, or extent, detrimentally affect the strength and serviceability of the pipe. Any pipe or fittings with such defects which, in the judgment of the Owner and/or Engineer, will affect the strength and serviceability shall be repaired or rejected. The pipe shall contain no recycled materials or compounds. If rework compounds are required, only those generated in the manufacturer’s own plant from resin compounds of the same class and type from the same raw material supplier shall be used.

F. HDPE fittings and transitions shall be manufactured to the requirements of ASTM D3261 and this Specification and shall be ductile iron pipe size (DIPS). Fabricated fittings shall be manufactured from pipe of at least one SDR heavier pipe than the system piping and shall be pressure rated to match the system piping. The butt fusion outlets of fabricated fittings shall be machined to the same SDR as the system piping to which they are to be fused. The manufacturer shall subject samples of each production lot of molded fittings to x-ray inspection for voids. Voids shall not be permitted; should voids be found in the samples, the entire production lot shall be x-ray inspected. If additional voids are found, the production lot shall be rejected. The x-ray testing shall be conducted by an independent laboratory, and certified test reports shall be made available to the Engineer upon request. Initial sampling shall be limited to not less than 5 percent of the production lot.

G. HDPE pipes and fittings shall be joined with thermal butt fusion in accordance with procedures recommended by the pipe manufacturer and as outlined in ASTM D2657. The manufacturer shall provide fusion training services to the Contractor upon request.

H. Butt fusion joining of unlike SDR’s shall not be permitted. Transition from one SDR to another shall be accomplished by the use of mechanical couplings or a transition nipple, which is a short length of the heavier SDR pipe with one end machined to the lighter SDR.

I. Mechanical connections of polyethylene pipe to systems or fittings of other materials, including ductile iron, or to unlike SDR shall be by means of flanged connections (flange adapters and back-up rings rated for the same pressure service as the system piping), mechanical compression couplings designed for jointing HDPE to HDPE or HDPE to another piping material, and/or as shown on the Drawings.

J. Flanged joints shall use compatible bolts in accordance with the American Standard. Gaskets of reinforced rubber or asbestos-rubber shall be required when joining to non-HDPE materials. Flanged HDPE joints shall be gasketed at all service pressures.

K. Bolts in flanged joints shall be evenly torqued in a crossing pattern. Bolts shall be re-torqued after one hour or more has passed. HDPE pipe adjacent to flanged joints and the joints themselves shall be rigidly supported for a distance of one (1) foot or one pipe diameter, whichever is greater, beyond the flange assembly.

L. When mechanical compression couplings are used, HDPE pipes shall be reinforced by a stiffener in the pipe bore. Stiffeners shall be properly sized from the size and SDR of pipe being joined. Mechanical couplings shall be installed in accordance with the manufacturer’s recommended procedure.
M. Factory tests for compliance with this Specification shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate of compliance and a report of each test shall be furnished by the manufacturer for all material furnished under this Specification. HDPE pipe and fittings shall be rejected for failure to meet the requirements of this Specification.

PART 3 -- EXECUTION

3.01 INSTALLATION

A. Lengths of pipe shall be assembled into suitable installation lengths by the thermal butt fusion process. All pipe so joined shall be made from the same class and type of raw material made by the same raw material supplier. Pipe shall be furnished in standard laying lengths not to exceed 50 feet. Field fusion shall be allowed only to join straight lengths of pipe, fittings to straight pipe, or flanges or adapters to pipe or fittings, and shall be performed by documented Certified Fusion Technicians. No field-fabricated fittings shall be allowed.

B. Fused joints shall be inspected prior to placing the pipe in the excavation and hydrostatically tested in accordance with Article 3.02 TESTING.

C. Contractor shall use a datalogger to document and record the fusion of each joint in the field.

D. Machine used to fuse joints shall be approved by the Owner and/or Engineer. Pipe shall be placed on pipe rollers, skids, or other items to assist in movement prior to pulling into excavation with rollers spaced close enough to prevent excessive sagging of pipe.

3.02 TESTING

A. The Contractor shall perform a low-pressure water test at a minimum of 20 psi on each joined string of pipe to test the integrity of the fusion of the HDPE pipe joints prior to placing each string of pipe in the excavation.

B. The Contractor shall hydrostatically test the HDPE pipe at 100 psi for a period of two (2) hours after installation to ensure its integrity. Zero leakage shall be allowed. The Contractor shall review the pipe manufacturer’s recommendations for testing of HDPE pipe and shall coordinate any factors that affect testing, such as temperature, pipe expansion, water temperature, etc., with the Owner and/or Engineer. A calibrated pressure recorder shall be used to record the pressure during the test period. A report of the hydrostatic test shall be submitted to the Owner and Engineer.

C. Both tests shall be performed to the satisfaction of the Engineer and adjusted for temperature and other relevant field conditions as established in the guidelines of the manufacturer of the HDPE pipe.

- END OF SECTION -
APPENDIX A

STANDARD DRAWINGS
NOT TO SCALE

NOTES:

1. The intent of this drawing is to show "suggested" paving limits only. Paving requirements will vary from site to site depending on location of the sewer line, depth of cut and other field conditions.

2. This drawing assumes 12' lanes.

3. Pavement replacement ends a minimum of 6' past the ditch cut.

4. Milling limits to be determined by the Engineer.

AS DIRECTED BY THE ENGINEER

JEFFERSON COUNTY, ALABAMA
ENVIRONMENTAL SERVICES DEPARTMENT

PAY LIMIT GUIDELINE FOR PAVEMENT REPLACEMENT

SEPTEMBER 2003

APPROVED:__________

STANDARD DRAWING NO. SD1100
**SECTION A-A**

- **Four (4) 1"x 1 1/2" Cored Anchor Holes**
- **Four (4) 5/8" Bolt Holes Drilled and Tapped**

**SECTION C-C**

- **Pickhole Detail**
- **1/6" Rubber Gasket**

**SECTION B-B**

- **Watertight Detail**
- **5/8" x 2" S.S. Hex Head Bolts with S.S. Washers**

**SECTION D-D**

- **Frame Section**
- **Five (4) 3/4" Stainless Steel Anchor Bolts Cast in Cone Section**

**SECTION E-E**

- **Typical Manhole Section Anchor**

**Estimated Weights**

<table>
<thead>
<tr>
<th>Frame &amp; Cover</th>
<th>200 LBS.</th>
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<tbody>
<tr>
<td>Cover</td>
<td>105 LBS.</td>
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</table>

**Notes:**

1. Manhole Section Anchor Assemblies shall be installed between all Precast Riser Sections at every Manhole. Bolt down frame and cover are specified.

**PreCast Manhole Details**

- **PreCast Manhole Base**
- **Precast Riser Sections**
- **Precast Cone Section**

**Jefferson County Alabama Environmental Services Department**

**Bolt Down Manhole Frame & Cover Details**

**Nov. 1999**

- **Approved:**
- **Standard Drawing No.: SD1575**
(A) FLEXIBLE PAVEMENT

1. ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED.
2. SURFACE TREATMENT PAVEMENT JOINTS SHALL BE LAPPED AND FEATHERED

(B) RIGID PAVEMENT

1. 3000 PSI CONCRETE, HIGH EARLY CEMENT, TO BE USED FOR PAVEMENT REPLACEMENT
2. JOINTS TO BE MECHANICALLY SAWED.
3. IF REINFORCED, REINFORCING STEEL TO BE REPLACED IN KIND. LONGITUDINAL STEEL TO BE BUTT WELDED TO EXISTING.
TYPICAL CONCRETE COLLAR
PIPE SIZES 12" OR LESS
N.T.S.

Class "B" Concrete

Mission Adjustable Repair Coupling or Equal with Stainless Steel Bends and Stainless Steel Shear Ring

1 1/2 D
NOTES:

1. Special Slope Protection of various points along existing stream banks may be required at the option of the Engineer to insure the stability of the sanitary sewer pipe and manholes.

2. Stone for channel protection Rip Rap shall be selected stone from rock cuts or other approved sources or pieces of concrete. It shall consist of well graded stones weighing from 10 pounds to 200 pounds each with at least 50% weighing over 80 pounds. Both width and thickness shall be at least 1/3 the length for each stone. Not more than 10% by total weight shall weigh less than 10 pounds and not more than 10% by total weight shall weigh more than 200 pounds.
February 9, 1999

Jefferson County Commission
202-B Courthouse
Birmingham, AL 35263-0044

Re: Jefferson County
Permit No. 3-1-3982
M. S. No. Jefferson County

Dear Sir:

Attached is your approved copy of the referenced permit.

Before starting any operation that is close to underground utilities the applicant is responsible for notifying the underground facility operator or a "One Call Notification System" at least 2 days prior to start of operations. If applicant or his agents damages underground facilities without prior notification they are subject to a civil penalty up to $10,000.00 as stated in State Act S.299 Section 10(a).

As required by the Alabama Department Standards for Accommodating Utilities on Highway Rights of Way, would you please notify Mr. Ralph Smith of this office at 205/581-5704 twenty-four (24) hours prior to beginning work and 48 hours prior to working on weekends. Also notify this office upon completion of the work.

Your cooperation is appreciated.

Yours truly,

A. Michael Mahaffey
District Engineer

LSH
Attachment
cc: File
February 4, 1999

Mr. A. Michael Mahaffey
District Engineer
Alabama Department of Transportation
1020 Bankhead Highway, West
Birmingham, Alabama 35204

RE: Jefferson County
Utility Permit No. 3-1-3982
Jefferson County Commission
Environmental Services
Department

Dear Mr. Mahaffey:

Attached is an approved copy of the above referenced utility permit. This approval covers county wide rehabilitation of the County Commission’s existing sanitary sewer systems along various routes provided that all associated work that is within the Department’s highway rights-of-way meets all ALDOT requirements.

This blanket approval does not cover work considered to be under the Maintenance Bureau’s jurisdiction or level of approval.

The Commission should be reminded that no work shall commence without prior review and approval from the Department.

This is for your use and further handling with Jefferson County Commission.

Sincerely,

James F. Horsley
Division Engineer

JFH/LJR/dmr
C: Mr. W. R. Davis
File
To: Mr. James F. Horsley, Third Division Engineer  
Alabama Department of Transportation  
P.O. Box 2745  
1020 Bankhead Hwy., West  
Birmingham, Al 35202

Reference: Utility Permit 3-1-3982  
Jefferson County Commission, Environmental Services Department

Attention: Mr. William R. Davis, Division Maintenance Engineer

Dear Mr. Horsley:

Please find attached an approved copy of the above referenced permit application for your use and further handling. Please be aware that this permit does not authorize any work on Interstate right-of-way without prior review and approval from this office.

If you should have any questions or comments please feel free to contact this office at (334) 242-6474.

Sincerely;

John Lorentson  
State Maintenance Engineer

JL/dep2
December 4, 1998

Mr. James F. Horsley, P.E.
Division Engineer
Alabama Department of Transportation
Post Office Box 2745
Birmingham, AL 35202

ATTN: A. Michael Mahaffey, P.E.

RE: ALDOT Blanket Construction Permit for Jefferson County Sanitary Sewer Rehabilitation

Dear Mr. Horsley:

Enclosed, as discussed, are "Blanket" Permit Agreements for Jefferson County Sanitary Sewer Rehabilitation to satisfy Consent Decree requirements. The agreements have been executed by the Jefferson County Commission.

Should you have questions or require clarifications, please give me a call at 325-5980.

Sincerely,

Ronald K. Wilson, P.E.
Project Manager

RKW/mo
ALABAMA DEPARTMENT OF TRANSPORTATION
"Blanket" Permit Agreement for the Repair, Rehabilitation and/or Improvement of Utility Facilities on Public Right-of-Way

Project Number
Permit No. 1-3-3982
P.E.
R.O.W.
Utilities
Construction
Maintenance Section, Jefferson County
Location of Accommodation:
Kilometer post _______ to _______

THIS AGREEMENT is entered into this the _____ day of ______________, 19___, by and between the Alabama Department of Transportation acting by and through its Transportation Director hereinafter referred to as the STATE and ______________________ a Utility hereinafter referred to as the APPLICANT.

WITNESSETH

WHEREAS, the APPLICANT desires to acquire a "Blanket" Permit for the maintenance, repair, rehabilitation, replacement and/or improvement of its facilities accommodated on public highway right-of-way in Jefferson County, Alabama, said project or maintenance section being designated as The Jefferson County Sanitary Sewer Rehabilitation Program and consisting approximately of the following:

 Sewer re-lining using trenchless methods, manhole rehabilitation, mainline point repairs, service lateral reconnection and repair, mainline replacement, manhole replacement and installation, and other repairs and improvements to meet Consent Decree requirements. All site restoration will be performed in accordance with ALDOT specifications. (See Attached)

WHEREAS, the STATE hereby grants to the APPLICANT approval to cross or locate its facilities on the public right-of-way at the location and in the manner hereinafter set forth:

NOW, THEREFORE, it is agreed by and between the parties hereto as follows:

1. The APPLICANT will repair, rehabilitate and/or improve its facilities on public right-of-way in accordance with plans and specifications of the APPLICANT as approved by the STATE which plans and specifications are hereby made a part hereof by reference.

2. In the repair, rehabilitation and/or improvement of facilities and performing work under this agreement, the APPLICANT will conform to the provisions of the latest edition of the Alabama Department of Transportation Utility Manual, which manual is of record in the Department of Transportation and is hereby a part hereof by reference.

3. The national Manual on Uniform Traffic Control Devices, latest edition, is hereby made a part hereof by reference and will be conformed to as the provisions thereof are applicable to such work. Such Manual is of record in the Alabama Department of Transportation at the execution of this Agreement.

4. The Clean Water Act, 1987 and the Alabama Nonpoint Source Management Program, 1989 are hereby made a part hereof by reference and will be conformed to by the APPLICANT as the provisions thereof are applicable hereto.

The APPLICANT will conform to the regulations of the Environmental Protection Agency (EPA) and of the Alabama Department of Environmental Management (ADEM), latest edition, for both installation and maintenance of such facilities.
5. If hazardous materials, wastes, substances, or as otherwise defined by Code of Alabama § 5-332.1 (a)(2)(1993 Repl. Vol.) are encountered in the execution of this Agreement it will be the responsibility of the APPLICANT to notify the proper agency responsible for said hazardous materials and to comply with any and all environmental regulations as established by the Environmental Protection Agency (EPA), Alabama Department of Environmental Management (ADEM), and of the Occupational Safety and Health Administration (OSHA) in the proper disposition of the hazardous materials encountered.

6. The APPLICANT will file with the STATE an acceptable certified check or bond in the penal amount of $______ to guarantee the faithful performance of this permit contract in its entirety. Upon satisfactory completion and acceptance of all work provided for in this permit contract, the check or bond, as applicable, will be returned to the APPLICANT; otherwise, the proceeds from the check, or any amount received by the STATE as a result of the bond, will be applied to complete and fulfill the permit contract terms.

7. Reimbursement for future relocations of the APPLICANT’s facilities will be in accordance with State law in effect at the time such relocations are made.

8. The APPLICANT will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the APPLICANT, its agents, servants, employees or facilities.

9. The APPLICANT will have a copy of this Agreement on the project site at all times while said work is being performed.

10. Nothing contained in this Permit Agreement, nor the issuance or receipt thereof, shall be construed to alter or affect the title of the STATE to the public right-of-way nor to increase, decrease or modify in any way the rights of the APPLICANT provided by law with respect to the construction, operation or maintenance of its facilities on the public right-of-way.

11. The repair, rehabilitation and/or improvement of the facilities and related work covered by this Agreement shall be completed within one year from the date the work is begun, otherwise this Agreement becomes null and void. Once work is begun the APPLICANT shall pursue the work continuously and diligently until completion.

12. The APPLICANT will perform or cause to be performed the work applied for in this permit contract and will restore the highway in the work area in as good condition as the same was prior to the work and will maintain the accomplished work and highway work area in condition satisfactory to the Alabama Department of Transportation for a period of one year from acceptance by the Department of the completion of work applied for by APPLICANT.

13. The APPLICANT stipulates that the specific use of these facilities located upon public right-of-way is for transport of domestic wastewater.

APPLICANT further stipulates that should this specific use change at any time in the future that the APPLICANT will notify the STATE immediately of the change.

14. THE APPLICANT IS NOT TO PERFORM ANY WORK ON INTERSTATE RIGHT-OF-WAY WITHOUT PRIOR WRITTEN PERMISSION FROM THE ALABAMA DEPARTMENT OF TRANSPORTATION.
IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, to be effective on the day and year first above stated.

WITNESS:

[Signature]

APPROVED AS TO FORM:

By:
Counsel,
Alabama Department of Transportation

RECOMMENDATION FOR APPROVAL:

By:
District Engineer

By:
Division Engineer

JEFFERSON COUNTY COMMISSION
(Legal Name of Applicant)

By:
(Signature and Title)

Gary White
(Typed or Printed Name)

President
(Typed or Printed Title)

c/o Ronald K. Wilson, P.E.
Project Manager
Environmental Services Department
(Address)

(205) 325-5980
(Telephone)

ALABAMA DEPARTMENT OF TRANSPORTATION
ACTING BY AND THROUGH ITS
TRANSPORTATION DIRECTOR

By:
(Maintenance Engineer)

APPROVED BY THE
JEFFERSON COUNTY COMMISSION
DATE: 12-2-98
MINUTE BOOK: 123
PAGE(S): 06-98
November 2, 1998

Mr. James F. Horsley
Division Engineer
Alabama Department of Transportation
Post Office Box 2745
Birmingham, AL 35202

RE: ALDOT Blanket Construction Permit for Jefferson County Sanitary Sewer Rehabilitation

Dear Mr. Horsley:

As you are aware, the Jefferson County Environmental Services Department, under the auspices of the Jefferson County Commission, is currently in the process of rehabilitating sanitary sewers in Jefferson County. This work is required as a result of a Consent Decree executed by Jefferson County, the U.S. Environmental Protection Agency and the Justice Department, local citizen plaintiffs R. Allen Kipp, Jr., et., al., and the Cahaba River Society and involves work on an estimated 12,000,000 linear feet (approx. 2,300 miles) of sanitary sewer. The County anticipates that over 125 projects will be let for construction under this program at a cost of over 500 million dollars. The total program, which also includes wastewater treatment plant upgrades and major sewer replacements, is projected to cost in excess of 1.2 billion dollars. The County is currently bidding sewer rehabilitation projects on a four (4) week schedule with lag time between projects to decrease to three (3) weeks by November, 1999. The critical path for completion of this work is September 1, 2006 and encompasses work in our largest system, the Valley Creek Basin.

Obviously, to successfully complete a program of this scope and magnitude requires the cooperation of many entities and jurisdictions. As discussed in our October 23, 1998 meeting with you and your staff, a blanket ALDOT permit for sewer rehabilitation work within state highway right-of-way is undoubtedly the most prudent and effective way to allow this work to proceed in a timely manner, to
allow it to remain on schedule and to avoid the imposition of stipulated penalties by the EPA for exceeding specified deadlines. Therefore, our request for a "blanket permit" for this work is hereby submitted.

As agreed upon in our meeting, the County, through its design engineer USInfrastructure, Inc., will provide the ALDOT Third Division-District 1 office with detailed drawings of all work to be performed within state highway right-of-way prior to the onset of that work. The County will also require its contractor to notify the ALDOT a minimum of 48 hours prior to commencing with the work. As discussed, work to be performed on existing sewers already located within state highway rights-of-way will be considered to be maintenance related. This work will primarily be trenchless in nature, but will also include mainline point repairs, service lateral repairs, mainline replacements, repairs to mainline connections at manholes, and manhole replacements and/or installations. Where practical, mainline replacements will be relocated to areas away from the pavement. All work will be performed in accordance with ALDOT specifications and your office will be furnished with as-constructed drawings once work is completed.

Your issuance of a "blanket permit" for Jefferson County sanitary sewer rehabilitation within state highway right-of-way is requested at your earliest convenience. Should you have questions or require additional information, please give me a call at 325-5980.

Sincerely,

[Signature]

Ronald K. Wilson, P.E.
Project Manager

RKW/mo

cc:  A. Michael McAliffey, Alabama Department of Transportation
     Jack W. Swann, Director
     Environmental Services Department
     Mike Eddington, USInfrastructure, Inc.
     Clarence Barber, Jefferson County Construction Superintendent
APPENDIX C

JEFFERSON COUNTY ENVIRONMENTAL SERVICES DEPARTMENT MBE/DBE FORMS
### JEFFERSON COUNTY, ALABAMA
ENVIRONMENTAL SERVICES DEPARTMENT

**POTENTIAL SUBCONTRACTORS LIST**
(TO BE SUBMITTED WITH BID DOCUMENTS)

**MBE/DBE DOCUMENTATION**

**GENERAL CONTRACTOR:**  BLD SERVICES, LLC

**CONTACT:**  JACOB TRAPANI

**SANITARY SEWER SYSTEM-ASSET MANAGEMENT PROGRAM CONTRACT**
**NAME OF PROJECT:**  NO 2019 AMP01-WYLAM PS SERVICE AREA COMPREHENSIVE REHABILITATION

**DATE SUBMITTED:**  01/22/20

<table>
<thead>
<tr>
<th>List Each MBE/DBE Firm Submitting Proposals</th>
<th>Scope of Work</th>
<th>Proposal Amount ($)</th>
</tr>
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<tbody>
<tr>
<td>Advantage Manhole &amp; Concrete Services</td>
<td>Manhole Rehab</td>
<td>$137,000.00</td>
</tr>
<tr>
<td>Underground Eyes, Inc.</td>
<td>Lateral Launch &amp; Clean/TV</td>
<td>$ 65,542.40</td>
</tr>
</tbody>
</table>

**Instructions:**

1. Complete this form regarding the MBE/DBE Firms submitting proposals on the specified project.
2. Submit completed form WITH BID DOCUMENTS.
3. Submission of Form “A” is a prerequisite to awarding the Contract.
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JEFFERSON COUNTY, ALABAMA
ENVIRONMENTAL SERVICES DEPARTMENT

SUBCONTRACTORS TO BE UTILIZED
(TO BE SUBMITTED PRIOR TO CONTRACT AWARD)

MBE/DBE DOCUMENTATION

GENERAL CONTRACTOR:  BLD Services LLC

CONTACT:  Jacob Trapani
Contract NO. 2019 AMP 01 Wylam PS Service Area
Comprehensive Rehabilitation

NAME OF PROJECT:

TOTAL CONTRACT AMOUNT $ 1,396,437.50

TOTAL AMOUNT OF ALL SUBCONTRACTORS $ 685,801.50

DATE SUBMITTED:  1/23/20

<table>
<thead>
<tr>
<th>List Each MBE/DBE Subcontractor to be Utilized</th>
<th>Scope of Work</th>
<th>Contract Amount ($)</th>
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<td>Advantage Manhole &amp; Concrete Services</td>
<td>Manhole Rehab</td>
<td>$137,000.00</td>
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TOTAL $ 202,542.40

Instructions:
1. Complete this form regarding the MBE/DBE participation to be utilized on the specified project.
2. Submit completed form prior to contract award.
3. Submission of Form "B" is a prerequisite to awarding the Contract.
JEFFERSON COUNTY, ALABAMA
ENVIRONMENTAL SERVICES DEPARTMENT

MONTHLY REPORT FORM
(TO BE SUBMITTED WITH EACH MONTHLY PAYMENT REQUEST)

MBE/DBE DOCUMENTATION

GENERAL CONTRACTOR: _________________________________________

CONTACT: ____________________________________________________

NAME OF PROJECT: ____________________________________________

TOTAL CONTRACT AMOUNT $ _________________________________

SUBMITTED WITH PAYMENT REQUEST NUMBER _____________________

DATE SUBMITTED: _____________________________________________

<table>
<thead>
<tr>
<th>List Each MBE/DBE Subcontractor Utilized</th>
<th>Original Subcontract Amount ($)</th>
<th>BILLINGS</th>
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| Totals |                                |                     |                |
|--------|--------------------------------|---------------------|

Instructions:

1. Complete this form regarding the MBE/DBE participation utilized on the specified project.
2. Submit completed form with each monthly payment request to Environmental Services Department.
3. Submission of this form is a prerequisite for processing the monthly payment request.

Revised 6/16/2003
FORM "D"

JEFFERSON COUNTY, ALABAMA
ENVIRONMENTAL SERVICES DEPARTMENT

PROJECT CLOSE-OUT REPORT
MBE/DBE DOCUMENTATION

GENERAL CONTRACTOR: ________________________________

CONTACT: ________________________________________

NAME OF PROJECT: ________________________________________

TOTAL CONTRACT AMOUNT $ ________________________________
(BID AMOUNT)

FINAL CONTRACT AMOUNT $ ________________________________
(FINAL AMOUNT INCLUDING CHANGE ORDERS)

DATE SUBMITTED: ________________________________

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<tr>
<th>List Each MBE/DBE Subcontractor Utilized</th>
<th>Original Subcontract Amount ($)</th>
<th>Final Subcontract Amount ($)</th>
<th>Changes in Original and Final Subcontract Amounts ($)</th>
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Totals

Instructions:

1. Complete this form regarding the MBE/DBE participation utilized upon completion of the specified project.
2. Submit completed form to Environmental Services Department with request for release of retainage.
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To: Birmingham Construction Industry Authority (BCIA)
3600 4th Avenue South
Birmingham, Alabama 35222
BCIA Fax: 205/324-6210
ESD Fax: 205/325-5981

We hereby request assistance from the BCIA in securing proposals from MBE/DBE Subcontractors/Suppliers per the below listing of construction specialties. In order to be considered, proposals must be received in the Office of the General Contractor on or before the below listed date and time.

Please contact the following for additional information and assistance:

General Contractor/Contact: BLD SERVICES, LLC
Address: 2424 TYLER STREET
KENNER, LA 70062
Telephone: 504-466-1344 Fax: 504-461-5971

DEADLINE FOR RECEIPT OF PROPOSALS FROM MBE/DBE'S

Date: 01/08/20 Time: 3:20PM

FOR BCIA USE ONLY

Date Received: ____________________
By: ____________________

Check all categories that apply to the referenced project:

- Demolition
- Dewatering
- Geotechnical Work
- Material Testing
- Site Clearing and Grubbing
- Grading/Earthwork
- Erosion Control/Silt Fence
- Fencing
- Grassing
- Landscaping/Planting
- Asphalt Paving
- Pavement Striping/Marking
- T.V. Inspection
- Prep Manholes for Rehabilitation
- Pipe Point Repairs
- Hauling/Trucking
- Concrete Curb & Gutter
- Concrete Sidewalks
- Pour & Finish Concrete Flat Work
- Concrete Formwork
- Install Reinforcing Steel
- Paint, Patch & Rub Concrete
- Cementitious Coatings
- Masonry Work
- Wood Cabinets
- Asphalt Shingle Roofing
- Built-up Roofing
- Metal Roofing
- Gutters and Downspouts
- Waterproofing/Dampproofing
- Insulation
- Glass & Glazing
- Gypsum Wall Board System
- Ceramic/Quarry Tile
- Resilient Flooring
- Acoustical Ceilings
- Carpet
- Wall Coverings
- Painting
- HVAC
- Plumbing
- Electrical
- Underground Duct Banks
- Material Supply
APPENDIX D

State of Alabama Resident Status Form
JEFFERSON COUNTY, ALABAMA
ENVIRONMENTAL SERVICES DEPARTMENT

STATE OF ALABAMA RESIDENT STATUS FORM

_________________________________________ is a Resident Contractor in the State of Alabama as defined
Individual or Firm Name of Bidder in Section 39-2-12, Code of Alabama (1975) as amended.

BLD SERVICES, LLC
Individual or Firm Name of Bidder

is a Non-Resident Contractor in the State of Alabama.

THE ATTENTION OF BIDDERS IS CALLED TO THE PROVISIONS OF ALABAMA CODE
SECTION 39-3-5 (1975) AS AMENDED, REGARDING PREFERENCE TO RESIDENT
CONTRACTORS.

Instructions:

1. Submit this form regarding State of Alabama Resident Status WITH BID DOCUMENTS
2. Submission of this form is a prerequisite to awarding the Contract.
APPENDIX E

Jefferson County, Alabama

Equal Employment Opportunity Certification Form
ADMINISTRATIVE ORDER
OF THE
JEFFERSON COUNTY COMMISSION
08- 4

PURSUANT to the authority vested in the Jefferson County Commission by law, the following Administrative Order is hereby issued:

PURPOSE

To give notice to potential contractors that Jefferson County is an equal opportunity employer in accordance with Title VII, Civil Rights Act of 1964, 42 U.S.C. §§ 1981, 1983, 1986 and amendments, and it is the policy of Jefferson County to require contractors, vendors and suppliers (hereinafter “Contractor”) providing goods and services to the County to afford equal opportunity for employment to all individuals regardless of race, color, sex, age, religion, national origin, disability or veteran status.

I. PROCEDURE

The clause set forth below which requires Contractor compliance with federal law shall be incorporated in each bid or offer to do business with the County and in all contracts and subcontracts with the County as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, age, disability or veteran status pursuant to the provisions of Title VII of the Civil Rights Act of 1964, 42 U.S.C. §§ 1981, 1983, 1986 and all amendments thereto relative to discriminatory employment practices. The Contractor will ensure that qualified applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, national origin, age, disability or veteran status. Such action shall include, but not be
limited to the following: employment, promotion, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

2. In the event of the Contractor's non-compliance with the equal employment opportunity clause of this contract, this contract may not be awarded or may be cancelled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further County contracts.

3. The Contractor will include the provisions of paragraph (1) in every subcontract or purchase order.

4. The Contractor shall certify to the County its compliance with this policy prior to receipt of any contract or business with the County. (Form attached.)

II. EFFECTIVE DATE

This Administrative Order shall be effective upon adoption.

ORDERED at the Jefferson County Courthouse this 17 day of June, 2008.

BETTYE FINE COLLINS, President
Jefferson County Commission
JEFFERSON COUNTY, ALABAMA
EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATION FORM

Contractor/Vendor Name: BLD SERVICES, LLC

Address: 2424 TYLER STREET
          KENNER, LA 70062

The Contractor acknowledges receipt of Jefferson County's Equal Employment Opportunity Contractor Compliance Administrative Order (attached hereto) and certifies that it is an equal opportunity employer and agrees to the requirements of the Policy and the Equal Employment Opportunity Clause therein. It further certifies that it will require all subcontractors to execute an Equal Employment Opportunity statement and certification of compliance.

The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, age, disability or veteran status. The Contractor will ensure that qualified applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, national origin, age, disability or veteran status. Such action shall include, but not be limited to the following: employment, promotion, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.

The Contractor will furnish to the County, upon request, reports, notices, policies and/or information certifying compliance with this policy.

In the event of the Contractor’s non-compliance with the equal employment opportunity clause of this contract, this contract may not be awarded or may be cancelled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further County contracts.

01/21/20
Date

Signature JACOB TRAPANI

VICE PRESIDENT

Title
CERTIFICATE OF LIABILITY INSURANCE

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Marsh & McLennan Agency LLC
8144 Walnut Hill Lane, 16th Floor
Dallas TX 75231

CONTACT NAME: Laurie Carter
PHONE: (972) 770-7138
FAX: (972) 404-5580
E-MAIL: Laurie_Carter@mmib.com

INSURED
BLD Services, LLC
2424 Tyler St
Kenner LA 70062

INSURER A: Amarisure Insurance Company
NAIC #: 19468
INSURER B: XL Specialty Insurance Company
NAIC #: 37885
INSURER C: Amarisure Partners Insurance Company
NAIC #: 11050
INSURER D:
INSURER E:
INSURER F:

COVERAGES

CERTIFICATE NUMBER: 650133462

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LIK TYPE OF INSURANCE ADD'L SUB- POLICY NUMBER POLICY EFF POLICY EXP LIMITS
A X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE OCCUR CPP2107069 12/16/2019 12/16/2020 EACH OCCURRENCE $1,000,000 DAMAGE TO RENTED PREMISES (By occurrence) $1,000,000 MED EXP (Any one person) $10,000 PERSONAL & ADV INJURY $1,000,000 GENERAL AGGREGATE $2,000,000 PRODUCTS- COMPO ACG $2,000,000

A X AUTOMOBILE LIABILITY ANY AUTO CA2107098 12/16/2019 12/16/2020 EACH OCCURRENCE $1,000,000 MED EXP (Any one person) $50,000 PERSONAL & ADV INJURY (Per accident) $1,000,000 PROPERTY DAMAGE (Per accident) $50,000

B X UMBRELLA LIABILITY OCCUR EXCESS LIABILITY CLAIMS-MADE US00081750LJ19A 12/16/2019 12/16/2020 EACH OCCURRENCE $10,000,000 MED EXP (Any one person) $50,000 PERSONAL & ADV INJURY (Per accident) $1,000,000 PROPERTY DAMAGE (Per accident) $50,000

C X WORKERS COMPENSATION AND EMPLOYEES' LIABILITY Y/N Y N/A WC2107085 12/16/2019 12/16/2020 E.L. EACH ACCIDENT $1,000,000 E.L. DISEASE - EA EMPLOYEE $1,000,000 E.L. DISEASE - POLICY LIMIT $1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)


Additional insured form #CA7115 edition 11/09, #CA7168 edition 11/09 & #CA7171 edition 05/08 applies to the Automobile Liability policy.

Waiver of subrogation form #WC000313 applies to the Workers Compensation policy.

CERTIFICATE HOLDER

Jefferson County, AL
716 Richard Arrington Jr. Blvd. N
Suite A-300
Birmingham AL 35203

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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ACORD 25 (2016/03) The ACORD name and logo are registered marks of ACORD
**ADDITIONAL REMARKS SCHEDULE**

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<td>BLD Services, LLC</td>
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<tr>
<td>ADDRESS</td>
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<tr>
<td>CITY</td>
<td>Kenner</td>
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<tr>
<td>STATE</td>
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**ADDITIONAL REMARKS**

**THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM.**

**FORM NUMBER:** 25  **FORM TITLE:** CERTIFICATE OF LIABILITY INSURANCE

The General Liability policy includes a blanket additional insured endorsement to the certificate holder only when there is a written contract between the named insured and the certificate holder that requires such status.

The General Liability policy contains an endorsement with “Primary and Non-Contributory” wording that may apply only when there is a written contract between the named insured and the certificate holder that requires such wording.

The General Liability policy contains a blanket waiver of subrogation endorsement that may apply only when there is a written contract between the named insured and the certificate holder that requires such wording.

The Automobile Liability policy contains language that provides additional insured status to the certificate holder only when there is a written contract between the named insured and the certificate holder that requires such status.

The Automobile Liability policy includes waiver of subrogation wording that may apply only when there is a written contract between the named insured and the certificate holder that requires such wording.

The Worker’s Compensation policy includes a waiver of subrogation endorsement that may apply only when there is a written contract between the named insured and the certificate holder that requires such wording.

RE: Project: Wyham PS Service Area Comprehensive Rehabilitation Contract No. 2019 AMP01

PROJECT LOCATION: Birmingham, AL

Wednesday, January 22, 2020 @ 2:00 p.m.
State Licensing Board for General Contractors

This is to certify that

BLD SERVICES LLC

is hereby licensed a General Contractor in the State of Alabama and is authorized
to perform the following type(s) of work:

BC: BUILDING CONSTRUCTION, HR: HEAVY AND RAILROAD, MU: MUNICIPAL AND UTILITY, REP: RECIPROCITY STATE OF

LOUISIANA

until November 30, 2020

Witness our hands and seal of the Board, dated Montgomery, Ala.

2nd day December, 2019

Chairman

Secretary-Treasurer

[Signature]
AUTHORIZATION OF AGENT
AND ATTORNEY-IN-FACT FOR BLD
SERVICES, L.L.C., BY SHIRLEY JARRELL WAGNER

I, Shirley Jarrell Wagner, the duly elected and acting Secretary/Treasurer and Manager of BLD Services, L.L.C., a Louisiana limited liability company, pursuant to the authority granted to me by resolutions unanimously adopted by the Members and Managers of BLD Services, L.L.C., in a Unanimous Written Consent of the Members and Managers of BLD Services, L.L.C., dated June 15, 2018, which resolutions are in full force and effect as of the date hereof, do hereby take the following action:

I hereby authorize, empower and appoint Jacob Trapani, Vice President and Manager, to serve as authorized Agent and Attorney-in-Fact of BLD Services, L.L.C., to act on behalf of BLD Services, L.L.C., in connection with any and all negotiations, bids, concerns and transactions, including but not limited to the execution of any and all bids, papers, documents, affidavits, bonds, sureties, contracts and acts, and to receive and receipt thereof all purchase orders and notices issued pursuant to the provisions of any such bids or contracts; and further to take any and all actions necessary to carry to the purposes and intents of this action; and that the Members and Managers of BLD Services, L.L.C., therefore do therefore ratify, confirm and approve and accept each and every act performed by Jacob Trapani, Vice President and Manager, as said Agent and Attorney-in-Fact of BLD Services, L.L.C., in furtherance of this appointment.

January 17, 2020

DATE

[Signature]

SHIRLEY JARRELL WAGNER
SECRETARY/TREASURER AND MANAGER
UNANIMOUS WRITTEN CONSENT
OF THE MEMBERS AND MANAGERS OF BLD SERVICES, L.L.C.

We, the undersigned, constituting all of the Members and Managers of BLD Services, L.L.C., a Louisiana limited liability company, do hereby unanimously approve the following resolutions, effective immediately:

RESOLVED, that the following persons are hereby elected and confirmed as the Officers and Managers of BLD Services, L.L.C.:

Daniel P. Wagner III – President and Manager

Shirley Jarrell Wagner – Secretary/Treasurer and Manager

Jacob Trapani – Vice President and Manager

RESOLVED FURTHER, that Shirley Jarrell Wagner be and is hereby authorized and empowered to submit bids for private or public contracts for or on behalf of BLD Services, L.L.C., whether such bids be inside or outside the State of Louisiana, with all of the rights, powers, and authority incumbent thereto.

FURTHER RESOLVED, that Shirley Jarrell Wagner be and she is further authorized and empowered to sign or otherwise execute any and all contracts for or on behalf of BLD Services, L.L.C., whether they be inside or outside the State of Louisiana, including but not limited to the execution of any and all bids, papers, documents, change orders, affidavits, bonds, sureties and acts, and to receive and receipt thereof all purchase orders and notices issued pursuant to the provisions of any such bids or contract, with all of the rights, powers, and authority incumbent thereto.

FURTHER RESOLVED, that Shirley Jarrell Wagner be and she is an authorized agent of BLD Services, L.L.C., for any and all purposes and with all of the rights, powers and authority incumbent thereto.

FURTHER RESOLVED, that Shirley Jarrell Wagner be and she is further authorized and empowered to appoint Daniel P. Wagner, III, Jacob Trapani, Brent D. Albert, Danny M. Albert and Dustin T. Richards to each serve as an authorized Agent and Attorney-in-Fact of BLD Services, L.L.C., to act on behalf of BLD Services, L.L.C., in connection with any and all negotiations, bids, concerns and transactions, including but not limited to the execution of any and all bids, change orders, papers, documents, affidavits, bonds, sureties, contracts and acts, and to receive and receipt thereof all purchase orders, notices issued pursuant to the provisions of any such bids or contracts; and further to take any and all actions necessary to carry to the purpose and intent of this resolution; and that the Members and Managers of BLD Services, L.L.C., therefore do ratify, confirm and approve and accept each and every act performed by Daniel P. Wagner, III, Jacob Trapani, Brent D. Albert, Danny M. Albert and Dustin T. Richards as an Agent and Attorney-in-Fact of BLD Services, L.L.C., in furtherance of this resolution.

Thus done and signed this 15th day of June, 2018.
Unanimous Written Consent of the Members and Managers of BLD Services, LLC
June 15, 2018

BRAD LOUIS DUTRUCH, MEMBER

DANIEL MIREMONT, MEMBER

DANIEL WAGNER, MANAGER

SHIRLEY JARRELL WAGNER, MANAGER

JACOB TRAPANI, MANAGER
APPENDIX F

Article H, Excavations-
General Code of the City of
Birmingham, 1980
Ordinance No. 10-115
Section 1. BE IT ORDAINED by the Council of the City of Birmingham, Alabama, that Title 4, "Municipal Services", Chapter 5, "Streets and Sidewalks", Article H, "Excavations", of the General Code of the City of Birmingham, 1980, Sections 4-5-131, 4-5-132, 4-5-133, 4-5-134, 4-5-135, 4-5-136, 4-5-137, 4-5-138, 4-5-139, 4-5-140, 4-5-141, 4-5-142, 4-5-143, 4-5-144 and 4-5-145 are hereby amended, altered, modified and add provisions related to excavations, to required that work be done by a licensed contractor; to provide that contact information be provided by all utilities and/or franchisees; to increase permit fees; to require that a permittee shall restore or caused to be restored pavement for all excavations according to city standards; to require a bond prior to issuance of an excavation permit and circumstances under which it may be waived; to revise time limits in permits; to provide clarifications for the term "utility," where new utilities shall be located, and for utility replacement; to provide that for the restoration of streets, alleys, sidewalks or other public ways by permittee in accordance with city standards, specifications and details; correct clerical errors; to provide for due process rights of permittee; and, otherwise revise; and to provide that an unmarked ordinance-containing the amended, altered, modified and additional provisions be substituted and replace the prior language of such sections as heretofore referenced herein in their entirety in the General City Code to read in full as follows:

"Sec. 4-5-131 Permit; required; exceptions.

"(a) It shall be unlawful, except in an emergency as set forth in section 4-5-132, for any person, other than an authorized officer, employee or agent of the city, to make any opening, cut or excavation in or under the surface of any street, alley, sidewalk or public way of the city without having first obtained a permit as provided in this article, or without having first obtained a permit as provided in this article, or without inspection as required by that permit.

"(b) It shall also be unlawful for any person to whom a permit has been issued to do or cause to be done the work authorized therein without also complying with inspection requirements contained in the permit.

"(c) The permittee shall cause the work authorized by a permit issued in accordance with this article to be performed by an entity licensed to do the work for which the permit is issued. All pavement restoration shall be performed by a licensed paving contractor. Proof of licensure shall be presented at the time application for a permit is made or a permit will not be issued.

"Sec. 4-5-132 Same; procedure when utility installation breaks, etc.
“(a) In the event that any sewer, main, conduit or other utility or franchisee installation in or under any street, alley, sidewalk or public way shall burst, break or otherwise be in a condition as seriously to endanger persons or property, the owner of that sewer, main, conduit or other installation shall immediately repair the trouble and shall immediately take all necessary steps to make the location safe and secure. That owner, utility or franchisee shall not, however, begin making any permanent repairs to the street, alley or sidewalk until he shall have secured a permit as provided in this article. A permit shall be secured on the next business day after any break or serious trouble shall have developed, and the necessary repairs to the street, alley or sidewalk shall be made as directed by the city engineer and shall be completed as is set forth in this Sec. 4-5-144.

“(b) It shall be unlawful for any person to cut any pavement under this section unless an emergency shall be of such nature that immediate repair is required for the safety of persons or property or both, and it shall be unlawful for any person to fail to comply with all other provisions of this article, including but not limited to the securing of a permit within the time required and the payment of the special charge and making of permanent restoration in the manner and time required by sections 4-5-133, 4-5-135, and 4-5-144.

“(c) Any and all utilities and/or franchisees shall provide current contact information, including the name of a designated person, address, telephone, cell phone, email or other electronic means of communication to the city engineer to report an emergency repair to be made under this section. Should the city become independently aware of a cut to any pavement under this section, the city shall notify utility or franchisee to comply with permit requirements. Failure to comply shall result in a permit fee of not less than two hundred dollars ($200.00). The contact information described herein shall be made available to the city engineer upon request.

“Sec. 4-5-133 Same; special charge; when required.

“Subject to the provisions of sections 4-5-36, 4-5-134, 4-5-135 and 4-5-144, any person desiring to make or who has under section 4-5-132 made any opening, cut or excavation in or under the surface of any paved, curbed or otherwise improved street, alley or sidewalk for any rightful or necessary purpose to be accomplished speedily and without undue delay in the event the street to be cut or which has been cut has been paved or repaved less than five (5) years next prior to the application for the permit, shall, at the time the excavation permit is applied for and prior to the issuance thereof pay to the city engineer a special charge, to become a part of the general fund of the city, an amount calculated according to the age of the pavement, as follows: During the first twelve (12) months after completion, one thousand dollars ($1000.00); during the second twelve (12) months, eight hundred dollars ($800.00); during the third twelve (12) months, six hundred dollars ($600.00); during the fourth twelve (12) months, four hundred dollars ($400.00); and during the fifth twelve (12) months, two hundred dollars ($200.00).

“Sec. 4-5-134 Same; same; when payment excused.
"In the event that the city engineer shall, in his sound discretion, determine that due to circumstances beyond the control of any person who owns such property as to which notice was mailed as provided in section 4-5-36 which abuts on or is in any street or alley which has been paved or repaved within five (5) years next preceding the application for a pavement cut permit, improvements on the property have been damaged or destroyed in such a manner as to require a permit for a pavement cut to be issued pursuant to the rebuilding or repair of such destroyed or damaged improvements, then the city engineer may issue a permit for such pavement cut without requiring the payment of the special charge provided in section 4-5-133. In no case shall this special charge be required where notice was not mailed as provided in section 4-5-36.

"Sec. 4-5-135 Same; provision to be made for restoration of pavement.

"(a) The permittee shall restore, or cause to be restored, the pavement for all excavations in streets, alleys, sidewalks or other public ways, and curbs and gutters in accordance with the city of Birmingham's standard specifications and details. Said specifications and details are on file in the office of the city engineer.

"(b) The cost of restoration shall be paid by the applicant for the total cost incurred to restore streets, alley, sidewalks or other public ways, and curbs and gutters.

"(c) Prior to the issuance of any permit required by this article, any permittee for whom application for a permit is made to make any opening, cut or excavation in or under the surface of any street, alley, sidewalk or public way of the city shall, in addition to payment of the special charge provided in the section 4-5-133, when the payment is required, deposit with the Department of Finance and continuously maintain a good and sufficient bond in the sum of ten thousand dollars ($10,000) for cuts seventy-five (75) square feet or less or if the cut is greater than seventy-five (75) square feet in an amount to be approved by the city engineer, and made by a surety company duly authorized to do business in Alabama. Said bond shall be conditioned that the person, firm, or corporation, to be known as the principal in said bond, shall observe all ordinances and laws of the City pertaining to said business or businesses, whether now or hereafter enacted, together with all rules and regulations established under the authority of said laws or ordinances; shall perform in a workmanlike manner all work undertaken by the permittee in the prosecution of said business or businesses; and shall indemnify and save harmless the said City from all liability occasioned or arising from any activities by said principal, its servants and agents, in any way related to said activities; and shall adequately safeguard all excavations which may be opened by said principal in the streets, alleys, sidewalks and other public ways of said City; and shall restore, or cause to be restored, in accordance with the city of Birmingham's standard specifications and details, all such portions of said streets, alleys and sidewalks and other public ways excavated by said principal in the prosecution.
of said business or businesses. Any person, firm, or corporation injured in person or property by reason of the activities by said principal, or by an act, default, or omission constituting a breach of any of the conditions of this bond, may maintain a suit or action thereon for such injury. Said bond shall also provide that it may be canceled by the surety by giving the city engineer thirty (30) days notice in writing prior to the date of cancellation.

"(d) The bonding requirement in section 4-5-135(c) of this Article is waived if any permittee for whom application for a permit is made has a bond as described in section 4-5-135(c) on file with the Department of Finance.

"(e) The bonding requirements of section 4-5-135(c) shall not apply to departments of the city.

"Sec. 4-5-136 Same; issuance; fee.

"All permits required by this article shall be issued by the city engineer or his or her designee. A permit fee of one hundred dollars ($100.00) shall be paid for each permit prior to issuance, provided that in the event construction is started before a written permit is granted, no permit shall be issued except upon payment of a fee of two hundred dollars ($200.00). The provisions of this section shall apply to all persons alike, whether they are authorized by law or franchise to excavate in or under any of the streets or sidewalks of the city or not.

"Sec. 4-5-137 Same; time limits.

"Any permit issued pursuant to this article shall become null and void in the event work authorized thereunder is not commenced within thirty (30) days after its issuance or in the event a cessation of work continues for twenty-four (24) hours unless a time extension is granted, in writing, by the city engineer or his or her designee.

"Sec. 4-5-138 Use of sewers or utilities prior to restoration of pavement prohibited; exceptions.

"It shall be unlawful for any person, except a public utility corporation, to use or attempt to use any sewer or public utility for which any pavement, sidewalk or curb cut was made until restoration shall have been completed and finally accepted by the city engineer, or his or her designee, where the work is done by a contractor and the cost thereof paid where done by the city.

"Sec. 4-5-139 Excavation under electrical, gas, building and plumbing codes subject to this article.

"All provisions of the electrical code, gas code, building code and plumbing code of the city relating to excavation in streets or alleys, and relating to connections with or use of
sewers and utilities requiring a permit for pavement, sidewalk or curb cuts shall be subject

to all applicable provisions of this article.

"Sec. 4-5-140 Obstruction of more than half of street or alley.

"(a) Except as otherwise provided in section 4-5-14 hereof, it shall be unlawful for any

person, firm or corporation to engage in any construction project, pavement or excavation

in or adjacent to any roadway, street or alley which shall in any way obstruct more than half

of the width of the roadway, street or alley any time, measured from curb to curb.

"(b) Any person, firm or corporation engaged in any construction, pavement or excavation

for which, due to the nature or extent of the work involved, obstruction is necessary of any

portion of a roadway, street or alley either within the Central Business District as defined in

section 10-1-1(6), or listed in "Schedule II, Through Streets Designated" as established in

section 10-10-1 hereof, may obstruct only such portion of the roadway, street or alley as the

city engineer, or his or her designee, may deem necessary and shall obtain a permit therefor

as provided herein, except as provided in the Technical Code of the City of Birmingham or

this section.

"(c) Requests for permits to obstruct any portion of a roadway, street or alley as referred to

in subsection (b) hereof for the purpose of construction, pavement or excavation on or

adjacent thereto shall be made on a form to be supplied by the city engineer, or his or her

designee, and prior to issuance of the permit, the request shall be reviewed and approved by

the city engineer, or his or her designee, and shall be reviewed by the traffic engineer.

"(d) Upon compliance with subsection (c) hereof, a permit shall be issued for a period of

time reasonably necessary for the completion of the proposed work and under such

restrictions as the issuing and approving authorities may reasonably require for the

protection of the public. Such permit may be renewed only upon reapplication and

approval.

"(e) A copy of the permit issued pursuant to subsection (d) hereof shall be maintained at the

job site of the construction, pavement or excavation and shall be produced for inspection by

the permittee or his agent or employee in charge upon demand by any authorized city

inspector, authorized employee of the city planning, engineering and permits department or

traffic engineering department or any city law enforcement officer, any of whom may issue

citations for violations of this section.

"(f) Any such obstruction of which no permit has been issued, or which exceeds the limits

established in an issued permit, shall be removed immediately upon demand by any of the

authorized city employees set out in subsection (e).

"(g) (1) Failure to comply with the permit requirements of this section or (2) failure to

comply with any lawful order to remove any unauthorized obstruction shall be punishable

in accordance with section 1-1-6, and continued failure to so comply for more than one (1)
day shall be punishable as an act or omission of a continuing character under the provisions of section 1-1-7.

"(b) The provisions of this section, or of any other section of this code or of any building code provision, notwithstanding, the city engineer, or his or her designee, may, at his discretion, authorize temporary obstructions of any street, roadway or alley for a period not to exceed one (1) day for emergency repairs to utilities or streets, and shall have the authority to set limits and conditions on such temporary obstructions as he may deem necessary.

"(c) The provisions of the section further notwithstanding, authorized obstruction of any street, alley or roadway shall comply with any and all other or additional requirements or restrictions contained in this code or any other code governing the activity for which the obstruction is necessary, as well as the traffic regulations of the city.

"Sec. 4-5-141 Duty of persons completing work on unimproved, etc., streets, etc.

"Except as otherwise provided in section 4-5-142, whenever an excavation is made in any unimproved, unpaved or oiled street, alley or sidewalk, or the same is otherwise obstructed, any person doing the same shall forthwith, upon completion of the work thereon, proceed to fill in the excavation, to remove all obstructions and to leave any unimproved, unpaved or oiled street, alley or sidewalk in as good condition as he found it, and free from all irregularities, obstructions or unevenness.

"Sec. 4-5-142 How work performed; materials for backfilling.

"In the event any cut, opening or excavation is made in or under the surface of any street or alley which is already paved or which is about to be paved pursuant to the terms of any existing contract, it shall be the duty of the person making the cut, opening or excavation or causing same to be done and of each agent acting for any such person to perform such works in accordance with standard specifications and details prescribed by the city engineer.

"Sec. 4-5-143 Utility installations.

"(a) Utility means any sewer; storm drain; culvert; water main; gas main; telephone line, cable or conduit; fiber optic line, cable or conduit; electric power line, cable or conduit; cable and duct; television cable; service connections; or any other main, line, conduit, cable or duct installed in the right-of-way.

"(b) Utilities, new construction - Utilities shall be installed behind the curb or beyond the edge of pavement in new subdivisions or commercial developments to the maximum extent practical. The city engineer, or his or her designee, may grant a variance from this requirement on a case-by-case basis to account for unusual site conditions. Replacement of existing utilities shall not be considered new construction.
"(c) Utilities, replacement

1. When existing underground utilities are replaced, the replacement utilities shall be relocated behind the curb or beyond the edge of pavement to the maximum extent practical. The city engineer, or his or her designee, may grant a variance from this requirement on a case-by-case basis to account for unusual site conditions.

2. The permittee shall, to the maximum extent possible, install or cause to be installed, facilities using technologies that are the least disruptive to the pavement.

3. The permittee shall, to the maximum extent possible, connect, or cause to be connected, existing service connections to facilities by utilizing technologies that minimize disruption to the pavement and public.

"Sec. 4-5-144 Restoration requirements.

(a) Restoration of streets, alleys, sidewalks or other public ways.

1. The permittee shall be responsible for making, or causing to be made, all temporary and permanent pavement repairs. All repairs shall be made in accordance with the city of Birmingham's standard specifications and details. Said specifications and details are on file in the office of the city engineer.

2. The permittee shall cut, or cause to be cut, the streets, alleys, sidewalks or other public ways to form straight lines and neat rectangular shapes as directed by the city engineer, or his or her designee.

3. The permittee shall install, or cause to be installed, a temporary repair upon completion of the work authorized by a permit. The permittee shall be responsible for maintaining the temporary repair for a period of thirty (30) days and until the permanent repair is made. If the permittee fails to install or maintain the temporary repair, the bond shall be forfeited and the permittee will not be issued any subsequent permits to excavate in the public right-of-way.

4. The permittee shall make, or cause to be made, the permanent repair no later than five (5) business days after expiration of the thirty (30) day period cited on section 4-5-144(a)3. If the permittee fails to make the permanent repair within the stated time frame, the bond shall be forfeited and the permittee will not be issued any subsequent permits to excavate in the public right-of-way.

5. The permittee shall be responsible for maintaining the permanent repair for one (1) year after completion of the permanent repair. The permittee shall commence, or cause to be commenced, maintenance of the permanent repair within five (5) business days of receipt of written notification from the city engineer, or his or her designee, to perform said maintenance. If the permittee fails to maintain the permanent repair within the time period stated, the bond shall be forfeited and the permittee will not be issued any subsequent permits to excavate in the public right-of-way.

6. The permittee shall replace, or cause to be replaced, existing traffic striping and markings damaged as a result of the work.

(b) Sidewalk, curb and driveway restoration.
"1. The permittee shall replace, or cause to be replaced, from joint to joint, all concrete sidewalk and curb sections that are disturbed, disrupted or damaged as a result of the permitted work.

"2. The permittee shall bore, or cause to be bored, all driveways where possible. The city engineer, or his or her designee, may grant a variance from this requirement on a case-by-case basis to account for unusual site conditions. Driveways that are allowed to be open cut shall be saw cut to form straight lines across the driveway. The city engineer, or his or her designee, may require that the entire driveway be replaced if it is determined to be in the best interest of the city to do so.

"3. The permittee shall make, or cause to be made, all concrete repairs in accordance with the city of Birmingham’s standard specifications and details. Said specifications and details are on file in the office of the city engineer.

"4. If the permittee fails to replace, or fails to cause to be replaced, as directed by the city engineer or his designee, any sidewalk, curbs or driveways that are disturbed, disrupted or damaged as a result of the permitted work, the bond shall be forfeited and the permittee will not be issued any subsequent permits to excavate in the public right-of-way.

"Sec. 4-5-145 Appealing decisions of the City Engineer.

"Any discretionary decision of the city engineer, or his or her designee, referenced in Sec. 4-5-144 which results in loss of property interests or costs other than set fees may be appealed to the city council for a public hearing on the matter. Person or permittee shall be required to provide written notice to the city engineer and the city clerk to request such hearing within fourteen (14) days of receipt of written notice of decision or the challenge to such decision or cost is waived. Upon a filing of a timely written Notice of Appeal hereunder filed in the Office of the City Clerk, a public hearing on the matter before the city council will be held within thirty (30) days of the filing of the Notice of Appeal."

Section 2. All ordinances or parts of ordinances heretofore adopted by the Council of the City of Birmingham which are inconsistent with the provisions of this ordinance are hereby repealed.

Section 3. If any section, sentence, clause or phrase of this ordinance is for any reason held to be invalid or unconstitutional by declaration of a court of competent jurisdiction, such declarations shall not affect the validity of remaining portions of this ordinance.

Section 4. This ordinance shall be in full force and effect upon its adoption and publication as required by law.

Adopted by the Council of the City of Birmingham August 31, 2010 and Approved by the Mayor September 3, 2010
The permittee shall bear all costs associated with testing.

No exceedences material shall be used as backfill.

For the fill depth of the excavation, the engineer shall determine the limits of excavation based on the required density. The engineer may approve the use of alternative crushed stone materials as backfill, subject to lining specifications and details.

The engineer shall notify the engineer at least 24 hours prior to beginning work.

Pavement Repair - General Notes
Pre-Bid Conference

Minutes of Meeting

Jefferson County Environmental Services Department
Sanitary Sewer System – Asset Management Program – Contract No.
2019 AMP01
Wylam PS Service Area Comprehensive Rehabilitation
January 8, 2020

- Sign in sheet - attached
- The following items listed are for emphasis and discussion topics. Minutes from this meeting will be distributed prior to the bid opening. – all items were read aloud

00100 Notice to Bidders
1. Bid opening Wednesday, January 22, 2020 at 2:00 P.M.
2. Questions received until Friday, January 10, 2020 at 5:00 P.M.
3. Contract time is two hundred seventy (270) consecutive calendar days.
4. The excavation contractor must be prequalified as a Class A contractor with Jefferson County ESD to perform the excavation portion.

00101 Instructions to Bidders
5. Each Bid Proposal will only consist of the Bid Proposal Form and the associated documentation as listed in Article 1.03 in a sealed envelope with the Bid Proposal Guaranty.
6. It is understood that the quantities may be increased or decreased as hereinafter provided without invalidating the bid prices in any way.
7. Bid Proposals may be considered irregular and rejected if the Bid Proposal contains unit prices that are obviously unbalanced.
8. Owner has 75 days to award the contract.

00630 MBE DBE Program
9. Submit Form E today (Appendix C).

00700 General Conditions
10. The award of the Contract, if it is awarded, will be to the lowest responsible, responsive Bidder. No Notice of Award will be given until the Owner has concluded such investigations as he deems necessary to establish the responsibility, qualifications, and financial ability of the Bidder to do the Work in accordance with the Contract Documents to the satisfaction of the Owner within the time prescribed. The Owner reserves the right to reject the Bid Proposal of any Bidder who does not pass such investigation to the Owner’s satisfaction.
11. Agreements with property owners must be in writing and supplied to the Engineer.

00820 Special Conditions
12. The Contractor may apply for an extension of time in accordance with provisions of the Contract. No time extensions will be considered for normal weather conditions.
13. Liquidated damages are $1,500/day.
14. 48 hour notification of property owners on company letterhead form.
15. All activities shall be performed in accordance with the manufacturer’s recommendations and regulations established by OSHA. Particular attention to excavations and confined spaces. (new OSHA rule subpart AA “Confined Spaces in Construction” took effect August 3, 2015)
16. A list of all subcontractors and the work they will perform must be submitted as part of the Bid Proposal.
17. Unpermitted discharge penalties are $1,000/day for the first 30 days. The Contractor shall owe the unpermitted discharge penalty to the Owner when the Owner reports any unpermitted discharge caused by the actions of the Contractor as an unpermitted discharge to USEPA.
18. Contact ESD to coordinate flow monitor temporary removal. (minimum 72 hour advance notice)

01010 Summary of Work
19. Contractor shall obtain, keep current, and pay all fees for any necessary construction permits. Excavation permits are required.
20. Contractor shall perform the cleanup work on a regular basis and as frequently as ordered by the Owner. Application for Payment will not be approved without adequate cleanup.
21. It is the Contractor’s responsibility to take videos and pictures prior to any work beginning. This media shall be submitted to the Engineer prior to beginning construction activities.

01015 Prosecution and Progress
22. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the Work to full completion in the manner and time required by the Contract, Drawings, and Specifications.
23. Normal time of work shall generally be between the times of 7am and 6pm Monday through Friday. Excessive overtime will not be allowed.
24. Work at night, on weekends, or holidays will only be allowed for special circumstances discussed and agreed upon well in advance of the work activity.

01025 Measurement and Payment
25. The Owner shall retain 5% of the value of the work done until 50% of the value of the work has been accomplished. No additional retainage will be withheld after 50% completion.

01028 Change Order Procedures
26. A field directive instructs the Contractor to proceed with a change in Work. Contractor shall promptly execute the field directive. The field directive can add time but not change the Contract amount.

01200 Project Meetings
27. Preconstruction and Progress meetings as specified. Progress meetings are usually held monthly.

01300 Submittals
28. Submittals may be submitted electronically. (recommended)
29. All submittals shall be thoroughly checked by the Contractor and shall bear the Contractor’s stamp of approval certifying they have been checked.
01310 Progress Schedules
30. At the Preconstruction Meeting, the Contractor shall provide the first timely, detailed and acceptable revenue loaded CPM schedule. An updated monthly schedule will be required with each pay request. Schedule is to show all work including subcontracted work.

01525 Working within ROW of Streets
31. The applicant must comply with the Manual on Uniform Traffic Control Devices. All devices must be in place prior to start of construction and shall be properly maintained by applicant during construction.

01550 Site Access and Storage
32. Contractor shall not store materials or encroach upon private property without the written consent of the owners of such private property.

01570 Traffic Regulation
33. Contractor shall be responsible for all traffic control measures according to the appropriate municipality and entity having jurisdiction over the specific street or road.

01720 Project Record Documents
34. Contractor shall keep and maintain a full size set of Drawings as the as-built record of day-to-day construction progress. These prints shall be delivered to the Engineer upon completion of the Project. Full size drawings are required for all excavation and manhole rehabilitation work. CIP work will be shown by the post installation videos along with the PACP database for reinstated service connections.
35. Contractor to keep and maintain all other required documents as specified.

02575 Pavement Repair
36. The Contractor shall saw cut all paved work areas prior to beginning construction. All saw cuts shall be clean and straight.
37. Contractor shall comply with all asphalt paving requirements of the local municipality having jurisdiction over the specific street to be repaved.

02731 Television Inspection
38. All video files and inspection reports shall be named per the specification.
39. The PACP database shall be comprehensive for the entire Project and additional data shall be added at each submittal.
40. All post video inspections shall be completed using the standard NASSCO PACP coding.

02740 Cured-In-Place Pipe Lining
41. Submittals prior to beginning work.
42. Reinstatement of services by excavation – Service Line Connection Replacement (SLCR) will be with InSerta Tee, Romac CB Saddle, or approved equal saddle. Needs to produce a watertight seal.
43. Obtain a sample of each liner installation and document with a chain-of-custody form. Testing of random 20% and a minimum of one sample tested for each 1,000 linear feet. Costs of collection and testing shall be included in the bid. Third party testing ASTM-certified testing laboratory to be approved by the Engineer prior to work beginning.
44. Leak testing and liner acceptance per the specification before reinstating service connections.
CLARIFICATIONS/COMMENTS

1. A post video inspection is required for each mainline after all service lateral connection rehabilitation and excavation is complete. A copy of the mainline CIP post installation video will be downloaded by the inspector in the field that day.

2. Daily management is required for this project. The project manager shall direct and track all prime and subcontracted work. Daily schedule emails are required noting all work scheduled for that day. Owner/Engineer will direct all questions to the designated project manager. Individual subcontractors will not act as prime project managers.

3. Be aware of roadway construction around the courthouse and plan accordingly. If you plan to mail your bid document please allow sufficient time for delivery and Contractors are welcome to notify the Owner/Engineer that a bid is being mailed so the Owner can be looking for the delivery.

QUESTIONS
Pre-Bid Conference
Attendance Sheet
January 8, 2020

<table>
<thead>
<tr>
<th>NAME</th>
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## Pre-Bid Conference Attendance Sheet

**January 8, 2020**

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