CITY OF FOUNTAIN INN

FOUNTAIN INN, SOUTH CAROLINA

SPECIFICATIONS, CONTRACT AND BID

FOR

2020 SANITARY SEWER REHABILITATION PROJECT
SC RIA Grant # S-20-1248

OCTOBER 2020

FE PROJECT NO.: FE-017
CITY OF FOUNTAIN INN

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FE PROJECT NO.: FE-017
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SECTION 01105

ADVERTISEMENT FOR BIDS

PROJECT: 2020 SANITARY SEWER REHABILITATION PROJECT

OWNER: CITY OF FOUNTAIN INN

ENGINEER: FRAZIER ENGINEERING, P.A.

RECEIPT OF BIDS: Sealed bids for the construction of the above-referenced project will be received by the Owner at the City of Fountain Inn Public Works Office, 200 North Main Street, Fountain Inn, SC 29644 until 2:00 PM, local time, on Wednesday, November 18, 2020 and at said Office will be publicly opened and read aloud.

PRE-BID CONFERENCE: There will not be a Pre-Bid Conference for this Project. All questions shall be directed to the Engineer in writing via email (afrazier@frazier-engineering.com).

PROJECT DESCRIPTION: This PROJECT is being partially funded by a $500,000 SC Rural Infrastructure Authority (RIA) Grant. This PROJECT includes cleaning and televising approximately 13,010 feet of 8” to 12” sanitary sewer; lining approximately 13,010 feet of 8” to 12” sanitary sewers with cured-in-place pipe lining and performing all associated work including removing protruding service laterals, re-connecting active service laterals to the lining and performing product tests; rehabilitating approximately 450 vertical feet of manholes using an approved specialized cementitious mortar product; and performing other miscellaneous manhole rehabilitation work such as replacing frames and covers and rebuilding existing benches and inverts.

DOCUMENTS AVAILABLE: Copies of the Contract Documents may be purchased from the Engineer at 6592 Bob White Trail, Stanley, NC 28164 (phone: 704-822-8444). The cost for the Project Plans and Specifications is $100 per set. The payment represents reproduction costs and is non-refundable. The cost includes mailing Contract Documents via standard US mail only. Payment must be received by the Engineer prior to mailing the Contract Documents. Digital copies of the Contract Documents will be provided at no cost.

SECURITY: Each bid must be accompanied by a certified check of the Bidder, or by a Bid Bond made payable to the Owner, for an amount equal to not less than five percent (5%) of the total bid as a guarantee that, if the bid is accepted, the required Agreement will be executed and that a one hundred percent (100%) Performance Bond and one hundred percent (100%) Payment Bond will be furnished.

OWNER’S RIGHTS: The Owner reserves the right to waive any informalities in bidding and to reject any or all Bids if it is in the Owner’s best interest to do so.

(End of Section 01105)
SECTION 01110

INFORMATION FOR BIDDERS

1. RECEIPT AND OPENING OF BIDS:

1.1 Bids will be received and opened as specified in the Advertisement for Bids.

2. LICENSES:

2.1 The attention of the Bidders is directed to the provisions of the acts for licensing of General Contractors for the State of South Carolina and all requirements of such acts which have bearing upon this work shall be deemed a part of the Specifications as if written therein in full. The showing by the Contractor of his license number shall be deemed as the Contractor's representation that he is legally qualified to enter into the prescribed Contract for any or all portions of the work included in his Bid.

2.2 All Bidders submitting a Bid shall have a currently valid “Contractor's License” for the State of South Carolina. These license numbers shall be shown on the Bid Schedule immediately below the signature identification and on the face of the sealed envelope containing the submitted Bid.

2.3 Subcontractors who will be engaged by the General Contractor shall also hold the licenses as required by the State of South Carolina. The General Contractor and all Subcontractors shall be responsible for determining all licensing requirements by the State of South Carolina.

3. BID SECURITY:

3.1 Each Bid must be accompanied by a certified check from the Bidder or a Bid Bond duly executed by the Bidder as principal and having as surety thereon a surety company qualified to do business under the laws of the State of South Carolina and satisfactory to the Owner, both made payable to the Owner, in the amount not less than five percent (5%) of the Bid. If the Bidder chooses to submit a certified check, the check shall be made payable to the Owner with the project name and “For Bid Security” in the memo line.

3.2 Bid Security will be returned to each Bidder after the Contract and Contract bond(s) have been executed. Bid securities may be returned earlier to unsuccessful Bidders, at the option of the Engineer.

4. EXAMINATION OF DRAWINGS AND SPECIFICATIONS:

4.1 Each Bidder shall carefully examine the Drawings and Specifications and all Addenda or other revisions thereto and thoroughly familiarize himself with the detailed requirements thereof prior to submitting a Bid. If any Bidder is in doubt as to the true meaning of any part of the Drawings, Specifications, and other documents, or if any error, discrepancy, conflict, or omission is noted, the Bidder should immediately contact the Engineer in writing and request clarification. The Engineer will clarify the intent of the documents and/or correct such error, discrepancy, conflict or omission and will notify all Bidders by Addendum in cases where the extent of work or the cost thereof will be appreciably affected. No allowance will be made after the Bids are received for oversight by a Bidder.

5. EXAMINATION OF SITE:

5.1 Each Bidder shall visit the site of proposed work and fully acquaint himself with conditions relating to construction and labor so he may fully understand facilities, difficulties, and restrictions attending execution of work under contract. By executing
the Agreement, the Contractor represents that he has visited the site, familiarized himself with the local conditions under which the work is to be performed, and correlated his observations with the requirements of the Contract Documents.

6. **INFORMATION NOT GUARANTEED:**

6.1 All information given on the Drawings or in the Contract Documents relating to subsurface conditions, existing structures, location of utilities, sewer inverts, pipe diameters, or other information on existing facilities, is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of the Bidders.

6.2 It is agreed and understood that the Owner does not warrant or guarantee that the conditions, pipes, or other structures encountered during construction will be the same as those indicated on the Drawings or in the Contract Documents. The Bidder must satisfy himself regarding the character, quantities, and conditions of the various materials and the work to be done.

6.3 It further is agreed and understood that the Bidder or the Contractor will not use any of the information made available to him or obtained in any examination made by him in any manner as a basis or grounds of claim or demand of any nature, against the Owner or the Engineer, arising from or by reason of any variance which may exist between the information offered by the actual materials or structures encountered during the construction work, except as may otherwise be provided for in the Contract Documents.

6.4 If any work is performed by the Contractor, or any subcontractor, prior to adequate verification of applicable data, any resultant extra cost for adjustment of work necessary to conform to existing conditions, or damage to existing facilities, shall be assumed by the Contractor without reimbursement or compensation by the Owner.

7. **INFORMATION AVAILABLE TO BIDDERS:**

(NOT USED)

8. **ADDENDA AND INTERPRETATIONS:**

8.1 No interpretation of the meaning of the Drawings, Specifications, or other Contract Documents will be made orally to any Bidder by the Engineer prior to award of the Contract.

8.2 Every request for such interpretation should be in writing addressed to the Frazier Engineering, P.A. 6592 Bob White Trail, Stanley, NC 28164, Phone: 704-822-8444. To be given consideration, such request must be received at least five (5) days prior to the date scheduled for the opening of bids. Any and all such interpretations and any supplemental instructions will be made in the form of written Addenda to the Specifications which, if issued, will be mailed by overnight delivery and/or via electronic delivery to all prospective Bidders (at the respective address furnished for such purposes), not later than two (2) days prior to the date scheduled for the opening of bids. Failure of any Bidder to receive any such Addendum or interpretation shall not relieve such Bidder from any obligation under his Bid as submitted. All Addenda so issued shall become part of the Contract Documents.

9. **COMPLETE WORK REQUIRED:**

9.1 The Drawings, Specifications, and all supplementary documents are essential parts of the Contract, and requirements occurring in one are as binding as though occurring in all. They are intended to be cooperative, to describe and provide for a complete work. In case of discrepancy on the Drawings, figured dimensions shall govern. In case of omissions from the Specifications as to items of equipment and materials or quantities therefor, the Drawings shall govern. It shall be the responsibility of the Bidder to call
the attention of the Engineer to obvious omissions of such magnitude as to affect the strength, adequacy, function, completeness, or cost of any part of the work in ample time for amendment by Addendum prior to letting date.

10. **LAWS AND REGULATIONS:**

10.1 All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included as though herein written out in full.

11. **TIME FOR COMPLETION:**

11.1 The Bidder must agree to commence work within the time stipulated in the Agreement. The Bidder also must agree to fully complete the project within the time stipulated in the Agreement.

12. **LIQUIDATED DAMAGES:**

12.1 The Bidder must agree to pay as liquidated damages the amount set forth in the Agreement for each consecutive calendar day that the work is incomplete after the scheduled date of completion or authorized extended time of completion.

13. **TELEGRAPHIC MODIFICATIONS:**

13.1 Any Bidder may modify his Bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the Owner prior to the closing time; and, provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the Bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed Bid is opened. If written confirmation is not received within two (2) days from the closing time, no consideration will be given to the telegraphic modification.

14. **WORK IN STATE AND COUNTY RIGHTS-OF-WAY:**

14.1 The Owner will obtain the necessary easements and permits for construction across both County and State Highway rights-of-way. The Contractor shall abide by all rules, regulations, and requirements of these agencies in regard to construction under this Contract, including the giving of notices, provisions for inspections, and employment of such methods of construction as may be required. Wherever these Specifications may be in conflict with the regulations or requirements of these agencies, such regulations shall govern and these Specifications shall be modified to such extent as necessary to conform with the said rules, regulations, and requirements. Wherever additional costs are incurred due to requirements of these agencies, such additional periods of maintenance, special features of construction, etc., all such costs shall be included in the prices bid. No additional compensation will be allowed for such costs after award of the Contract.

14.2 The Contractor will not encroach on any property unless it has been established that easements have been obtained. On all other land, the Contractor has no rights unless he obtains permission from the proper parties.

15. **RIGHT TO INCREASE OR DECREASE THE AMOUNT OF WORK:**

15.1 The work comprises approximately the quantities shown in the Bid Schedule which will be used as a basis for comparison of Bids and not for final estimate. The Owner does not, by expression or by implication, agree that the actual amount of work shall correspond with the estimated quantities.
15.2 The Owner reserves the right to increase or decrease the amount of work under each Bid Item in the Contract by any amount without any change to the unit prices bid.

16. **ITEMS AND INDETERMINATE ITEMS:**

16.1 The work to be done under this Contract has been divided into items, and items having sub-items to enable each Bidder to bid on the different portions of the work in accordance with his unit price estimate of their cost, and so that the actual quantity of work executed under each item, or sub-item, may be paid for at the unit price bid for the particular item, or sub-item, even though such quantity is greater or less than the estimated quantity stated in the Bid.

17. **ESTIMATED QUANTITIES:**

17.1 Bidders must satisfy themselves of the accuracy of the estimated quantities of the Bid Schedule by examination of the site and a review of the Drawings and Specifications, including Addenda. After Bids have been submitted, the Bidder shall not assert that there was a misunderstanding concerning the quantities of work or of the nature of the work to be done.

18. **FEDERAL AND/OR STATE FUNDING:**

18.1 Any Federal and/or State Funding for this Project shall be as specified in the Bid Advertisement and/or the Special Provisions Section of these Specifications.

19. **SUBMITTING BIDS:**

19.1 Each Bid must be submitted on the prescribed Bid Schedule. All blank spaces for bid prices must be filled in, in ink or typewritten, and the Bid must be fully completed and executed when submitted. Only one copy of the Bid is required, either bound in the Contract Specifications or only the Bid Section of the Specifications.

19.2 The Bid must be signed manually, in ink, by a principal or an officer duly authorized to make contracts. The Bidder’s legal name must be fully stated and the name and title of the person signing must be typed below his signature. If the Bid is made by an individual, their name and post office address must be shown. If made by a partnership, the name and post office address for each member of the partnership must be shown. If made by a corporation, the person signing the Bid shall give the name of the state under the laws of which the corporation was chartered and the name, titles and business address of the president, secretary, and the treasurer. Anyone signing a Bid as an agent shall file evidence of their authority to do so and that the signature is binding upon the firm or corporation.

19.3 Bidders are cautioned that it is the responsibility of each individual Bidder to assure that his Bid is in the possession of the responsible official or his designated alternate prior to the stated time and at the stated place of the Bid opening. The Owner is not responsible for Bids delayed by mail and/or delivery services of any nature.

19.4 Each Bid must be submitted in an opaque sealed envelope, plainly marked on the outside as BID FOR 2020 SANITARY SEWER REHABILITATION PROJECT, addressed and delivered as shown below:

19.4.1 **Upper Left Hand Corner:**

Bidder’s Name
Bidder’s Address
20. **COMPARISON OF BIDS AND METHOD OF AWARD:**

20.1 The Contract will be awarded to the responsive, responsible bidder submitting the lowest total bid complying with the conditions of the Contract. The Bidder to whom the award is made will be notified at the earliest possible date.

20.2 The Owner reserves the right to reject any and all Bids when such rejection is in the interest of the Owner; to reject the Bid of a Bidder who has previously failed to perform properly or complete contracts on time of a similar nature; and to reject the Bid of a Bidder who is not, in the opinion of the Engineer, in a position to perform the Contract. The Owner also reserves the right to waive any informalities and technicalities in Bidding. In the event there is a discrepancy between the unit price and/or the computed total amount, the unit price shall govern. In the event of discrepancy between the prices quoted in the Bid in words and those quoted in figures, the words shall control. The Owner may also accept or reject any of the alternates that may be set forth on the Bid.

20.3 The Owner reserves the right to reject any and all Bids contingent upon the availability of funding for the project.

20.4 The basis for determining Responsiveness and Responsibility of the Low Bidder shall be as defined below. The determination by the Owner as to whether any or all of the items listed are satisfactory shall be conclusive and final.

A. **Responsiveness** will be defined by:

1. The completeness and regularity of Bid Form.

2. A Bid Form without excisions or special conditions.

3. A Bid Form having no alternative bids for any items unless requested in the technical specifications.

4. A Bid Form which acknowledges receipt of all addenda.
5. A Bid whose item prices are not unbalanced. An unbalanced Bid is defined as a Bid Offering which is:

(a) Unreasonably low prices on all or certain Bid items;

(b) Unreasonably high prices on all or certain Bid items.

B. **Responsibility** will be based on whether the bidder:

1. Maintains a permanent place of business.

2. Has adequate plant equipment to do the work properly and within the time limit that is established.

3. Has adequate financial status to meet their obligations contingent to the work.

4. Has a work history which indicates an ability to meet their obligation under the conditions of the Contract.

5. Has sufficient skill, judgment and integrity necessary to faithfully perform the Contract.

6. Has sufficient facilities, equipment and manpower and material necessary to do the job required under the Contract.

C. A Bid will be considered **irregular** and may be rejected for any one of the reasons listed below. The Owner’s determination related to each of the items listed shall be conclusive and final.

1. If the Bid is on a form other than that furnished by the Owner; or if the form is altered or any part detached.

2. If there are unauthorized additions, conditional or alternate bids, or irregularities of any kind which may tend to make the bid incomplete, indefinite, or ambiguous as to its meaning.

3. If the Bidder adds any provisions reserving the right to accept or reject an award, or to enter into a Contract pursuant to an award.

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

5. If the Bid does not contain the aggregate of the Bid, obtained by adding the extended amounts of the various items, if applicable.

6. If the Bid contains unit prices that are obviously unbalanced.

7. If the Bid is not accompanied by the Bid Bond specified by the Owner.

8. If the Bid does not acknowledge addenda received.

9. If the Bid does not include all requested information, including names of proposed subcontractors.

10. If there is reason to believe that any Bidder is interested in more than one Bid on the same project or that there has been collusion among the Bidders.
21. **ABILITY, QUALIFICATIONS AND EXPERIENCE OF BIDDER:**

21.1 It is the purpose of the Owner not to award this Contract to any Bidder who does not furnish satisfactory evidence that he has the experience of successfully completing projects of this type and magnitude and that he has sufficient capital, equipment, and personnel to enable him to prosecute the work successfully and to complete it in the time named.

21.2 Before a Bid is considered for award, the Bidder may be requested by the Owner to submit a statement of facts in detail as to his previous experience in performing similar or comparable work, and of his business and technical organization and financial resources and plant available to be used in performing the contemplated work.

21.3 The successful Bidder will be required to construct the work with his own directly employed personnel to an extent not less than fifty percent (50%) of the Contract Amount.

22. **WITHDRAWAL OF BIDS:**

22.1 Any Bidder may withdraw his Bid, either personally or by written request, at any time prior to the scheduled time for opening of bids or authorized postponement thereof.

22.2 No Bidder may withdraw his Bid for a period of ninety (90) days after the date set for the opening thereof, and all Bids shall be subject to acceptance by the Owner during this period.

23. **DISQUALIFICATION OF BIDDERS:**

23.1 More than one Bid from an individual, a firm or partnership, a corporation or any association, under the same or different names, will not be considered. Reasonable grounds for believing that any Bidder is interested as a principal in more than one Bid for the work contemplated will cause the rejection of all Bids in which such Bidder is believed to be interested. Any or all Bids will be rejected if there is reason to believe that collusion exists among the Bidders. The low Bidder will be required to provide a letter stating that he has not colluded with any other Bidder in preparation of his Bid. Contracts will be awarded only to responsible Bidders capable of performing the class of work contemplated within the time specified and having sufficient resources and finances to carry on the work properly.

24. **GUARANTY BONDS:**

24.1 The Bidder to whom the Contract is awarded will be required to execute the Agreement and obtain the Performance Bond and Payment Bond, each in the sum of the full amount of the Contract Price, within ten (10) calendar days from the date the Notice of Award is delivered to the Bidder.

24.2 The Bonds must be duly executed and acknowledged by the Bidder as principal and by a corporate surety company qualified to do business under the laws of the State of South Carolina, and satisfactory to the Owner as surety, for the faithful performance of the Contract and payment for labor and materials. The premiums for such Bonds shall be paid by the Contractor. Each Bond must be valid for one year beyond the date of final acceptance of the project.

25. **POWER OF ATTORNEY FOR BONDS:**

25.1 Attorneys-in-fact who sign Bid Bonds or Performance Bonds or Payment Bonds must file with each Bond a certified and effective dated copy of their power of attorney.
26. **LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT:**

26.1 The successful Bidder, upon his failure or refusal to execute and deliver the Agreement and Bonds required within ten (10) days after he has received notice of the acceptance of his Bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his Bid unless time is extended by the Owner.

27. **EXECUTION OF CONTRACT:**

27.1 The Owner, within ten (10) days of receipt of Agreement, signed by the party to whom the Agreement was awarded, shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the Owner not execute the Agreement within such period, the Bidder may by written notice withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

28. **NOTICE TO PROCEED:**

28.1 The Notice to Proceed will be issued within ten (10) days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor. If the Notice to Proceed has not been issued within the ten (10) day period or within the period mutually agreed upon, the Contractor may, by written notice, terminate the Agreement without further liability on the part of either party.

(End of Section 01110)
SECTION 01140

BID

PROJECT IDENTIFICATION: 2020 SANITARY SEWER REHABILITATION PROJECT

THIS BID IS SUBMITTED TO:

City of Fountain Inn
200 North Main Street
Fountain Inn, SC 29644

OWNER: City of Fountain Inn

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with the OWNER (Agreement form included in the Contract Documents) to perform and furnish all Work as specified or indicated in the Contract Documents within the specified time and for the amount indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. Bidder accepts all of the terms and conditions of the Advertisement for Bids and the Information for Bidders, including without limitation those dealing with the disposition of bid security. This Bid will remain subject to acceptance for 90 days after the day of the bid opening. Bidder will sign and submit the Agreement with the Bonds and other documents required by the Bidding Documents within 10 days after the date of Owner’s Notice of Award.

3. In submitting this Bid, Bidder represents that:

   a. Bidder has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

      No. ___________________________  Dated____________________

      No. ___________________________  Dated____________________

      No. ___________________________  Dated____________________

   b. Bidder has visited the site and become familiar with and satisfied itself as to the general, local, and site conditions that may affect cost, progress, performance, and furnishing of the Work.

   c. Bidder is familiar with and has satisfied itself as to all Federal, State, and Local Laws and Regulations that may affect cost, progress, performance, and furnishing of the Work.

   d. Bidder has carefully studied all available information including reports and inspections which have been identified in the Contract Documents. Bidder accepts the determination set forth in the Contract Documents to the extent
of the "technical data" contained in such reports and drawings upon which Bidder is entitled to rely. Bidder acknowledges that such reports are not Contract Documents and may not be complete for Bidder's purposes. Bidder acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to underground facilities at or contiguous to the site. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder and safety precautions and programs incident thereto. Bidder does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the time, price, and other terms and conditions of the Contract Documents.

e. Bidder is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

f. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

g. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Bidder, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

h. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm, or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

4. Bidder will complete the Work for the unit prices defined in the following Bid Schedule. Quantities indicated are estimated and not guaranteed; they are solely for comparing Bids and establishing the initial Contract Price. Final payment will be based on actual quantities.
### FOR CLEANING AND TELEVISIONING EXISTING SEWERS TO FURTHER EVALUATE THE SEWERS, AS SPECIFIED, ANY REQUIRED CLEANING, ANY LOCATION, ANY LENGTH OF SEWER, COMPLETE IN PLACE, FOR VARIOUS PIPE DIAMETERS.

| A. | EXISTING 8" DIAMETER MAIN SEWERS | 12,875 | LF |
| B. | EXISTING 12" DIAMETER MAIN SEWERS | 135 | LF |

### DYE TEST TO VERIFY IF A SERVICE LATERAL IS ACTIVE

1) 1 OR 2 SERVICES TO BE DYE TESTED PER SEWER SEGMENT; COST PER DYE TEST

| | | 2 | EA |

2) 3 OR MORE SERVICES TO BE DYE TESTED PER SEWER SEGMENT; COST PER DYE TEST

| | | 2 | EA |

### FOR PERFORMING POINT REPAIRS TO EXISTING GRAVITY SEWERS (INCLUDING REPLACING SERVICE LATERAL CONNECTIONS AND PIPING) USING PVC PIPE, REPAIR LENGTH AS SPECIFIED BELOW, VARIOUS PIPE DIAMETERS, VARIOUS DEPTHS OF SEWER, BACKFILL USING EXCAVATED SOIL EXCEPT AS NOTED, INCLUDING COMPLETE RESTORATION OF GRASSED AREAS (RESTORATION OF PAVED AREAS PAID UNDER SEPARATE BID ITEMS), AS SPECIFIED AND IN ACCORDANCE WITH DETAIL SS-22, COMPLETE IN PLACE.

#### A. REPAIR TO EXIST 8" DIAMETER SEWERS USING PVC PIPE

1) 0 TO 10 FEET DEEP

(a) 0 TO 8 FEET LONG

| | | 7 | EA |

(b) GREATER THAN 8 FEET IN LENGTH, PAYMENT FOR EACH FOOT OVER 8 FEET, ADD TO ITEM 1(a) ABOVE

| | | 15 | LF |

2) 10.1 TO 15 FEET DEEP

(a) 0 TO 8 FEET LONG

| | | 3 | EA |

(b) GREATER THAN 8 FEET IN LENGTH, PAYMENT FOR EACH FOOT OVER 8 FEET, ADD TO ITEM 2(a) ABOVE

| | | 5 | LF |

#### B. ADD-ON COST FOR SUBSTITUTING PRESSURE CLASS 350 DUCTILE IRON PIPE (PROTECTO 401 NOT REQUIRED) FOR THE POINT REPAIR, AS SPECIFIED, COMPLETE IN PLACE

| | | 10 | LF |

| | | | |

#### C. INSTALL TEE-WYE WITHIN POINT REPAIR SEGMENT AND RECONNECT LATERAL TO TEE (UP TO 6 FEET OF LATERAL)(ANY DEPTH), PER DETAIL SS-16

1) 8-INCH DIP TEE-WYE

(a) WITH 6 FEET OF 4" OR 6" PVC LATERAL PIPE

| | | 2 | EA |

(b) WITH 6 FEET OF 4" OR 6" DIP LATERAL PIPE

<p>| | | 1 | EA |</p>
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
</tr>
</thead>
</table>
| 3    | FOR INSTALLING NEW PRECAST CONCRETE MANHOLES WITH A CONE SECTION TOP ON EXIST OR NEW SEWERS OR TO PROVIDE A MANHOLE WHERE ONE CURRENTLY DOES NOT EXIST, VARIOUS DEPTHS AND SIZES OF SEWERS, COMPLETE RESTORATION, AS SPECIFIED, COMPLETE IN PLACE.  
A.   | 4-FOOT-DIAMETER MANHOLE UP TO 6 FEET IN DEPTH IN UNPAVED AREAS                                                                                                                                       |          |            |       |
<p>|      | 1) WITH 24&quot; SOLID COVER                                                                                                                                                                                   | 1        | EA         |       |
|      | 2) WITH 24&quot; CAM-LOCK WATERTIGHT COVER                                                                                                                                                                     | 1        | EA         |       |
|      | 3) PAYMENT FOR EACH VERTICAL FOOT OVER 6 FEET (ADD ON TO ITEMS A(1) AND A(2) ABOVE)                                                                                                                     | 5        | VF         |       |
| B.   | COST FOR EACH SEWER THAT MUST BE RECONNECTED TO THE NEW MANHOLE, MINIMUM OF 10 FEET OF SEWER FOR EACH SEWER, ANY LOCATION, ANY DEPTH, ANY MANHOLE DIAMETER                                                                 |          |            |       |
|      | 1) 4&quot; or 6&quot; DIP SERVICE LATERALS                                                                                                                                                                         | 1        | EA         |       |
|      | 2) 4&quot; or 6&quot; PVC SERVICE LATERALS                                                                                                                                                                         | 1        | EA         |       |
|      | 3) 8&quot; DIP SEWER                                                                                                                                                                                               | 2        | EA         |       |
|      | 4) 8&quot; PVC SEWER                                                                                                                                                                                               | 2        | EA         |       |
| 4    | FOR REMOVING PROTRUDING SERVICE CONNECTIONS VIA AN INTERNAL ROBOTIC CUTTER PRIOR TO INSTALLING CURED-IN-PLACE PIPE LINING OR AS NECESSARY TO COMPLETE CCTV, ANY SERVICE LATERAL MATERIAL, ANY SIZE LATERAL, AS SPECIFIED, COMPLETE IN PLACE.  | 5        | EA         |       |
| 5    | FOR INSTALLING CURED-IN-PLACE PIPE LINING (CIPP), AS SPECIFIED, REQUIRED INSTALLED LINER THICKNESS AS SPECIFIED BELOW, ANY LOCATION, COMPLETE IN PLACE.                                                                 |          |            |       |
| A.   | 8&quot; DIAMETER SEWER, ANY LOCATION                                                                                                                                                                           |          |            |       |
|      | 1) 6.0 mm CIPP                                                                                                                                                                                               |           | 12,875 LF  |       |
| B.   | 12&quot; DIAMETER SEWER, ANY LOCATION                                                                                                                                                                          |          |            |       |
|      | 1) 7.5 mm CIPP                                                                                                                                                                                               |           | 135 LF     |       |
| C.   | FOR RECONNECTING EXISTING ACTIVE SERVICE LATERALS TO NEW CURED-IN-PLACE PIPE LINING VIA AN INTERNAL REMOTE CUTTER, AS SPECIFIED, COMPLETE IN PLACE.                                                                 |           | 96 EA      |       |
| D.   | CIPP PRODUCT TESTS, AS SPECIFIED                                                                                                                                                                           |           | 10 EA      |       |
| 6    | FOR INSTALLING 1&quot; THICK CEMENTITIOUS MORTAR ON EXISTING INTERNAL MANHOLE WALLS &amp; BENCHES, AS SPECIFIED AND IN ACCORDANCE WITH DETAIL SS-13, ANY LOCATION, COMPLETE IN PLACE.                                                                 |          |            |       |
| A.   | IN EXISTING 4-FOOT-DIAMETER MANHOLES                                                                                                                                                                       |          |            |       |
|      | 1) ANY SPECIFIED MATERIAL                                                                                                                                                                                  |           | 450 VF     |       |
| 7    | FOR resetting EXISTING FRAMES AND COVERS AS SPECIFIED, INCLUDING COMPLETE RESTORATION OF PAVED OR UNPAVED AREAS AS SPECIFIED AND IN ACCORDANCE WITH DETAIL SS-10A, COMPLETE IN PLACE.                                                                 |          |            |       |</p>
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>MANHOLES IN PAVED AREAS</td>
</tr>
<tr>
<td>B.</td>
<td>MANHOLES IN UNPAVED AREAS</td>
</tr>
<tr>
<td>8</td>
<td>FOR REPLACING EXISTING MANHOLE FRAMES AND COVERS WITH NEW 24-INCH-DIAMETER FRAMES AND COVERS, AS SPECIFIED, INCLUDING COMPLETE RESTORATION OF PAVED OR UNPAVED AREAS AS SPECIFIED AND IN ACCORDANCE WITH DETAIL SS-10A, COMPLETE IN PLACE.</td>
</tr>
<tr>
<td>A.</td>
<td>MANHOLES IN PAVED AREAS</td>
</tr>
<tr>
<td>1)</td>
<td>FRAME WITH SOLID COVER</td>
</tr>
<tr>
<td>2)</td>
<td>FRAME WITH WATERTIGHT CAM-LOCK COVER</td>
</tr>
<tr>
<td>B.</td>
<td>MANHOLES IN UNPAVED AREAS</td>
</tr>
<tr>
<td>1)</td>
<td>FRAME WITH SOLID COVER</td>
</tr>
<tr>
<td>2)</td>
<td>FRAME WITH WATERTIGHT CAM-LOCK COVER</td>
</tr>
<tr>
<td>9</td>
<td>FOR RAISING EXISTING MANHOLE COVERS WITH BRICKS OR CONCRETE GRADE RINGS, HEIGHT OF ADJUSTMENT AS NOTED, AS SPECIFIED, INCLUDING COMPLETE RESTORATION OF PAVED OR UNPAVED AREAS AS SPECIFIED AND IN ACCORDANCE WITH DETAIL SS-10A, COMPLETE IN PLACE.</td>
</tr>
<tr>
<td>A.</td>
<td>MANHOLES IN PAVED AREAS</td>
</tr>
<tr>
<td>1)</td>
<td>0 TO 1 VERTICAL FOOT</td>
</tr>
<tr>
<td>2)</td>
<td>GREATER THAN 1 VERTICAL FOOT, PAYMENT FOR EACH FOOT OVER 1 VERTICAL FOOT, ADD TO ITEM A(1) ABOVE</td>
</tr>
<tr>
<td>B.</td>
<td>MANHOLES IN UNPAVED AREAS</td>
</tr>
<tr>
<td>1)</td>
<td>0 TO 1 VERTICAL FOOT</td>
</tr>
<tr>
<td>2)</td>
<td>GREATER THAN 1 VERTICAL FOOT, PAYMENT FOR EACH FOOT OVER 1 VERTICAL FOOT, ADD TO ITEM B(1) ABOVE</td>
</tr>
<tr>
<td>10</td>
<td>FOR BUILDING CONCRETE SLIDES IN MANHOLES FOR EXISTING SERVICE LATERALS AND INCOMING SEWERS AS SPECIFIED ON THE DRAWINGS AND/OR WHERE DIRECTED BY THE ENGINEER IN ACCORDANCE WITH DETAIL SS-7A, ANY CONFIGURATION, INCLUDING BYPASS PUMPING, COMPLETE IN PLACE.</td>
</tr>
<tr>
<td>A.</td>
<td>6&quot; OR LESS (INVERT OF PIPE TO BENCH)</td>
</tr>
<tr>
<td>B.</td>
<td>6&quot; TO 12&quot; (INVERT OF PIPE TO BENCH)</td>
</tr>
<tr>
<td>C.</td>
<td>12&quot; TO 24&quot; (INVERT OF PIPE TO BENCH)</td>
</tr>
<tr>
<td>11</td>
<td>FOR REBUILDING EXISTING MANHOLE BENCHES AND INVERT CHANNELS, ANY CONFIGURATION, INCLUDING BYPASS PUMPING, AS SPECIFIED, COMPLETE IN PLACE, PER DETAIL SS-7.</td>
</tr>
<tr>
<td>A.</td>
<td>IN EXIST 4-FOOT-DIAMETER MANHOLES</td>
</tr>
<tr>
<td>12</td>
<td>FOR PLUGGING EXISTING ABANDONED/INACTIVE SEWERS CONNECTING TO MANHOLES, PIPE DIAMETER AS NOTED, AS SPECIFIED, COMPLETE IN PLACE.</td>
</tr>
<tr>
<td>A.</td>
<td>EXIST 4-INCH TO 8-INCH-DIAMETER SEWERS</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>13</td>
<td>FOR PERFORMING MISCELLANEOUS RESTORATION WORK AS DEFINED BELOW, AS SPECIFIED, COMPLETE IN PLACE, EXCEPT RESTORATION OF GRASSED AREAS VIA SEEDING AND MULCHING WHICH IS CONSIDERED INCIDENTAL TO THE WORK WITH COSTS INCLUDED IN THE OTHER BID ITEMS AND EXCEPT FOR PAVEMENT RESTORATION WHERE SUCH RESTORATION IS SPECIFICALLY INCLUDED IN OTHER BID ITEMS</td>
</tr>
<tr>
<td>A.</td>
<td>SAWCUT, REMOVE AND REPLACE ASPHALT PAVEMENT, ASPHALT AS SPECIFIED IN THE STANDARD SPECIFICATIONS AND DETAILS.</td>
</tr>
<tr>
<td>(a)</td>
<td>ASPHALT/CONCRETE 6 TO 12 INCHES THICK/DEEP (FIRST 6 INCHES OF DEPTH CONSIDERED INCIDENTAL TO THE WORK)</td>
</tr>
<tr>
<td>(b)</td>
<td>ASPHALT/CONCRETE GREATER THAN 12 INCHES THICK/DEEP (ADD-ON TO ITEM 1(a) ABOVE)</td>
</tr>
<tr>
<td>2)</td>
<td>PAVEMENT PATCH PER DETAIL SS-36 (PRIMARY ROAD)</td>
</tr>
<tr>
<td>3)</td>
<td>PAVEMENT PATCH PER DETAIL SS-36A (SECONDARY ROAD)</td>
</tr>
<tr>
<td>4)</td>
<td>PAVEMENT PATCH PER DETAIL SS-37 (PARKING LOTS)</td>
</tr>
<tr>
<td>5)</td>
<td>1.5&quot; PAVEMENT OVERLAY PER DETAIL SS-36B</td>
</tr>
<tr>
<td>6)</td>
<td>ASPHALT REMOVAL / MILLING UP TO 1.5&quot; AS REQUIRED PRIOR TO INSTALLING ASPHALT OVERLAY, INCLUDING ALL WORK REQUIRED TO PERFORM MILLING AND DISPOSAL OF MATERIAL OFFSITE, COMPLETE IN PLACE.</td>
</tr>
<tr>
<td>B.</td>
<td>SAWCUT, REMOVE AND REPLACE CONCRETE WALKS AND DRIVES (CONCRETE AS SPECIFIED)</td>
</tr>
<tr>
<td>1)</td>
<td>4-INCH CONCRETE WITH WELDED WIRE FABRIC REINFORCING</td>
</tr>
<tr>
<td>2)</td>
<td>5-INCH CONCRETE WITH WELDED WIRE FABRIC REINFORCING</td>
</tr>
<tr>
<td>C.</td>
<td>SAWCUT, REMOVE AND REPLACE CONCRETE CURBS AND GUTTERS, (CONCRETE AS SPECIFIED), PER LINEAR FOOT OF REPLACEMENT</td>
</tr>
<tr>
<td>D.</td>
<td>REMOVE EXCAVATED SOIL AND DISPOSE OF OFFSITE, AND BACKFILL WITH IMPORTED ABC STONE UNDER PAVED ROADS, ADD TO VARIOUS BID ITEMS WHERE THIS REQUIREMENT APPLIES, COST PER CUBIC YARD OF ABC STONE INSTALLED</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>E.</td>
<td>REMOVE EXCAVATED SOIL AND DISPOSE OF OFFSITE, AND BACKFILL WITH FLOWABLE FILL UNDER PAVED ROADS, ADD TO VARIOUS BID ITEMS WHERE THIS REQUIREMENT APPLIES, COST PER CUBIC YARD OF FLOWABLE FILL INSTALLED</td>
</tr>
<tr>
<td>14</td>
<td>FOR MOBILIZATION TO THE PROJECT SITE, AS SPECIFIED (2% OF SUBTOTAL)</td>
</tr>
</tbody>
</table>

**SUBTOTAL (ITEMS 1-13)**

**TOTAL BID (ITEMS 1-14)**
5. Refer to Section 01232 – Special Provisions for additional requirements and information including the method for awarding this Contract.

6. Refer to Section 01250 – Measurement and Payment.

7. Proposed Contractors and Subcontractors with Proposed Work Duties (Note: All subcontractors shall be subject to approval by the Owner):

________________________________________________________________________
________________________________________________________________________

8. Proposed Project Manager: ____________________________

Proposed Project Superintendent: ____________________________

9. **The Notice to Proceed is expected to be issued on or before February 1, 2021.** Bidder agrees that the Work will be complete and ready for final payment in accordance with the Contract Times specified in the Special Provisions. Liquidated damages in the amount of $800 per day will be assessed for each calendar day after the specified Contract Times required for final completion.

10. Communications concerning this Bid shall be sent to Bidder at the following address:

    U.S. Mail Address:____________________________________________________
    ____________________________________________________________

    Overnight Shipping Address:__________________________________________
    ____________________________________________________________

    Phone Number: __________________________________________________

    Attention: _____________________________________________________

11. The terms used in this Bid, which are defined in the General Conditions included as part of the Contract Documents, have the meanings assigned to them in the General Conditions.

**SIGNATURE OF BIDDER** ________________________________________________

    Contractor's License Number __________________________

    License Expiration Date_______________________________
If an Individual

By___________________________________________ (signature of individual)

doing business as ______________________________________

Business address ______________________________________

____________________________________________________

Phone No. __________________________ Fax No. __________________________

Date ______________________________, 20__

ATTEST ______________________________ TITLE ______________________________

If a Partnership

By___________________________________________ (firm name)

___________________________________________ (signature of general partner)

Business address ______________________________________

____________________________________________________

Phone No. __________________________ Fax No. __________________________

Date ______________________________, 20__

ATTEST ______________________________ TITLE ______________________________
If a Corporation

By ____________________________________________
   (corporation name)

By ____________________________________________
   (signature of authorized person)

______________________________________________
   (title)

Business address ____________________________________________

___________________________________________________________

Phone No. __________________________ Fax No. _________________________

Date __________________________, 20___

ATTEST __________________________ TITLE

(Seal)
If a Joint Venture  (Other party must sign below.)

Contractor's License Number____________________

License Expiration Date________________________

If an Individual (Other Party of Joint Venture only)

By___________________________________________

(signature of individual)

doing business as________________________________

Business address ______________________________________

____________________________________________________

Phone No. __________________ Fax No. __________________

Date ________________________________, 20_____  

ATTEST ____________________ TITLE________________________

If a Partnership (Other Party of Joint Venture only)

By____________________________________________

(firm name)

___________________________________________________________

(signature of general partner)

Business address ______________________________________

______________________________________________________

Phone No. __________________ Fax No. __________________

Date ________________________________, 20____

ATTEST ____________________ TITLE________________________
If a Corporation (Other Party of Joint Venture only)

By______________________________
    (corporation name)

By______________________________
    (signature of authorized person)

____________________________________________________________
    (title)

Business address ________________________________

_______________________________________________________

Phone No. ______________________ Fax No. ______________________

Date ___________________________, 20__

ATTEST ______________________ TITLE________________________

(Seal)

(End of Section 01140)
SECTION 01142

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned __________________________
_________________________ as Principal, and __________________________, as
Surety, are hereby held and firmly bound unto CITY OF FOUNTAIN INN as OWNER, in the penal
sum of __________________________ Dollars ($__________________) 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 ___ day of ____________________, 20___.

The Condition of the above obligation is such that whereas the Principal has submitted to CITY OF
FOUNTAIN INN a certain BID, attached hereto and hereby made a part hereof, to enter into a
contract in writing, for the construction of: 2020 SANITARY SEWER REHABILITATION PROJECT
NOW, THEREFORE,

(a) If the said BID shall be rejected, or in the alternate,
(b) If said BID 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) 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,

then this obligation shall be void, otherwise the same shall 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; 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.

_________________________
Principal

_________________________
Surety

By: ___________________________

SEAL

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department’s
most current list (Circular 570 as amended) and be authorized to transact business in the State
where the project is located.

(End of Section 01142)
THIS AGREEMENT, made this ________ day of ___________________________, 20_______, by

and between the City of Fountain Inn herein after called "OWNER" and

_____________________________________________________________________________,

(Name of Contractor)

of the City of _________________________________, County of ________________________,

and

State of ____________________________________, hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR hereby agrees with the OWNER to commence and complete the construction described as follows:

   2020 SANITARY SEWER REHABILITATION PROJECT

   hereinafter called the PROJECT.

2. The CONTRACTOR will furnish all of the materials, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the PROJECT described herein.

3. The CONTRACTOR will commence work required by the CONTRACT DOCUMENTS within fifteen (15) calendar days after the date of the NOTICE TO PROCEED and will fully complete the PROJECT within the time for completion specified in the SPECIAL PROVISIONS of the CONTRACT DOCUMENTS unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS. The CONTRACTOR further agrees to pay, as liquidated damages, the sum of eight hundred dollars ($800) for each consecutive calendar day thereafter as herein provided in the SPECIAL PROVISIONS.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of ($__________________) ____________________________ Dollars or as shown in the Bid Schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:

A. Advertisement for Bids
B. Information for Bidders
C. Bid
D. Bid Bond
E. Agreement
F. Performance Bond
G. Payment Bond
H. General Conditions
I. Special Provisions
J. Notice of Award
K. Notice to Proceed
L. Change Orders
O. Addenda
   No. ________________ Dated _________________
   No. ________________ Dated _________________
   No. ________________ Dated _________________
   No. ________________ Dated _________________

6. The OWNER agrees to pay the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

7. This Agreement shall be binding on all parties hereto and their respective heirs, executors, administrators, successors and assigns.
IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized officials, this Agreement in four (4) counterparts, each of which shall be deemed an original, in the year and day first above written.

______________________________________
(OWNER)

By:____________________________________

(SEAL)

_________________________________________
ATTEST

_________________________________________
(Title of Authorized Official)

_________________________________________
(Secretary)

_________________________________________
(Witness)

______________________________________
(CONTRACTOR)

By:___________________________________

______________________________________
______________________________________
______________________________________
(Title)

_________________________________________
(Address)

(SEAL)

ATTEST:

_________________________________________
(Secretary)

_________________________________________
(Witness)

(End of Section 01210)
SECTION 01212

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

__________________________
(Name of Contractor)

__________________________
(Address of Contractor)

a ___________________________________________________, hereinafter called Principal and
(Corporation, Partnership or Individual)

__________________________
(Name of Surety)

__________________________
(Address of Surety)

hereinafter called Surety are held and firmly bound unto the

__________________________
(Name of Owner)

__________________________
(Address of Owner)

hereinafter called OWNER, in the penal sum of ______________________________________

_______________________________________Dollars, ($____________

in lawful money of the United States, for the payment of which sum well and truly to be made, we
bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas the Principal entered into a certain
contract with the OWNER, dated the ______________ day of ___________________,
20________, a copy of which is hereto attached and made a part thereof for the construction of:

2020 SANITARY SEWER REHABILITATION PROJECT

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the
undertakings, covenants, terms, conditions, and agreements of said contract during the original
term thereof, and any extensions thereof which may be granted by the OWNER, with or without
notice to the Surety and during the one-year guaranty period, and if he shall satisfy all claims and
demands incurred under such contract, and shall fully indemnify and save harmless the OWNER
from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse
and repay the OWNER all outlay and expense which the OWNER may incur in making good any
default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that
no change, extension of time, alteration or addition to the terms of the contract or to the WORK to
be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect
its obligation on this BOND, and it does hereby waive notice of any such change, extension of time,
alteration, or addition to the terms of the contract of to the WORK or to the SPECIFICATIONS.
PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each one of which shall be deemed an original, this the ______________ day of _________________________, 20______.

ATTEST

__________________________________________
Principal

__________________________________________
(Principal) Secretary
(SEAL)

By:_____________________________________(S)

__________________________________________
Address

__________________________________________
Witness as to Principal

__________________________________________
Address

__________________________________________
(Surety) Secretary

By:______________________________________

__________________________________________
Address

__________________________________________
Witness as to Surety

__________________________________________
Address

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located.

(End of Section 01212)
SECTION 01214
PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

______________________________________________
(Name of Contractor)

______________________________________________
(Address of Contractor)

______________________________________________, hereinafter called
(an individual), (a Partnership), or (a Corporation)

Principal, and _____________________________________________
(Name of Surety)

______________________________________________
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto __________________________________

______________________________________________
(Name of Owner)

______________________________________________
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____________________________________________ Dollars, ($__________ ) in lawful money of

the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly, by these presents.

THE CONDITION OF THE OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the __________ day of _______________________, 20_______, a copy of which is hereto attached and made a part hereof for the construction of:

2020 SANITARY SEWER REHABILITATION PROJECT

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, fuel, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed on such WORK, whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.
PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each one of which shall be deemed an original, this the ____________ day of _____________________, 20________.

ATTEST: ____________________________________________________________________________

Principal

________________________________________

(Principal) Secretary

(SEAL)

By:____________________________________(S)

________________________________________

Address

________________________________________

Witness as to Principal

________________________________________

Address

________________________________________

Surety

ATTEST: ____________________________________________________________________________

By:____________________________________

Attorney-in-fact

________________________________________

(Surety) Secretary

(SEAL)

________________________________________

Address

________________________________________

Witness as to Surety

________________________________________

Address

________________________________________

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is a Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department’s most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located.

(End of Section 01214)
I, the undersigned, ____________________________, the duly authorized and acting legal representative of ____________________________,

do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

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DATE: ___________________________  
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___________________________________________  
___________________________________________ 
(address and phone number)
CERTIFICATE OF ACKNOWLEDGEMENT OF CONTRACTOR
IF A CORPORATION

FOR AGREEMENT

STATE OF __________________________________________)
COUNTY OF ________________________________________)
ON THIS _________________ day of ____________________, 20______,
before me personally came ________________________________________, to me known,
who being by me duly sworn, did depose and say as follows:

That he resides at ___________________________________________________________
and is the _______________________________ of _______________________________________,
(Title of Officer)                                                   (Name of Corporation)

the Corporation described in and which executed the foregoing instrument; that he knows the
corporate seal of said Corporation; that the seal affixed to the foregoing instrument is such
Corporate Seal and it was so affixed by order of the Board of Directors of said Corporation; and
that by the like order he signed thereto his name and official designation.

________________________________
Notary Public (Seal)

My Commission expires: __________________________
CERTIFICATE OF ACKNOWLEDGEMENT OF CONTRACTOR
IF A CORPORATION

FOR CONTRACT BONDS

STATE OF ________________________________

COUNTY OF ________________________________

ON THIS ___________________ day of ____________________________, 20______, before
me personally came ________________________________, to me known, who being
by me duly sworn, did depose and say as follows:

That he resides at ________________________________, and is the ________________________________ of ________________________________,

(Title of Officer) (Name of Corporation)

the Corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said Corporation; that the seal affixed to the foregoing instrument is such Corporate Seal and it was so affixed by order of the Board of Directors of said Corporation; and that by the like order he signed thereto his name and official designation.

__________________________
Notary Public (Seal)

My Commission expires: ____________________________

(End of Section 01219)
SECTION 01230

GENERAL CONDITIONS

1. **GENERAL:**

1.1 **THE CONTRACT DOCUMENTS:**

1.1.1 The Contract Documents consist of the Advertisement for Bids, Information for Bidders, Bid, Bid Bond, Agreement, Payment Bond, Performance Bond, Conditions of the Contract (General Conditions, Special Provisions and Other Conditions), Material and Technical Specifications, Drawings, Addenda, Notice of Award, Notice to Proceed and Change Orders.

1.2 **CORRELATION AND INTENT OF DOCUMENTS:**

1.2.1 The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all.

1.2.2 The intent of the Drawings and Specifications is that the Contractor shall furnish all labor, supplies and materials, tools, machinery, equipment, transportation, supervision, temporary construction of any nature, and all other services, facilities and means necessary for the proper execution and completion of the work in accordance with the Contract Documents and all incidental work necessary to complete the project in an acceptable manner, and fully complete the work or improvement ready for use, occupancy and operation by the Owner.

1.2.3 Any mention in the Specifications or indication on the Drawings of articles, materials, methods or operations shall require the Contractor to furnish such item or service as if it was fully specified unless it is noted or specified as not in the contract. It is intended that all materials shall be new and best quality in every respect unless otherwise noted or specified. All workmanship, methods of assembly, and erection shall be first class in every respect.

1.3 **CONFLICT OR INCONSISTENCY:**

1.3.1 If there is any conflict or inconsistency between the provisions of the Special Provisions and the provisions of the other Contract Documents, the provisions of the Special Provisions shall prevail. If there is any conflict or inconsistency between the provisions of the General Conditions and the provisions of any of the Contract Documents other than the Special Provisions, the provisions of the General Conditions shall prevail.

1.3.2 In the case of conflict between the Drawings and Specifications, the Specifications shall govern. Figure dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings.

1.3.3 In case of difference between small-scale and large-scale drawings, the large-scale drawings shall govern. Schedules on any contract drawing shall take precedence over conflicting information on that or any other contract drawing. On any of the drawings where a portion of the work is detailed or drawn out and the remainder is shown in outline, the parts detailed or drawn out shall apply also to all other like portions of the work. Where the word "similar" occurs on the drawings, it shall have a general meaning and not be
interpreted as being identical, and all details shall be worked out in relation to their location and their connection with other parts of the work.

1.3.4 Any discrepancies found between the Drawings and Specifications and site conditions or any inconsistencies or ambiguities in the Drawings or Specifications shall be immediately reported to the Engineer, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk.

1.3.5 Should a conflict be discovered within the Contract Documents, the Contractor shall be deemed to have estimated the higher quality way of doing the work unless he shall have asked for and obtained a decision in writing from the Engineer before entering into this contract.

1.4 ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS:

1.4.1 The Contractor may be furnished additional instructions and detail drawings, by the Engineer, as necessary to carry out the work required by the Contract Documents. The additional drawings and instructions thus supplied will become a part of the Contract Documents. The Contractor shall carry out the work in accordance with the additional detail drawings and instructions.

1.5 SPECIFICATION HEADINGS:

1.5.1 For convenience of reference, these Specifications are divided into various Divisions, Sections, Subsections and Paragraphs. The titles of these headings shall not be taken as a correct or complete segregation of the various types of material and labor nor as an attempt to outline jurisdictional procedures. The headings shall not be deemed to limit or restrict the content, meaning or effect of such section, subsection, paragraph, provision or part.

1.5.2 The organization of the Specifications into the various headings, and the arrangement of Drawings shall not control the Contractor in dividing the work among subcontractors or in establishing the extent of the work to be performed by any trade. Each subcontract shall be dependent upon its own definite confines, regardless of Divisions of these Specifications. No responsibility, either direct or implied, is assumed by the Owner for omissions or duplications by the Contractor or by any of his subcontractors due to real or alleged errors in arrangement of matter in Contract Documents.

1.6 DRAWINGS AND SPECIFICATIONS FOR CONSTRUCTION PURPOSES:

1.6.1 The Contractor will be furnished five (5) complete sets of Drawings and Specifications to be used during the course of construction. If more than five (5) sets are needed, the Contractor will be required to pay the actual cost of printing and handling.

1.7 DEFINITIONS:

1.7.1 Wherever the words hereinafter defined or pronouns used in their stead occur in the Contract Documents, they shall have the following meanings:

1.7.1.1 ADDENDA: Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the Contract Documents, Drawings and Specifications by additions, deletions, clarifications or corrections. Such addendum or addenda will take
precedent over the position of the general drawings and specifications concerned and will be considered as part of the Contract Documents.

1.7.1.2 **AGREEMENT:** The Agreement represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations or agreements either written, or oral, including the bidding documents. The Agreement may be amended or modified by a Change Order.

1.7.1.3 **BID:** The written offer or proposal of the bidder, submitted on the prescribed form, properly signed and guaranteed, to perform the work at the prices quoted by the bidder.

1.7.1.4 **BID BOND:** The security furnished by the bidder with his proposal for the project as guaranty he will enter into a contract for the work if his proposal is accepted.

1.7.1.5 **BIDDER:** Any individual, firm or corporation or combination of same submitting a bid for the work contemplated, acting directly or through a duly authorized representative.

1.7.1.6 **BONDS:** Bid, Performance and Payment Bonds and other instruments of security furnished by the Contractor and his Surety in accordance with the Contract Documents.

1.7.1.7 **CALENDAR DAY:** Every day shown on the calendar, Sundays and Holidays included.

1.7.1.8 **CHANGE ORDER:** A written order to the Contractor authorizing an addition, deletion or revision in the work within the general scope of the Contract Documents, or authorizing an adjustment in the contract price or contract time.

1.7.1.9 **CONTRACT:** The Contract Documents form the contract. The contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations or agreements, either written or oral, including the bidding documents. The contract may be amended or modified by a Change Order.

1.7.1.10 **CONTRACT DOCUMENTS:** The Contract Documents consist of the Advertisement for Bids, Information for Bidders, Bid, Bid Bond, Agreement, Payment Bond, Performance Bond, the Conditions of the Contract (General, Supplemental, and other Conditions), the Drawings, the Material and Technical Specifications, Addenda issued prior to execution of the Contract, Notice of Award, Notice to Proceed and Change Orders.

1.7.1.11 **CONTRACT PRICE:** The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.7.1.12 **CONTRACTOR:** The individual, firm or corporation with whom the Owner has executed the Agreement by which the Contractor is obligated directly, or through subcontractors, to perform work in connection with the project. The Contractor is the person or organization identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number and masculine in gender. The term Contractor means the Contractor
or his authorized representative.

1.7.1.13 **CONTRACT TIME:** The number of calendar days stated in the Contract Documents for completion of the work.

1.7.1.14 **DRAWINGS:** The part of the Contract Documents which show the characteristics and scope of the work to be performed and which have been prepared or approved by the Engineer.

1.7.1.15 **EARTH:** An excavated material or material to be excavated; all kinds of material other than rock.

1.7.1.16 **ELEVATION:** The figures given on the Drawings or in the other Contract Documents after the word “elevation” or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

1.7.1.17 **ENGINEER:** The person, firm or corporation named as such in the Contract Documents and duly appointed by the Owner to undertake the duties and powers herein assigned to the Engineer, acting either directly or through duly authorized representatives.

1.7.1.18 **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.

1.7.1.19 **FIELD ORDER:** A written order effecting a change in the work not involving an adjustment in the contract price or an extension of the contract time, issued by the Engineer to the Contractor during construction.

1.7.1.20 **FURNISH:** Furnish and install complete, in place, and ready for use.

1.7.1.21 **INFORMATION FOR BIDDERS:** The Notice to Contractors containing all necessary information as to provisions, requirements, date, place and time of submitting bids.

1.7.1.22 **LATEST EDITION:** The current printed documents issued eight weeks or more prior to date of receipt of bids.

1.7.1.23 **MATERIALS:** Any substance specified for use in the construction of the project and its appurtenances.

1.7.1.24 **NET COST:** The cost to the Contractor after application of all credits and discounts (excepting only cash discounts) and without the addition of any factor for burden, overhead or indirect cost or profit.

1.7.1.25 **NOTICE OF AWARD:** The written notice of the acceptance of the bid from the Owner to the successful bidder.

1.7.1.26 **NOTICE TO PROCEED:** Written communication issued by the Owner to the Contractor authorizing him to proceed with the work and establishing the date for commencement of the work.

1.7.1.27 **OPTIMUM MOISTURE CONTENT FOR COMPACTION:** The moisture content of a soil calculated on the basis of dry weight of
soil at which the soil can be compacted to the approximate maximum density under a specified standard method of compaction.

1.7.1.28 **OWNER:** A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the work is to be performed.

1.7.1.29 **PAYMENT BOND:** The approved form of security furnished by the Contractor to guarantee the payment to all persons supplying labor and materials in the prosecution of the work in accordance with the terms of the contract.

1.7.1.30 **PERFORMANCE BOND:** The approved form of security furnished by the Contractor to guarantee the completion of the work in accordance with the terms of the contract.

1.7.1.31 **PRECONSTRUCTION CONFERENCE:** A conference following award and prior to start of construction to be attended by a duly authorized representative of the Engineer and by the responsible officials of the Contractor and other affected parties.

1.7.1.32 **PROJECT:** The undertaking to be performed as provided in the Contract Documents.

1.7.1.33 **PROPOSAL:** The written offer of the bidder, submitted on the prescribed form, properly signed and guaranteed, to perform the work at the prices quoted by the bidder.

1.7.1.34 **PROPOSAL FORM:** The approved form on which the Owner requires formal bids to be prepared and submitted for the work.

1.7.1.35 **PROPOSAL GUARANTY:** The security furnished by the bidder with his proposal for a project, as guaranty he will enter into a contract for the work if his proposal is accepted.

1.7.1.36 **PROVIDE:** Furnish and install complete, in place, and ready for use.

1.7.1.37 **RESIDENT PROJECT REPRESENTATIVE:** The authorized representative of the Owner or Engineer who is assigned to the project site or any part thereof.

1.7.1.38 **ROCK:** An excavated material or material to be excavated; only boulders and pieces of concrete or masonry exceeding 1 cu. yd. in volume, or solid ledge rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power operated tool. No soft or disintegrated rock which can be removed with a hand pick or power operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation will be classified as rock.

1.7.1.39 **SHOP DRAWINGS:** All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier or distributer, which illustrate how specific portions of the work shall be
1.7.1.40 SPECIALIST: An individual or firm of established reputation which is regularly engaged in, and which maintains a regular force of workmen skilled in either manufacturing or fabricating items required by the contract, installing items required by the contract, or otherwise performing work required by the contract. Where the contract specifications require installation by a specialist, that term shall also be deemed to mean either the manufacturer of the item, an individual or firm licensed by the manufacturer, or an individual or firm who will perform the work under the manufacturer's direct supervision.

1.7.1.41 SPECIFICATIONS: A part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.7.1.42 STRUCTURES: Bridges, culverts, catch basins, drop inlets, manholes, retaining walls, cribbing, endwalls, buildings, sewers, service pipes, underdrains, foundation drains, and other miscellaneous items which may be encountered in the work, and which are not otherwise classified herein.

1.7.1.43 SUBBASE: The layer or layers of specified or selected material of designated thickness or rate of application placed on a subgrade to comprise a component of the pavement structure to support the base course, pavement or subsequent layer of the construction.

1.7.1.44 SUBCONTRACTOR: An individual, firm or corporation having a direct contract with the Contractor or with any other subcontractor for the performance of a part of the work at the site. The term subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a subcontractor or his authorized representative thereof.

1.7.1.45 SUB-SUBCONTRACTOR: An individual, firm or corporation having a direct or indirect contract with a subcontractor to perform any of the work at the site. The term sub-subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a sub-subcontractor or an authorized representative thereof.

1.7.1.46 SUBGRADE: The top surface of a roadbed upon which the pavement structure and shoulders are constructed.

1.7.1.47 SUBSTANTIAL COMPLETION: That date as certified by the Engineer when the construction of the project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the project or specified part can be utilized for the purposes for which it was intended.

1.7.1.48 SPECIAL PROVISIONS: Conditions of the Contract other than the General Conditions.

1.7.1.49 SUPERINTENDENT: The Contractor's authorized representative in responsible charge of the work.

1.7.1.50 SUPPLIER: Any person or organization who supplies materials or fabricated or installed.
equipment for the work, including that fabricated to a special
design, but who does not perform labor at the site.

1.7.1.51 **SURETY:** The corporation, partnership or individual bound with
and for the Contractor for the full and complete performance of the
contract, and for the payment of all debts pertaining to the work.

1.7.1.52 **TITLES (OR HEADINGS):** The titles or headings of the
documents and subsections herein are intended for convenience
of reference and shall not be considered as having any bearing on
their interpretation.

1.7.1.53 **WORK:** All labor necessary to produce the construction required
by the Contract Documents, and all materials and equipment
incorporated or to be incorporated in the project.

1.7.1.54 **WRITTEN NOTICE:** Any notice to any party of the Agreement
relative to any part of this Agreement 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.

1.8 **ADDITIONAL DEFINITIONS:**

1.8.1 Wherever in the Specifications or on the Drawings, the words "as
designated," "as detailed," "as directed," "as ordered," "as permitted," "as
prescribed," "as provided," "as requested," "as required," or words of like
import are used, it shall be understood that the designation, detail, direction,
order, permission, prescription, provision, request or requirement of the
Engineer is intended.

1.8.2 Similarly, the words "approved," "acceptable," "satisfactory," and words of
like import shall mean approved by, acceptable to, or satisfactory to the
Owner and/or Engineer.

1.9 **ABBREVIATIONS:**

1.9.1 Where any of the following abbreviations are used in the Specifications, they
shall have the meaning set forth opposite each.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Name</th>
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<tbody>
<tr>
<td>AA</td>
<td>Aluminum Association</td>
</tr>
<tr>
<td>AAMA</td>
<td>Architectural Aluminum Manufacturers Association</td>
</tr>
<tr>
<td>AAN</td>
<td>American Association of Nurserymen</td>
</tr>
<tr>
<td>AAR</td>
<td>Association of American Railroads</td>
</tr>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>AATC</td>
<td>American Association of Textile Chemists and Colorists</td>
</tr>
<tr>
<td>ACI</td>
<td>American Concrete Institute</td>
</tr>
<tr>
<td>ACPA</td>
<td>American Concrete Pipe Association</td>
</tr>
<tr>
<td>AED</td>
<td>American Equipment Dealers</td>
</tr>
<tr>
<td>AFBMA</td>
<td>Anti-Friction Bearing Manufacturers Association, Inc.</td>
</tr>
<tr>
<td>AFI</td>
<td>American Filter Institute</td>
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<tr>
<td>AGA</td>
<td>American Gas Association</td>
</tr>
<tr>
<td>AGC</td>
<td>Associated General Contractors of America, Inc.</td>
</tr>
<tr>
<td>AGMA</td>
<td>American Gear Manufacturers Association</td>
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<tr>
<td>AHAM</td>
<td>Association of Home Appliance Manufacturers</td>
</tr>
<tr>
<td>AHDGA</td>
<td>American Hot Dip Galvanizers Association</td>
</tr>
<tr>
<td>AIA</td>
<td>American Institute of Architects</td>
</tr>
</tbody>
</table>
AIEE  American Institute of Electrical Engineers
AISC  American Institute of Steel Construction
AISI  American Iron and Steel Institute
ALS  American Lumber Standards
AMA  Acoustical Materials Association
AMCA  Air Moving and Conditioning Association
ANS  American Nuclear Society
ANSI  American National Standards Institute
APA  American Plywood Association
API  American Petroleum Institute
ARA  American Railway Association
AREA  American Railway Engineering Association
ARI  Air Conditioning and Refrigeration Institute
ASA  Acoustical Society of America
ASCE  American Society of Civil Engineers
ASHRAE  American Society of Heating, Refrigerating and Air Conditioning Engineers
ASLA  American Society of Landscape Architects
ASLE  American Society of Lubricating Engineers
ASME  American Society of Mechanical Engineers
ASQC  American Society for Quality Control
ASSE  American Society of Sanitary Engineers
ASTM  American Society for Testing Materials
AVATI  Asphalt and Vinyl Asbestos Tile Institute
AWI  Architectural Woodwork Institute
AWPA  American Wood Preservers' Association
AWPI  American Wood Preservers' Institute
AWS  American Welding Society
AWWA  American Water Works Association
BHMA  Builders Hardware Manufacturers Association
CABRA  Copper and Brass Research Association
CDA  Copper Development Association
CEMA  Convoyor Equipment Manufacturers Association
CGA  Compressed Gas Association
CRSI  Concrete Reinforcing Steel Institute
CS  Commercial Standards, U.S. Department of Commerce
CSI  Construction Specification Institute
DCDMA  Diamond Core Drill Manufacturers Association
EIA  Electronic Industries Association
EPA  Environmental Protection Agency
FCI  Fluid Controls Institute
FGJA  Flat Glass Jobbers Association
FIA  Factory Insurance Association
FM  Factory Mutual
FMEC  Factory Mutual Engineering Corporation
FS  Federal Specification
FSPT  Federation of Societies for Paint Technology
FSS  Federal Specifications, General Services Administration
FHWA  Federal Highway Administration
GA  Gypsum Association
IBI  Insulation Board Institute
IBR  Institute of Boiler and Radiator Manufacturers
IEEE  Institute of Electric and Electronics Engineers
IES  Illuminating Engineering Society
ILIA  Indiana Limestone Institute of America, Inc.
IME  Institute of Makers of Explosives
IP  Institute of Petroleum (London)
IPC  Institute of Printed Circuits
IPCEA  Insulated Power Cable Engineers Association
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Name</th>
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<tbody>
<tr>
<td>ISA</td>
<td>Instrument Society of America</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
</tr>
<tr>
<td>ITE</td>
<td>Institute of Traffic Engineers</td>
</tr>
<tr>
<td>LIA</td>
<td>Lead Industries Association</td>
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<tr>
<td>MBMA</td>
<td>Metal Building Manufacturers Association</td>
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<td>MIA</td>
<td>Marble Institute of America</td>
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<tr>
<td>MLA</td>
<td>Metal Lath Association</td>
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<tr>
<td>MLMA</td>
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<td>MPTA</td>
<td>Mechanical Power Transmission Association</td>
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<td>MRIS</td>
<td>Maritime Research Information Service</td>
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<tr>
<td>MS</td>
<td>Military Specification</td>
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<tr>
<td>MSDS</td>
<td>Material Safety Data Sheet</td>
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<td>MSTD</td>
<td>Military Standard</td>
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<tr>
<td>NAAMM</td>
<td>National Association of Architectural Metal Manufacturers</td>
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<tr>
<td>NAFM</td>
<td>National Association of Fan Manufacturers</td>
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<td>National Board of Fire Underwriters</td>
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<td>NBS</td>
<td>National Bureau of Standards</td>
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<tr>
<td>NCCLS</td>
<td>National Committee for Clinical Laboratory Standards</td>
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<td>NCMA</td>
<td>National Concrete Masonry Association</td>
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<td>NEC</td>
<td>National Electrical Code</td>
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<tr>
<td>NFC</td>
<td>National Fire Code</td>
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<td>NFPA</td>
<td>National Fire Protection Association</td>
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<td>NHLA</td>
<td>National Hardware Lumber Association</td>
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<td>National Lime Association</td>
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<td>NLGI</td>
<td>National Lubricating Grease Institute</td>
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<td>National Lumber Manufacturers Association</td>
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<td>National Microfilm Association</td>
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<td>NMWIA</td>
<td>National Mineral Wool Insulation Association</td>
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<tr>
<td>NPC</td>
<td>National Plumbing Code</td>
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<tr>
<td>NRCA</td>
<td>National Roofing Contractors Association</td>
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<tr>
<td>NRMCA</td>
<td>National Ready Mixed Concrete Association</td>
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<tr>
<td>NSF</td>
<td>National Sanitation Foundation</td>
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<td>NTMA</td>
<td>The National Terrazzo and Mosaic Association</td>
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<td>NWMA</td>
<td>National Woodwork Manufacturers Association</td>
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<td>OSHA</td>
<td>Occupational Safety and Health Act</td>
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<td>PCA</td>
<td>Portland Cement Association</td>
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<td>PCI</td>
<td>Prestressed Concrete Institute</td>
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<td>PDCA</td>
<td>Painting and Decorating Council of America</td>
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<tr>
<td>PEI</td>
<td>Porcelain Enamel Institute</td>
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<td>PI</td>
<td>Perlite Institute</td>
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<td>Redwood Inspection Service</td>
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<td>RMA</td>
<td>Rubber Manufacturers Association</td>
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<td>RTI</td>
<td>Resilient Tile Institute</td>
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<td>Resistance Welder Manufacturers Association</td>
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<td>Scientific Apparatus Makers Association</td>
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<td>SBI</td>
<td>Steel Boiler Institute</td>
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<tr>
<td>SCDHPT</td>
<td>South Carolina Department of Highways and Public Transportation</td>
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<td>SCDOT</td>
<td>South Carolina Department of Transportation</td>
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<td>SCPI</td>
<td>Structural Clay Products Institute</td>
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<td>SCSPHD</td>
<td>South Carolina State Highway Department</td>
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<td>SDI</td>
<td>Steel Deck Institute</td>
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<td>SIS</td>
<td>Swedish Standards Association</td>
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<td>SJI</td>
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<td>SMA</td>
<td>Screen Manufacturers Association</td>
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<td>SMACNA</td>
<td>Sheet Metal and Air Conditioning Contractors National</td>
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</table>
2. **OWNER'S RIGHTS AND RESPONSIBILITIES:**

2.1 **CHANGES IN THE WORK:**

2.1.1 The Owner, without invalidating the contract, may make changes in the work and in the Drawings and Specifications therefor by making alterations therein, additions thereto, or omissions therefrom. All work resulting from such changes shall be performed and furnished under and pursuant to the terms and conditions of the contract. If such changes result in an increase or decrease in the work to be done hereunder, or increase or decrease the quantities thereof, adjustment in compensation shall be made therefor as provided in Subsection 7.12 entitled PAYMENT FOR EXTRA WORK.

2.1.2 Except in an emergency endangering life or property, no change shall be made unless in pursuance of a written order from the Engineer authorizing the change, and no claim for additional compensation shall be valid unless the change is so ordered.

2.1.3 The Contractor agrees that he shall neither have nor assert any claim for, or be entitled to, any additional compensation for damages or for loss of anticipated profits on work that is eliminated.

2.2 **PROJECT ENGINEER:**

2.2.1 Frazier Engineering, P.A
6592 Bob White Trail
Stanley, NC 28164
Phone: 704-822-8444 Fax: 704-822-8666

2.3 **ENGINEER'S AUTHORITY:**

2.3.1 The Engineer will be the Owner's representative periodically during the construction period and he will observe the work in progress on behalf of the Owner. The Engineer will have the authority to act on behalf of the Owner in the following matters consistent with the Owner's rights and obligations as set forth in these Contract Documents:

2.3.1.1 Interpretation of Contract Documents.

2.3.1.2 Approval of samples and shop drawings.

2.3.1.3 Preparation of supplementary details and instructions.

2.3.1.4 Inspection and approval of construction work.
2.3.1.5 Preliminary approval of progress payment applications.

2.3.1.6 Review of television inspection logs and video tapes

2.3.2 Any instructions which the Engineer may issue the Contractor shall be adjudged an interpretation of the contract requirements and not an act of supervision. The Engineer has no authority, nor accepts any responsibility, either direct or implied, to direct and superintend the construction operations.

2.3.3 The Contractor shall proceed without delay to perform the work as directed, instructed, determined, or decided by the Engineer and shall comply promptly with such directions, instructions, determinations, or decisions. If the Contractor has any objection thereto, he may require that any such direction, instruction, determination, or decision be put in writing and within ten (10) days after receipt of any such writing, he may file a written protest with the Owner stating clearly and in detail his objections, the reasons therefor, and the nature and amount of additional compensation, if any, to which he claims he will be entitled thereby. A copy of such protest shall be filed with the Engineer at the same time as it is filed with the Owner. Unless the Contractor files such written protest with the Owner and Engineer within such ten (10) day period, he shall be deemed to have waived all grounds for protest of such direction, instruction, determination, or decision and all claims for additional compensation or damages occasioned thereby, and shall further be deemed to have accepted such direction, instructions, determination, or decision as being fair, reasonable, and finally determinative of his obligations and rights under the contract.

2.4 LIABILITY OF THE OWNER:

2.4.1 No person, firm or corporation, other than the Contractor, who signed this contract as such, shall have any interest herein or right hereunder. No claim shall be made or be valid either against the Owner or any agent of the Owner and neither the Owner nor any agent of the Owner shall be liable for or be held to pay any money, except as herein provided. The acceptance by the Contractor of the payment as fixed in the final estimate shall operate as and shall be a full and complete release of the Owner and of every agent of the Owner of and from any and all claims, demands, damages and liabilities, by or to the Contractor for anything done or furnished for or arising out of or relating to or by reason of the work or for or on account of any act or neglect of the Owner or of any agent of the Owner or of any other person, arising out of, relating to or by reason of the work, except the claim against the Owner for the unpaid balance, if any there be, of the amounts retained as herein provided.

2.5 RIGHTS-OF-WAY:

2.5.1 All work shall be performed within the existing sewer right-of-way and/or road-right-of-way as noted on the Drawings. The Contractor shall be responsible for gaining access to such rights-of-way and accessing sewers and manholes to perform the work including negotiating with property Owners, paying all costs for accessing sewers and manholes, and restoring all areas impacted by the Contractor’s construction operations. The Contractor shall not be entitled to make or assert claim for damage or a time extension due to accessing the existing rights-of-way.

2.6 SURVEYS, PERMITS AND REGULATIONS:
2.6.1 All surveying shall be the responsibility of the Contractor. The Owner will furnish bench marks for locating the principle component parts of the work.

2.6.2 Permits and licenses of a temporary nature necessary for the prosecution of the work shall be secured and paid for by the Contractor unless otherwise stated in the Special Provisions. Encroachment permits, easements for permanent structures and permits for permanent changes in existing facilities shall be secured and paid for by the Owner, unless otherwise specified. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the Contract Documents are at variance therewith, he shall promptly notify the Engineer in writing, and any necessary changes shall be adjusted as provided in Subsection 2.1 entitled CHANGES IN THE WORK.

2.7 LINES, GRADES AND MEASUREMENTS:

2.7.1 The Contractor shall be responsible for setting all base lines and elevations necessary for performing the work. The Contractor shall employ a registered civil Engineer, or land surveyor and shall require said Engineer to establish all lines, elevations, reference marks, batter boards, etc., needed by the Contractor during the progress of the work, and from time to time to verify such marks by instrument or other appropriate means.

2.7.2 The Owner's Engineer shall be permitted at all times to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor, who shall correct any errors in lines, elevations, reference marks, batter boards, etc., disclosed by such check. Such check shall not be construed to be an approval of the Contractor's work and shall not relieve or diminish in any way the responsibility of the Contractor for the accurate and satisfactory construction and completion of the entire work.

2.7.3 The Contractor shall make, check and be responsible for all measurements and dimensions necessary for the proper construction of, and the prevention of misfittings in, the work.

2.8 OWNER'S RIGHT OF AUDIT:

2.8.1 In case the Owner agrees that a Contractor perform work on a cost plus basis, the Owner is to have a full and complete right to audit and make copies of the Contractor's or subcontractor's records with respect to any payment the Owner may be requested to make, or may make, for any work done on a cost plus basis.

2.9 OWNER'S RIGHT TO SEPARATE CONTRACTS:

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

2.9.2 The Owner may perform additional work related to the project by himself, or he may let other contracts containing provisions similar to these. The Contractor will afford the other contractors who are parties to such contracts (or the Owner, if he is performing the additional work himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of work and shall properly connect and coordinate his work.
with theirs.

2.10 **OWNER’S RIGHT TO DO WORK:**

2.10.1 If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this contract, the Owner after three (3) days' written notice to the Contractor may, without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor. If such expense shall exceed the unpaid balance, the Contractor shall pay the difference to the Owner on demand.

2.10.2 The Engineer's certificate setting forth the fair and reasonable cost of repairing, replacing, rebuilding or restoring any damaged or defective work or equipment when performed by one other than the Contractor shall be binding and conclusive as to the amount thereof upon the Contractor.

2.11 **OWNER’S RIGHT TO TERMINATE CONTRACT:**

2.11.1 If the Contractor should be adjudged as bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver or trustee should be appointed on account of his insolvency, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Owner and his representatives, or otherwise be guilty of substantial violation of any provision of the contract, then the Owner, may, without prejudice to any other right or remedy and after giving the Contractor, and his surety, if any, seven (7) days' written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, as it may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expense of finishing the work including compensation for additional engineering, managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner.

2.12 **SUSPENSION OF WORK, TERMINATION AND DELAY:**

2.12.1 The Owner may suspend the work or any portion thereof for a period of not more than ninety (90) days or such further time as agreed upon by the Contractor, by written notice to the Contractor and the Engineer, which notice shall fix the date on which work shall be resumed. The Contractor shall resume that work on the day so fixed. The Contractor will not be allowed an increase in the contract price but may be due an extension of the contract time that is directly attributable to any suspension.

2.13 **INSPECTIONS AND TESTING:**

2.13.1 If the Contract Documents, Owner's instructions, laws, ordinances or any public authority having jurisdiction require any work to be specially tested or approved, the Contractor shall give the Owner timely notice of its readiness for observation by the Owner or inspection by another authority, and if the inspection is by another authority rather than the Owner, of the date fixed for such inspection. The required certificates of such inspection shall be secured by the Contractor. Observations by the Owner shall be promptly made, and where practicable, at the source of supply. If any work should be
covered up without approval or consent of the Owner, it must, if required by the Owner, be uncovered for examination, at the Contractor’s expense.

2.14 **INSPECTION OF WORK AWAY FROM THE SITE:**

2.14.1 If the work to be done away from the construction site is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time so that the necessary arrangements for the inspection can be made.

2.15 **PIPE LOCATION:**

2.15.1 Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with structures or for other reasons. Where fittings, etc., are noted on the Drawings such notation is for the Contractor’s convenience and does not relieve him from laying and jointing different or additional items where required.

2.16 **PRIOR USE OR OCCUPANCY:**

2.16.1 The Owner reserves the right to use or occupy the work or portion thereof, and to use equipment installed under the contract, prior to final acceptance. Such use or occupancy will not constitute acceptance of the work or any part thereof. Despite such use or occupancy, guarantee periods will not begin until the completion of all work under the contract, unless agreement to the contrary is made in writing between the parties.

2.17 **WEATHER CONDITIONS:**

2.17.1 In the event of temporary suspension of work, or during inclement weather, or whenever the Engineer shall direct, the Contractor will, and will cause his subcontractors to, protect carefully his and their work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of his subcontractors so to protect its work, such materials shall be removed and replaced at the expense of the Contractor.

2.18 **OWNER’S RIGHT TO CLEAN UP:**

2.18.1 If a dispute arises between the separate contractors as to their responsibility for cleaning up, the Contractor awarded the contract shall be responsible for the cleanup or the Owner may clean up and charge the cost thereof to the Contractor as the Engineer shall determine to be just.

3. **CONTRACTOR’S RIGHTS AND RESPONSIBILITIES:**

3.1 **ACCESS TO WORK:**

3.1.1 The Owner, the Engineer, and their officers, agents, servants, and employees plus representatives of the various participating Federal or State agencies may at any and all times and for any and all purposes, enter upon the work and site thereof and the premises used by the Contractor, and the Contractor shall at all times provide safe and proper facilities therefor.
3.2 **ACCIDENT PREVENTION:**

3.2.1 In the performance of the contract the Contractor shall comply with the applicable provisions of the regulations issued by the Secretary of Labor pursuant to section 107 of the Contract Work Hours and Safety Standards Act entitled “Safety and Health Regulations for Construction” (29 CFR Part 1518, renumbered as Part 1926). Occupational Safety and Health Standards (29 CFR Part 1910) issued by the Secretary of Labor pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 are applicable to work performed by the Contractor subject to the provisions of the Act.

3.3 **STATED ALLOWANCES:**

3.3.1 No allowances are included in the Contract Documents.

3.4 **ARCHAEOLOGICAL RIGHTS:**

3.4.1 There is a possibility that items of archaeological significance may be found during the excavation of the site. In such event, the Contractor shall stop excavation in the vicinity of the find and notify the Engineer immediately; subsequent excavation work shall proceed as directed by the Engineer. All items found which are considered to have archaeological significance are the property of the Owner.

3.5 **OBLIGATIONS OF CONTRACTOR:**

3.5.1 The Contractor shall and will, in good workmanlike manner, do and perform all work and furnish all supplies and materials, tools, machinery, equipment, transportation, supervision, temporary construction of any nature, and all other services, means and facilities except as herein otherwise expressly specified, necessary or proper to perform and complete all work required by this contract, within the time herein specified, in accordance with the provisions of this contract and in accordance with the Drawings and Specifications and in accordance with the direction of the Engineer as given from time to time during the progress of the work. He shall furnish, erect, maintain and remove such construction plants and such temporary works as may be required.

3.5.2 The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the contract and Specifications, and shall do, carry on, and complete the entire work to the satisfaction of the Engineer and the Owner.

3.5.3 The Contractor shall check all dimensions, elevations, quantities and instructions shown on the Drawings or given in the Specifications and shall notify the Engineer should any discrepancy of any kind be found in the Drawings, Specifications or conditions at the site. He will not be allowed to take advantage of any discrepancy, error or omission in the Contract Documents. If any discrepancy is discovered, the Engineer will issue full instructions pertaining thereto and the Contractor shall carry out these instructions as if originally specified.

3.6 **CLAIMS FOR ADDITIONAL COST:**

3.6.1 If the Contractor wishes to make a claim for an increase in the contract Sum, he shall give written notice thereof within twenty (20) days after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor before proceeding to execute the work, except in an
emergency endangering life or property, in which case the Contractor shall proceed in accordance with Subsection 3.28 entitled PROTECTION OF WORK, PROPERTY AND PERSONS IN AN EMERGENCY. No such claim shall be valid unless so made. If the Owner and the Contractor cannot agree on the amount of the adjustment in the contract Sum, it shall be determined by the Engineer. Any change in the contract sum resulting from such claim shall be authorized by Change Order.

3.7 CLAIMS FOR DAMAGES:

3.7.1 If the Contractor makes claim for any damages alleged to have been sustained by breach of contract or otherwise, he shall, within ten (10) days after occurrence of the alleged breach or within ten (10) days after such damages are alleged to have been sustained, whichever date is the earlier, file with the Engineer a written, itemized statement in triplicate of the details of the alleged breach and the details and amount of the alleged damages. The Contractor agrees that unless such a statement is made and filed as so required, his claim for damages shall be deemed waived, invalid and unenforceable, and that he shall not be entitled to any compensation for any such alleged damages. Within ten (10) days after the timely filing of such statement, the Engineer shall file with the Owner one copy of the statement together with his recommendations for action by the Owner.

3.7.2 The Contractor shall not be entitled to claim any additional compensation for damages by reason of any direction, instruction, determinations or decision of the Engineer, nor shall any such claims be considered, unless the Contractor shall have complied in all respects with the last paragraph of Subsection 2.3 entitled ENGINEER’S AUTHORITY, including, but not limited to, the filing of a written protest in the manner and within the time therein provided.

3.8 (NOT USED)

3.9 CLEANING UP:

3.9.1 The Contractor at all times shall keep the site of the work free from rubbish and debris caused by his operation under the contract. When the work has been completed, the Contractor shall remove from the site of the work all of his plant, machinery, tools, construction equipment, temporary work and surplus materials so as to leave the work and the site clean and ready for use.

3.9.2 All public streets adjacent to the site and all private ways at the site shall be kept clean of debris, spilled materials, and wet and dry earth at all times and shall be cleaned at the end of each working day. When wet earth is encountered, it shall be cleaned from the vehicles before they leave the site and enter streets and private ways.

3.10 NON-COMPLIANCE WITH CONTRACT REQUIREMENTS:

3.10.1 In the event the Contractor, after receiving written notice from the Engineer of non-compliance with any requirement of this contract, fails to initiate promptly such action as may be appropriate to comply with the specified requirement within a reasonable period of time the Owner shall have the right to order the Contractor to stop any or all work under the contract until the Contractor has complied or has initiated such action as may be appropriate to comply within a reasonable period of time. The Contractor will not be entitled to any extension of contract time or payment for any costs incurred as a result of being ordered to stop work for such cause.
3.11 **OVERALL PROJECT COORDINATION:**

3.11.1 The Contractor shall coordinate all work of his contract to produce the required finished project in accordance with the Contract Documents. The Contractor shall develop the detailed Project Schedule required under Paragraph 6 to include all required coordination required for completion of this Contract. Special attention shall be given to the submission of shop drawings, samples, color charts, and requests for substitution within the specified time; furnishing the proper shop drawings to subcontractors and material suppliers, whose work and equipment is affected by and related thereto; and the furnishing of all information concerning location, type, and size of built-in equipment and materials and equipment utilities. This coordination is in addition to all other coordination requirements called for in the technical documents of the Specifications.

3.12 **COMMUNICATIONS:**

3.12.1 The Contractor shall forward all communications to the Owner through the Engineer unless directed otherwise by the Engineer and/or Owner.

3.13 **NO DISCRIMINATION IN EMPLOYMENT:**

3.13.1 In connection with the performance of work under this contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, religion, color or national origin. The aforesaid provision shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

3.14 **AS-BUILT DRAWINGS:**

3.14.1 The Contractor shall designate one set of Drawings for "As-Built Drawings." The Contractor shall indicate on these drawings all field changes and the location of each service lateral reconnected, the address and the locations as actually installed. The "As-Built Drawings" shall be kept current by the Contractor. The "As-Built Drawings" shall be delivered to the Engineer within 3 days of Substantial Completion. The Engineer will review the "As-Built Drawings" for completeness and accuracy and will forward all deficiencies required for correction to the Contractor within 21 days from receipt. The Contractor shall correct and address all comments and deficiencies identified by the Engineer and shall submit the corrected "As-Built Drawings" prior to submittal of the final Application for Payment. The Engineer will again review the "As-Built Drawings" for completeness and accuracy and will forward additional deficiencies and comments to the Contractor for correction. Final payment shall not be made until the "As-Built Drawings" are completed, approved by the Engineer and accepted by the Owner.

3.15 **DRAWINGS AND SPECIFICATIONS AT THE SITE:**

3.15.1 The Contractor shall maintain at the site one complete set of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders and other Modifications, in good and readable condition. These shall be available to the Engineer.

3.16 **EMPLOY COMPETENT PERSONS:**
3.16.1 The Contractor shall endeavor to employ only competent persons on the work. Whenever the Engineer notifies the Contractor in writing that in his opinion any person on the work is incompetent, unfaithful, disorderly, or otherwise unsatisfactory, or not employed in accordance with the provisions of the contract, such person shall be discharged from the work and shall not again be employed on it, except with the written consent of the Engineer.

3.17 **EMPLOY SUFFICIENT LABOR AND EQUIPMENT:**

3.17.1 If, in the judgement of the Engineer, the Contractor is not employing sufficient labor, plant, equipment or other means to complete the work within the time specified, the Engineer may, after giving written notice, require the Contractor to employ such additional labor, plant, equipment and other means as the Engineer may deem necessary to enable the work to progress properly.

3.18 **EXISTING STRUCTURES:**

3.18.1 Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

3.19 **INDEMNIFICATION:**

3.19.1 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 attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful 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.

3.19.2 In any and all claims against the Owner and 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 any way 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 benefits acts.

3.20 **DRUG FREE ENVIRONMENT:**

3.20.1 The Contractor shall not sell and shall neither permit nor suffer the introduction or use of intoxicating liquors upon or about the work.

3.21 **LEGAL ADDRESS OF CONTRACTOR:**

3.21.1 The Contractor's business address and his office at or near the site of the work are both hereby designated as places to which communications may be delivered. The depositing of any letter, notice, or other communication in a postpaid wrapper directed to the Contractor's business address in a post office box regularly maintained by the U. S. Postal Service or the delivery at either designated address of any letter, notice, or other communication by
mail or otherwise shall be deemed sufficient service thereof upon the Contractor, and the date of such service shall be the date of receipt. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor and delivered to the Engineer. Service of any notice, letter or other communication upon the Contractor personally shall likewise be deemed sufficient service.

3.22 **MUTUAL RESPONSIBILITY OF CONTRACTORS:**

3.22.1 The Contractor shall afford other contractors responsible opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall properly connect and coordinate his work with theirs.

3.22.2 If any part of the Contractor's work depends for proper execution or results upon the work of any other separate contractor, the Contractor shall inspect and promptly report to the Owner any apparent discrepancies or defects in such work that render it unsuitable for such proper execution and results. Failure of the Contractor so to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper to receive his work, except as to defects which may develop in the other separate contractor's work after the execution of the Contractor's work. To ensure proper execution of the subsequent work, the Contractor shall measure work already in place and shall at once report to the Owner any discrepancy between the executed work and the Contract Documents.

3.22.3 Should the Contractor cause damage to any separate contractor on the work, the Contractor agrees, upon due notice to settle with such contractor by agreement or arbitration, if he will so settle. If such separate contractor sues the Owner on account of any damage alleged to have been so sustained, the Owner shall notify the Contractor, who shall defend such proceedings at the Contractor's expense, and if any judgement against the Owner arises therefrom, the Contractor shall pay or satisfy it and pay all costs incurred by the Owner.

3.23 **NIGHT AND WEEKEND WORK:**

3.23.1 No work shall be done at night or on weekends except:

3.23.1.1 Usual protective work, such as pumping and the tending of lights;

3.23.1.2 Work done in case of emergency threatening injury to persons or property;

3.23.1.3 When provided for under Special Provisions as herein specified;

3.23.1.4 If all of the conditions set forth in the next paragraph below are met.

3.23.2 No work other than that included in (3.23.1.1), (3.23.1.2), and (3.23.1.3) above, shall be done at night except when:

3.23.2.1 In the judgement of the Engineer, the work will be of advantage to the Owner and can be performed satisfactorily at night;

3.23.2.2 The work will be done by a crew organized for regular and continuous night work;

3.23.2.3 The Engineer has given written permission for such night work.
3.23.3 Any work necessary to be performed after regular hours, on weekends, or Legal Holidays, shall be performed without additional expense to the Owner.

3.24 **OCCUPYING PRIVATE LAND:**

3.24.1 The Contractor shall not (except after written consent from the property parties) enter or occupy with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner. A copy of the written consent shall be given to the Engineer prior to occupation of private land.

3.25 **PERMITS AND RESPONSIBILITIES:**

3.25.1 The Contractor shall, without additional expense to the Owner, be responsible for obtaining any necessary licenses and permits, and for complying with any applicable Federal, State and municipal laws, codes, and regulations, in connection with the prosecution of the work. He shall be similarly responsible for all damages to persons or property that occur as a result of his fault or negligence. He shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire construction work, except for any completed unit of construction thereof which theretofore may have been accepted.

3.26 **PRECAUTIONS DURING ADVERSE WEATHER:**

3.26.1 During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood shelters, or other approved means.

3.26.2 During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by approved means which will result in a moist or dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

3.26.3 The Engineer may suspend construction operations at any time when, in his judgement, the conditions are unsuitable or the proper precautions are not being taken, whatever the weather may be, in any season. The Contractor agrees that he shall not have or assert any claim for or be entitled to any additional compensation or damages on account of any such suspension.

3.27 **PROTECTION OF WORK, PROPERTY AND PERSONS:**

3.27.1 The Contractor will 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 all employees on the work and other persons who may be affected thereby, all the work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and 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.

3.27.2 The Contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect
and maintain as required by the conditions and progress of the work, all necessary safeguards for safety and protection. He will notify Owners of adjacent utilities when prosecution of the work may affect them. The Contractor will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except damage or loss attributable to the fault of the Contract Documents or to the acts or omissions of the Owner or the Engineer or anyone employed by either of them or anyone for whose acts either of them may be liable and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor.

3.28  **PROTECTION OF WORK, PROPERTY AND PERSONS IN AN EMERGENCY:**

3.28.1 In emergencies affecting the safety of persons or the work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer or Owner, shall act to prevent threatened damage, injury or loss. He will give the Engineer prompt Written Notice of any significant changes in the work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved.

3.29  **PROTECTION AGAINST WATER AND STORM:**

3.29.1 The Contractor shall take all precautions necessary to prevent damage to the work by storms or by water entering the site of the work directly or through the ground. In case of damage by storm or water, the Contractor shall at his own cost and expense make such repairs or replacements or rebuild such parts of the work as the Engineer may require in order that the finished work may be completed as required by the contract.

3.30  **PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES AND IMPROVEMENTS:**

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

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

3.30.3 The Contractor shall protect trees adjacent to his work and not to be cut, with substantial barriers of such height as may be necessary to protect the trees from injury from piled material, from equipment, from his operation, or otherwise due to his work. Excavating machinery and cranes shall be of suitable type and shall be operated with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.
3.30.4 On paved surfaces, the Contractor shall not use or operate tractors, bulldozers or other power operated equipment, tire treads or wheels of which are so shaped as to cut or otherwise injure such surfaces.

3.31 RESTORATION OF PROPERTY:

3.31.1 All existing surfaces, including lawns, grassed and planted areas which have been injured by the Contractor's operations shall be restored to a condition at least equal to that in which they were found immediately before work was begun. Suitable materials and methods shall be used for such restoration. All restored plantings shall be maintained by cutting, trimming, fertilizing, etc., until acceptance. The restoration of existing property or structures shall be done as promptly as practicable and not be left until the end of the construction period.

3.32 INTERFERENCE WITH AND PROTECTION OF STREETS:

3.32.1 The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefor from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.

3.32.2 Streets, roads, private ways and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefor.

3.32.3 The Contractor shall, at least twenty-four (24) hours in advance, notify the highway, police and fire departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. The Contractor shall also place an advertisement in The Index Journal at least one day prior to the closing to provide details of the closing to the public, including the appropriate detour routes. The Contractor shall cooperate with the police department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

3.33 TRAFFIC CONTROL:

3.33.1 Where control of traffic is required for public safety, the Contractor shall provide an adequate number of flagmen employed at his own expense.

3.34 CONSTRUCTION DRAINAGE:

3.34.1 The Contractor shall furnish all labor, materials and necessary equipment for the temporary control of surface water and seepage water during construction and keep all excavations, pits and trenches free from water at all times.

3.34.2 The Contractor shall furnish and operate pumps and other equipment required. Dikes and ditches shall be constructed around excavations and elsewhere as necessary to prevent surface water from flooding the excavations or standing in areas adjacent to excavations, in work areas or in material storage areas. The Contractor shall take all necessary precautions to protect adjacent areas and properties from damage. He shall not divert water onto adjacent areas and properties at points other than that which would be considered the natural flow, prior to construction, without the expressed consent of the Owner in writing with a copy to the Engineer. He shall take steps to prevent the erosion of soil, earth and other material and
the conduction of the eroded materials onto adjacent properties and shall be responsible for the removal of such materials and the restoration of adjacent areas to their original condition.

3.35 **RETURN OF DRAWINGS:**

3.35.1 All copies of Drawings, Specifications and other Documents furnished by the Owner or the Engineer to the Contractor may be used only in connection with the prosecution of the work and shall be returned by the Contractor upon completion of the work.

3.36 **SITE INVESTIGATION:**

3.36.1 The Contractor acknowledges that he has investigated 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, roads and uncertainties of weather, river stages, tides or similar physical conditions at the site, the confirmation and conditions of the ground, the character of equipment and facilities needed preliminary to and during the 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 by the Owner, as well as from information presented by the Drawings and Specifications made a part of the contract. Any failure by the Contractor to acquaint himself with the 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 the Owner.

3.37 **SOIL EROSION AND SEDIMENT CONTROL:**

3.37.1 The Contractor’s attention is directed to the fact that unless exposed earth areas are properly cared for during construction, they may result in substantial sedimentation damage downstream from the construction area. The Contractor shall be responsible for conducting his site grading and drainage operations in such manner as to prevent excessive soil erosion of the construction site work areas. He shall at all times provide satisfactory means to prevent the movement and washing of soil onto pavements or into adjacent ditches, swales, inlets and drainage pipes, to avoid the possibility of these structures becoming clogged with soil. He shall promptly repair all areas which may become eroded and shall clear drainage ditches, swales and structures of siltation.

3.38 **SUBSURFACE CONDITIONS:**

3.38.1 The Contractor shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the Owner by Written Notice of:

3.38.1.1 Subsurface or latent physical conditions of the site differing materially from those indicated in the Contract Documents.

3.38.1.2 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 the Contract Documents.
3.38.2 The Owner shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the work, an equitable adjustment shall be made and the Contract Documents shall be modified by a Change Order. Any claim of the Contractor for adjustment hereunder shall not be allowed unless he has given the required Written Notice; provided that the Owner may, if he determines the facts so justify, consider and adjust any such claims asserted before the date of the final payment.

3.39 SUBCONTRACTING:

3.39.1 The Contractor may utilize the services of specialty subcontractors on those parts of the work which, under normal contracting practices, are performed by specialty subcontractors. The Contractor shall, without additional expense to the Owner, utilize the services of specialty subcontractors on those parts of the work which are specified to be performed by specialty subcontractors.

3.39.2 The Contractor shall not award any work to any subcontractor without prior written approval of the Owner, which approval will not be given until the Contractor submits to the Owner a written statement concerning the proposed award to the subcontractor, which statement shall contain such information as the Owner may require. No request for payment will be approved before this list has been received and reviewed by the Owner. The Owner reserves the right to reject subcontractors based on their experience and past experience for the Owner.

3.39.3 The Contractor shall not award work to subcontractor(s), in excess of fifty percent (50%) of the contract price, without prior written approval of the Owner.

3.39.4 The Contractor shall be 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.

3.39.5 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 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 provisions of the Contract Documents.

3.39.6 If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the Contractor or of any of his subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage. The Contractor agrees to and does hereby indemnify and save harmless the Owner from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay and from and against any and all claims, demands, costs and expenses, including attorneys’ fees, arising out of, relating to or resulting from such claims,

3.39.7 The Contractor shall be responsible for the coordination of the trades, subcontractors and material men engaged upon his work. The Owner or Engineer will not undertake to settle any differences between the Contractor and his subcontractors or between subcontractors. If any subcontractor on the project, in the opinion of the Owner, proves to be incompetent or
otherwise unsatisfactory, he shall be replaced if and when directed in writing by the Engineer.

3.39.8 Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.

3.40 **SUPERVISION:**

3.40.1 The Contractor shall keep on his work, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Owner. The superintendent shall not be changed except with the consent of the Owner, unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor. Important directions shall be confirmed in writing to the Contractor. Other directions shall be so confirmed on written request in each case. The Owner shall not be responsible for the acts or omissions of the superintendent or his assistants.

3.40.2 The Contractor shall give efficient supervision to the work, using his best skill and attention. He shall carefully study and compare all Drawings, Specifications and other instructions and shall at once report to the Owner any error, inconsistency or omission which he may discover.

3.41 **TAXES:**

3.41.1 The Contractor shall promptly pay all Federal, State and local taxes which may be assessed against him in connection with the work or his operations under the Agreement and/or the other Contract Documents, including, but not limited to, taxes attributable to the purchase of materials and equipment, to the performance of services and the employment of persons in the prosecution of the work.

3.42 **TEMPORARY HEAT:**

3.42.1 The Contractor shall provide temporary heat whenever necessary to protect all work and materials against injury from dampness and cold and to dry out moisture from the building. Fuel, equipment and method of heating shall be satisfactory to the Owner's Insurer and the Engineer.

3.42.2 Temporary heating apparatus shall be installed and operated in such a manner that finished work will not be damaged thereby.

3.43 **SANITARY FACILITIES:**

3.43.1 The Contractor shall provide adequate sanitary facilities for the use of those employed on the work. Such facilities shall be made available when the first employees arrive on the site of the work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the work in suitable numbers and at such points and in such a manner as may be required or approved. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the work, on lands of the Owner or on adjacent property. The Owner and the Engineer shall have the right to inspect such facilities at all times to determine whether or not they are being properly and adequately maintained.

3.44 **TEMPORARY UTILITIES:**
3.44.1 The Contractor shall make arrangements for and furnish as a part of the contract, all electricity, water, lighting and other utilities needed to do the work called for by the contract. Any separate contractors having a contract with the Owner shall make arrangements for and share the cost with the Contractor for the use of the required utilities on a pro rata schedule based on an agreed basis. All electrical work shall comply with the National Electric Code.

3.44.2 The Contractor shall provide and pay for all temporary wiring, switches, connections and meters. The Contractor shall provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

3.45 **UNCOVERING AND CORRECTION OF WORK:**

3.45.1 The Engineer shall be furnished by the Contractor with every reasonable facility for examining and inspecting the work and for ascertaining that the work is being performed in accordance with the requirements and intent of the contract, even to the extent of requiring the uncovering or taking down of portions of finished work by the Contractor.

3.45.2 Should the work thus uncovered or taken down prove satisfactory, the cost of uncovering or taking down and the replacement thereof shall be considered as extra work unless the original work was done in violation of the contract in point of time or in absence of the Engineer or his inspector and without his written authorization, in which case said cost shall be borne by the Contractor. Should the work uncovered or taken down prove unsatisfactory, said cost shall likewise be borne by the Contractor.

3.45.3 The inspection of the work shall not relieve the Contractor of any of his obligations to perform and complete the work as required by the contract. Defective work shall be corrected and unsuitable materials, equipment, apparatus and other items shall be replaced by the Contractor, notwithstanding that such work, materials, equipment, apparatus and other items may have been previously overlooked or accepted or estimated for payment. If the work or any part thereof shall be found defective at any time before the final acceptance of the work, the Contractor shall forthwith make good such defect in a manner satisfactory to the Engineer; if any materials, equipment, apparatus or other items brought upon the site for use or incorporation in the work, or selected for the same, are condemned by the Engineer as unsuitable or not in conformity with the Specifications or any of the other Contract Documents, the Contractor shall forthwith remove such materials, equipment, apparatus and other items from the site of the work and shall at his own cost and expense make good and replace the same and any material furnished by the Owner which shall be damaged or rendered defective by the handling or improper installation by the Contractor, his agents, servants, employees or subcontractors.

3.45.4 If the Owner deems it inexpedient to correct work not in accordance with the contract, an equitable deduction from the contract price shall be made therefor.

3.46 **COOPERATION WITH UTILITIES:**

3.46.1 The Owner will notify all utility companies, all pipe line Owners or other parties affected, and endeavor to have all necessary adjustments of the public or private utility fixtures, pipe lines and other appurtenances within or adjacent to the limits of construction, made as soon as practicable.
3.46.2 Water lines, gas lines, wire lines, sewer lines, water and gas meter boxes, water and gas valve boxes, manholes, light standards, cableways, signals and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the Owner under separate agreement, except as otherwise provided for in the Special Provisions or as noted on the Drawings.

3.46.3 The Drawings will show all known utilities located within the limits of the contract according to information obtained. The accuracy of the Drawings in this respect is not guaranteed by the Owner. The Contractor shall have considered in his bid all of the permanent and temporary utility appurtenances in their present or relocated position. No additional compensation will be allowed for any delays, inconveniences or damages sustained by him due to any interference from the said utility appurtenances or the operation of moving them.

3.46.4 Unless otherwise provided, the cost of temporary rearrangement of utilities made only in order to facilitate the construction of the work will be borne by the Contractor.

3.47 **VERIFICATION OF DIMENSIONS AND ELEVATIONS:**

3.47.1 Dimensions and elevations indicated on the Drawings in reference to existing structures, location of utilities, sewer inverts or other information on existing facilities, are the best available data obtainable but are not guaranteed by the Engineer. The Engineer will not be responsible for their accuracy. Before proceeding with any work dependent upon the data involved, the Contractor shall field check and verify all dimensions, grades, inverts, lines, elevations or other conditions of limitations at the site of the work to avoid construction errors or damage to existing facilities. If any work is performed by the Contractor, or any subcontractors, prior to adequate verification of applicable data, any resultant extra cost for adjustment of work necessary to conform to existing conditions, or damage to existing facilities, shall be assumed by the Contractor without reimbursement or compensation by the Owner.

3.47.2 If the Contractor, in the course of the work, finds any discrepancy between the Drawings and the physical conditions of the locality, or any errors or omissions in Drawings or in the layout as given by survey points and instructions, he shall immediately inform the Engineer in writing. The Engineer will promptly investigate the reported conditions and issue such instructions as may be necessary for the proper execution of the work. Any work done after such discovery and prior to receipt of such instructions shall be at the risk of the Contractor.

4. **MATERIALS, EQUIPMENT AND WORKMANSHIP:**

4.1 **CHEMICAL USAGE:**

4.1.1 All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either EPA or U.S.D.A. The use of all such chemicals and disposal of residues shall be in strict conformance with manufacturer and U.S.D.A. instructions. The Contractor shall provide a MSDS for all chemicals or products used during the project prior to the use of such material.

4.2 **CONTRACTOR’S TITLE TO MATERIALS:**
4.2.1 No materials or supplies for the work shall be purchased by the Contractor or by any subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him, in the work, free from all liens, claims or encumbrances.

4.3 **CORRECTION OF WORK BEFORE COMPLETION:**

4.3.1 The Contractor shall promptly remove from the premises all work condemned by the Owner as failing to conform to the Contract Documents, whether incorporated or not and the Contractor shall promptly replace and re-execute his own work in accordance with the contract and without expense to the Owner and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement. The fact that the Engineer may have previously overlooked such defective work shall not constitute an acceptance of any part of it.

4.3.2 If the Contractor does not remove such condemned work within a reasonable time, fixed by written notice, the Owner may remove it, and after storing it at the job site for thirty (30) days, due written notice thereof being given the Contractor, the Owner may offer the material for sale and removal from the premises. Net proceeds from such sale shall be for the Contractor's credit against the "Owner's Right to Do Work." If the material has no sale value, the Owner may remove it from the premises and/or otherwise dispose of it. The costs of such disposition shall be deducted from payments to the Contractor as provided in Subsection 2.10 entitled OWNER'S RIGHT TO DO WORK.

4.4 **CORRECTION OF WORK AFTER COMPLETION:**

4.4.1 The Contractor shall remedy any defects due to faulty materials or workmanship 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 except where longer periods are specified and in accordance with the terms of any special guarantees provided in the contract. The Owner will give notice of observed defects with reasonable promptness.

4.5 **CORRECTIONS OF WORK AFTER GUARANTEE PERIOD:**

4.5.1 It shall be the responsibility of the Contractor to permanently correct all defective items called to his attention within the guarantee period, whether such correction be made within the guarantee period or not. The contract shall not be fully performed until such permanent corrections are made.

4.6 **GENERAL GUARANTY:**

4.6.1 The Contractor warrants to the Owner that all materials and equipment furnished under this contract will be new unless otherwise specified, and that all work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All work not so conforming to these standards may be considered defective. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

4.6.2 Neither the final certificate of payment 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 any 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, except where longer periods are specified. The Owner will give notice of observed defects with reasonable promptness. If the Contractor shall fail to repair, replace, rebuild or restore such defective or damaged work or equipment promptly after receiving notice, the Owner shall have the right to have the work done by others in the same manner as is provided for in Subsection 2.10, OWNERS RIGHT TO DO WORK.

4.6.3 The Contractor shall further guarantee for a period of one (1) year that any building or buildings, constructed under this project, shall be watertight and leakproof at every point and in every area, except where leaks can be attributed to damage to the building by external forces other than storm or foundation settlement. He shall, immediately upon notification by the Owner of water penetration, determine the source of water penetration and, at his own expense, do any work necessary to make the building watertight. He shall also, at his own expense, repair or replace any other damaged material to return the building or buildings to the original accepted condition.

4.6.4 In addition to the foregoing stipulations, the Contractor shall comply with all other guarantees and warranties referred to in any portions of the Contract Documents, the more stringent requirement governing. Unless otherwise specifically stated elsewhere in these Specifications, the date of beginning of all guarantee or warranty periods shall be the date of acceptance of the project.

4.6.5 If for any reason, the Contractor cannot guarantee any part of his work using material or construction methods which have been specified, or shown, he shall notify the Engineer in writing before contracts are signed, giving reasons together with the name of product and data on substitutions he can guarantee. Should the Contractor fail to so notify the Engineer prior to the signing of contracts, he will be held to have agreed to guarantee all work specified or shown.

4.7 HANDLING AND DISTRIBUTION:

4.7.1 The Contractor shall handle, haul and distribute all materials and all surplus materials on the different portions of the work as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the work, and be responsible for the protection, loss of or damage to materials and equipment furnished by him, until the final completion and acceptance of the work.

4.7.2 Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

4.8 MANUFACTURER’S DIRECTIONS:

4.8.1 All manufactured articles, material and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturers, unless herein specified to the contrary.

4.9 MATERIALS, SERVICES AND FACILITIES:

4.9.1 It is understood that, except as otherwise specifically stated in the Contract
Documents, the Contractor shall provide and pay for all labor, supplies and materials, tools, machinery, equipment, transportation, supervision, temporary construction of any nature and all other services, means and facilities of any nature whatsoever necessary to execute, complete and deliver the work within the specified time.

4.9.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the work. Stored materials and equipment to be incorporated in the work shall be located so as to facilitate prompt inspection.

4.9.3 Materials, supplies and equipment shall be in accordance with samples submitted by the Contractor and approved by the Engineer.

4.10 MISCELLANEOUS ITEMS:

4.10.1 The work to be done by the Contractor, specified and enumerated under this contract, shall include any minor details of the work not specifically mentioned in the Specifications or shown on the Drawings, but obviously necessary for the proper completion of the work, which shall be considered incidental and as being a part of and included with the work for which prices are given in the bid. The Contractor will not be entitled to any additional compensation therefor.

4.10.2 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 above requirement is not intended to include major components not covered by or inferable from the Drawings and Specifications.

4.11 MISTAKES OF CONTRACTOR:

4.11.1 The Contractor shall promptly correct and make good any and all defects, damages, omissions or mistakes, for which he and/or his agents, servants, employees or subcontractors are responsible, and he shall pay to the Owner all costs, expenses, losses and damages resulting therefrom or by reason thereof as determined by the Engineer.

4.12 PROTECTION AGAINST ELECTROLYSIS:

4.12.1 Where dissimilar metals are used in conjunction with each other, or against concrete surfaces, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other approved materials.

4.13 RIGHT TO MATERIALS:

4.13.1 Nothing in the contract shall be construed as vesting in the Contractor any right of property in the materials, equipment, apparatus and other items furnished after they have been installed or incorporated in or attached or affixed to the work or the site, but all such materials, equipment, apparatus and other items shall, upon being so installed, incorporated, attached or
ROYALTIES AND PATENTS:

4.14.1 The Contractor shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for all such loss when a particular process or the product of a particular manufacturer or manufacturers is specified, but if the Contractor has information that the process or article specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Owner in writing.

SUBMITTAL SCHEDULE:

4.15.1 Within twenty (20) days after execution and delivery of the contract, the Contractor shall prepare and deliver to the Engineer a Submittal Schedule. This includes a list of all submittals required under the contract. The list shall identify each major group of shop drawings, coordination drawings and schedules and each sample and the planned submission date for each.

4.15.2 After the Engineer's review of the list of submittals, the Engineer will meet with the Contractor for a joint review and correction and adjustment, as necessary, for agreement on the submittal. In addition, at the meeting the duration of the review period for each submittal will be established. The Contractor's planned submission date for each submittal shall allow no less than fifteen (15) working days for review and appropriate action before approval of the submittal becomes critical to the progress of the Contractor's work. Within five (5) calendar days after the joint review, the Contractor shall make any necessary revisions to the list of submittals, including durations of the review periods, in accordance with the agreements reached during the joint review and submit two (2) revised copies to the Engineer. No application for partial payment will be approved until the submitted schedule is approved.

SHOP DRAWINGS:

4.16.1 Shop Drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier or distributor, and which illustrate some portion of the work. It shall be the Contractor's responsibility to furnish Shop Drawings as required by the technical specifications or as requested by the Engineer. These submittals must be made no later than is required by the Submittal Schedule.

4.16.2 Shop Drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for the contract.

4.16.3 When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted for approval in place of Shop and Working Drawings. In such case the requirements shall be as specified for Shop and Working Drawings, insofar as applicable except that the submission shall be in quadruplicate.
4.16.4 The Contractor shall be responsible for the prompt and timely submittal of all Shop and Working Drawings so that there shall be no delay to the work due to the absence of such drawings.

4.16.5 The Contractor shall check the Shop Drawings, shall coordinate them (by means of coordination drawings wherever required) with the work of all trades involved before submission and shall indicate thereon his approval. Drawings and schedules submitted without evidence of the Contractor's approval may be returned for resubmission.

4.16.6 By approving and submitting Shop Drawings, the Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data, or will do so, and that he has checked and coordinated each Shop Drawing with the requirements of the work and of the Contract Documents.

4.16.7 If drawings or schedules show variations from the contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, the Engineer may approve any or all such variations and issue an appropriate Change Order. If the Contractor fails to describe such variations he shall not be relieved of the responsibility for executing the work in accordance with the contract, even though such drawings or schedules may have been approved.

4.16.8 Each Shop Drawing or Coordination Drawing shall have a blank area five (5) by five (5) inches located adjacent to the title block. The title block shall display the following:

- Number and Title of Drawing
- Date of Drawing
- Revision Number and Date (if applicable)
- Project Title
- Name of Project Building or Facility
- Name of Contractor
- Name of Subcontractor (if applicable)
- Clear identity of contents and location of the work.

4.16.9 Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.

4.16.10 The Contractor shall stamp all drawings which are to be submitted to the Engineer for approval. The rubber stamp shall incorporate the following items:

- PROJECT TITLE __________________________________________
- CONTRACTOR'S NAME ____________________________________
- APPROVED BY ________________ DATE ________________
- SPECIFICATION SECTION ______ TRANSMITTAL NO. _______

4.16.11 The review of Shop Drawings will be general only and shall not relieve or, in any respect, diminish the responsibility of the Contractor for details of
design, dimensions, etc., necessary for proper fitting and construction of the work as required by the contract and for achieving the result and performance specified thereunder.

4.16.12 Should the Contractor submit for approval equipment that requires modifications to the structures, piping, layout, etc., detailed on the Drawings, he shall also submit for approval details of the proposed modifications. If such equipment and modifications are approved, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications. Required structural changes shall be designed and detailed by an Engineer registered in the state in which the project will be constructed. Drawings shall be signed and show registration number or may have seal affixed.

4.16.13 Submission of Shop Drawings shall be accompanied by a copy of a transmittal letter containing project name, Contractor’s name, number of drawings, titles, specifications section and other pertinent data. The submittal shall include the following:

6 legible copies of Shop Drawings or printed matter

4.16.14 The review of Shop Drawings will be performed by the Engineer as follows:

4.16.14.1 When the submittal conforms fully with the Contract Drawings and Specifications, the Engineer will approve it. The reproducible of each drawing or page of approved submittals will be stamped approved, signed, dated and returned to the Contractor. No changes shall be made on approved drawings by the Contractor. If the Contractor desires to make any change from approved drawings, or pages of approved submittals, he shall notify the Engineer in writing that the approved material has been withdrawn and shall submit the substitution set in accordance with the above procedure.

4.16.14.2 When the submittal clearly does not conform with the Contract Drawings and Specifications, the Engineer will disapprove it by stamping it “Rejected.” Rejected submittals shall be corrected and resubmitted within fourteen (14) calendar days from the date of rejection. Submittals which are rejected shall not be released for any work.

4.16.14.3 When the submittal has only minor deviations from the Contract Drawings and Specifications, the Engineer will note the deviations and omissions as may be appropriate and approve the submittal subject to the notations by stamping it “Approved as Noted.” Approved as Noted submittals may be released for fabrication of work at the Contractor’s risk; in any event the submittal shall be corrected and resubmitted for approval within fourteen (14) calendar days from the date of approval as noted.

4.16.15 The Contractor shall be responsible for delays resulting from the rejection or approval as noted of incomplete, inadequate, incorrect or otherwise unacceptable submittals.

4.16.16 The Contractor shall assure that only drawings and pages of printed material bearing the Engineer’s “Approved” stamp are allowed on the job site.

4.16.17 The Contractor shall submit, at the completion of the project, one set of
all reviewed and corrected Shop Drawings, catalog cuts and descriptive literature for the Owner before final Certificate of Payment is issued.

4.17 OPERATING AND MAINTENANCE MANUALS:

4.17.1 One copy of each required Operating and Maintenance Manual must be submitted to the Engineer with the first submittal of Shop Drawings. Five additional copies of each required Operating and Maintenance Manual must be submitted to the Engineer within fourteen (14) days of the return of approved Shop Drawings to the Contractor. No payment will be approved on any equipment for which Operating and Maintenance Manuals are required until the Operating and Maintenance Manuals are received by the Engineer. These Operating and Maintenance Manuals must be addressed specifically to the piece of equipment supplied and shall not be general in nature; each item must be clearly identified and located. Each page must be printed on 8-½” x 11” paper or folded to that size in a manner which will be suitable for insertion in a 3-ring binder.

4.18 SAMPLES:

4.18.1 Samples are physical examples furnished by the Contractor to illustrate materials, equipment or workmanship, and to establish standards by which the work will be judged. It shall be the Contractor's responsibility to furnish samples as required by the Technical Specifications or as requested by the Engineer. These samples must be submitted no later than is required by the Submittal Schedule.

4.18.2 Each sample shall have a label indicating:
   - Project Title
   - Name of Project Building or Facility
   - Name of Contractor
   - Name of Subcontractor (if applicable)
   - Identification of Material with Specification Section
   - Name or Producer and Brand (if any)

4.18.3 Samples shall be submitted in duplicate unless otherwise noted in the Technical Specifications and shall be accompanied by a copy of a transmittal letter containing project name, Contractor's name, number of samples, specification section and other pertinent data.

4.18.4 If the Engineer so requires, either prior to or after commencement of the work, the Contractor shall submit samples of materials for such special tests as the Engineer deems necessary to demonstrate that they conform to the Specifications. Such samples shall be furnished, taken, stored, packed and shipped by the Contractor as directed. Except as otherwise expressly specified, the Contractor shall make arrangements for, and pay for, the tests.

4.18.5 All samples shall be packed so as to reach their destination in good condition. To insure consideration of samples, the Contractor shall notify the Engineer by letter that the samples have been shipped and shall properly describe the samples in the letter. The letter of notification shall be sent separate from and should not be enclosed with the samples.

4.18.6 The Contractor shall submit data and samples, or place his orders, sufficiently early to provide ample time for consideration, inspection, testing and approval before the materials and equipment are needed for incorporation in the work. The consequences of his failure to do so shall be
4.18.7 In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall provide such samples of workmanship of wall, floor, finish, etc., as may be required.

4.19 **STORAGE OF MATERIALS AND EQUIPMENT:**

4.19.1 All excavated materials, construction equipment, and materials and equipment to be incorporated in the work shall be placed so as not to injure any part of the work or existing facilities and so that free access can be had at all times to all parts of the work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining Owners, tenants and occupants.

4.20 **INSPECTION AND TESTING:**

4.20.1 All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the Contract Documents.

4.20.2 The Owner shall provide all inspection and testing services not required by the Contract Documents.

4.20.3 The Contractor shall provide at his expense the testing and inspection services required by the Contract Documents.

4.20.4 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any work to specifically be inspected, tested or approved by someone other than the Contractor, the Contractor will give the Engineer timely notice of readiness. The Contractor will then furnish the Engineer the required certificates of inspection, testing or approval.

4.20.5 Inspections, tests or approvals by the Engineer or others shall not relieve the Contractor from his obligations to perform the work in accordance with the requirements of the Contract Documents.

4.20.6 The Engineer and his representatives will at all times have access to the work. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials and other relevant data and records. The Contractor will provide proper facilities for such access and observation of the work and also for any inspection or testing thereof.

4.20.7 If any work is covered contrary to the written instructions of the Engineer it must, if requested by the Engineer, be uncovered for his observation and replaced at the Contractor's expense.

4.20.8 If the Engineer considers it necessary or advisable that covered work be inspected or tested by others, the Contractor, at the Engineer's request, will uncover, expose or otherwise make available for observation, inspection or testing as the Engineer may require, that portion of the work in question, furnishing all necessary labor, materials, tools and equipment. If it is found that such work is defective, the Contractor will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of
satisfactory reconstruction. If, however, such work is not found to be
defective, the Contractor will be allowed an increase in the contract price or
an extension of the contract time, or both, directly attributable to such
uncovering, exposure, observation, inspection, testing and reconstruction
and appropriate Change Order shall be issued.

4.21 **SUBSTITUTIONS:**

4.21.1 The Contractor may recommend the substitution of a material, article or
piece of equipment of equal function for those referred to in the Contract
Documents by reference to brand name or catalogue number, and if, in the
opinion of the Engineer, such material, article or piece of equipment is of
equal function to that specified, the Engineer may approve its substitution
and use by the Contractor. Any cost differential shall be deductible from the
contract price and the Contract Documents shall be appropriately modified
by Change Order. The Contractor warrants that if substitutes are approved,
no major changes in the function or general design of the project will result.
Incidental changes or extra component parts required to accommodate the
substitute will be made by the Contractor without a change in the contract
price or contract time.

4.22 **"OR EQUAL" CLAUSE:**

4.22.1 The phrase "or equal" shall be construed to mean that material or
equipment will be acceptable only when in the judgement of the Engineer
they are composed of parts of equal quality, or equal workmanship and
finish, designed and constructed to perform or accomplish the desired result
as efficiently as the indicated brand, pattern, grade, class, make or model.

4.22.2 Whenever a material, article or piece of equipment is identified on the
Drawings or in the Specifications by reference to manufacturers' or vendors'
names, trade names, catalogue numbers, etc., it is intended merely to
establish a standard of quality and function; and, any material, article, or
equipment of other manufacturers and vendors which will perform
adequately the duties imposed by the general design will be considered
equally acceptable provided the material, article or equipment so proposed,
is, in the opinion of the Engineer, of equal substance and function. It shall
not be purchased or installed by the Contractor without the Engineer's
written approval.

4.23 **WAGES AND OVERTIME COMPENSATION:**

4.23.1 The Contractor and each of his subcontractors shall comply with all
applicable State and local laws or ordinances with respect to the hours
worked by laborers and mechanics engaged in work on the project and with
respect to compensation for overtime.

4.24 **NO WAIVER:**

4.24.1 Neither the inspection by the Owner or the Engineer, nor any order,
measurement, approval, determination, decision or certificate by the
Engineer, nor any order by the Owner for the payment of money, nor any
payment for or use, occupancy, possession or acceptance of the whole or
any part of the work by the Owner, nor the extension of time, nor any other
act or omission of the Owner or of the Engineer shall constitute or be
deemed to be an acceptance of any defective or improper work, materials,
or equipment nor operate as a waiver of any requirement or provision of the
contract, nor of any remedy, power or right of or herein reserved to the
Owner, nor of any right to damages for breach of contract. Any and all
rights and/or remedies provided for in the contract are intended and shall be construed to be cumulative; and, in addition to each and every other right and remedy provided for herein by law, the Owner shall be entitled as of right to a writ of injunction against any breach or threatened breach of the contract by the Contractor, by his subcontractors or by any other person or persons.

4.25  **WORK TO CONFORM:**

4.25.1 During its progress and on its completion, the work shall conform truly to the lines, levels, and grades indicated on the Drawings or given by the Engineer and shall be built in a thoroughly substantial and workmanlike manner, in strict accordance with the Drawings, Specifications, and other Contract Documents and the directions given from time to time by the Engineer.

4.25.2 All work done without instructions having been given therefor by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered uncovered or taken down, removed and replaced at the Contractor's expense.

4.26  **WORKING HOURS:**

4.26.1 It is contemplated that all work will be performed during the customary working hours of the trades involved unless otherwise specified in this contract. Work performed by the Contractor at his own volition outside such customary working hours shall be at no additional expense to the Owner.

4.26.2 Any requests received by the Contractor from occupants of existing buildings to change the hours of work shall be referred to the Owner for determination.

5.  **INSURANCE, LEGAL RESPONSIBILITY AND SAFETY:**

5.1  **ARBITRATION:**

5.1.1 Should there by any dispute or any questioned decision of the Engineer which is subject to arbitration, it shall be promptly submitted to arbitration upon demand by either party to the dispute. The Contractor shall not delay the work because arbitration proceedings are pending unless he shall have written permission from the Owner to do so and such delay shall not extend beyond the time when the arbitrators shall have opportunity to determine whether the work shall continue or be suspended pending decision by the arbitrators of such a dispute. Any demand for arbitration shall be in writing and shall be delivered to the Engineer and the adverse party either by personal delivery or by registered mail addressed to the last known address of each, within ten (10) days of receipt of the Engineer's decision, and in no event after final payment has been made and accepted. Should the Engineer fail within a reasonable period to make a decision regarding a claim of the Owner or Contractor, a demand for arbitration may then be made as if the Engineer's decision had been rendered against the party demanding arbitration.

5.1.2 No one shall be qualified to act as an arbitrator who has, directly or indirectly, any financial interest in the contract or who has any business or family relationship with the Owner, the Contractor or the Engineer. Each
arbitrator selected shall be qualified by experience and knowledge of the work involved in the matter to be submitted to arbitration.

5.1.3 Arbitration shall be in accordance with the procedure and standards of the American Arbitration Association.

5.2 ASSIGNMENTS:

5.2.1 The Contractor shall not assign the whole or any part of the contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that 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 claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this contract.

5.3 PERFORMANCE BOND AND PAYMENT BOND:

5.3.1 Unless otherwise noted in the Special Provisions, a Performance Bond and a Payment Bond are required. The Contractor shall obtain a Performance Bond and a Payment Bond, acceptable to the Owner in a surety company authorized to do business in the state in which the project is constructed, each for the full amount of the contract Sum. The bonds shall guarantee the Contractor's faithful performance of the contract and the payment of all obligations arising thereunder. The bonds shall remain in force until:

5.3.1.1 The project has been completed and accepted by the Owner.

5.3.1.2 The provisions of all guarantees required by these Contract Documents have been fulfilled or the time limitation for all guarantees has expired, or

5.3.1.3 The time for the filing of all mechanic's liens has expired, whichever is longer, after which it shall become void.

5.3.2 The Contractor shall pay all charges in connection with the bonds as a part of the contract. One executed copy of the bonds shall be attached to each copy of the contract before they are returned to the Engineer for the Owner's signature.

5.3.3 If the Contractor defaults, the Contractor or his Surety shall reimburse the Owner for any additional engineering fees for additional services made necessary because of the Contractor's default.

5.4 ADDITIONAL OR SUBSTITUTE BOND:

5.4.1 If at any time the Owner for justifiable cause, shall be or become dissatisfied with the surety or sureties for the Performance and/or Payment Bonds, the Contractor shall within five (5) days after notice from the Owner to do so, substitute an acceptable bond(s) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond(s) shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable bond(s) to the Owner.

5.5 CHANGES NOT TO AFFECT BONDS:
5.5.1 It is distinctly agreed and understood that any changes made in the work or the Drawings or Specifications therefor (whether such changes increase or decrease the amount thereof or the time required for its performance) or any changes in the manner or time of payments made by the Owner to the Contractor, or any other modifications of the contract, shall in no way annul, release, diminish or affect the liability of the Surety on the contract bonds given by the Contractor, it being the intent hereof that notwithstanding such changes the liability of the Surety on said bonds continue and remain in full force and effect.

5.6 **COMPLIANCE WITH LAWS:**

5.6.1 The contract shall be governed by the law of the place where the project is located. The Contractor shall abide by all local and State laws or ordinances to the extent that such requirements do not conflict with Federal laws or regulations. The Contractor shall keep himself fully informed of all existing and future Federal, State and local laws, ordinances, rules and regulations affecting those engaged or employed on the work, the materials and equipment used in the work or the conduct of the work, and of all orders, decrees and other requirements of bodies or tribunals having any jurisdiction or authority over the same, including, but not limited to the U. S. Department of Labor and Bureau of Standards Safety and Health Regulations for Construction and its amendments as set up under the Williams-Steiger Occupational Safety and Health Act of 1970. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or other Contract Documents in relation to any such law, ordinance, rule, regulation, order, decree or other requirement. The Contractor shall forthwith report the same to the engineer in writing. The Contractor shall at all times observe and comply with, and cause all his agents, servants, employees and subcontractors to observe and comply with all such existing requirements, and he shall protect, indemnify and save harmless the Owner, its officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgements, penalties, losses, damages, costs and expense, including attorney's fees, arising from or based upon any violation or claimed violation of any such law, ordinance, rule, regulation, order, decree or other requirement, whether committed by the Contractor or any of his agents, servants, employees or subcontractors.

5.7 **REQUIRED PROVISIONS DEEMED INSERTED:**

5.7.1 Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein, and the contract shall be read and enforced as though it were included herein. If through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the contract shall forthwith be physically amended to make such insertion or correction.

5.8 **LIENS:**

5.8.1 If at any time any notice of liens are filed for labor performed or materials or equipment manufactured, furnished or delivered to or for the work, the Contractor shall, at his own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Owner shall have the right to retain from any monies payable hereunder an amount which, in his sole judgement, he deems necessary to satisfy such liens and pay the costs and expenses, including attorney's fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.
5.9 **CLAIMS:**

5.9.1 If at any time there be any evidence of any claims for which the Contractor is or may be liable or responsible hereunder, the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Owner may retain from any monies which would otherwise be payable hereunder so much thereof as, in his judgement, he may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses, including attorney's fees, of defending any actions brought to enforce such claims, or incurred in connection therewith or by reason thereof.

5.10 **INSURANCE:**

5.10.1 The Contractor shall not commence any work until he obtains, at his own expense, all required insurance. Such insurance must have the approval of the Owner as to limit, form and amount. The Contractor will not permit any subcontractor to commence work on this project until the same insurance requirements have been complied with by such subcontractor.

5.10.2 The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of policies. Such certificates shall also contain substantially the following statement: "The insurance covered by this certificate will not be cancelled or materially altered, except after thirty (30) days notice in writing and delivered by registered mail to the Owner." Should any policy be cancelled before final payment by the Owner to the Contractor and the Contractor fails immediately to procure other insurance as specified, the Owner reserves the right to procure such insurance and to deduct the cost thereof from any sum due the Contractor under this contract.

5.10.3 Any insurance bearing on adequacy of performance shall be maintained after completion of the project for the full guaranty period. Should such insurance be cancelled before the end of the guaranty period and the Contractor fails immediately to procure other insurance as specified, the Owner reserves the right to procure such insurance and to charge the cost thereof to the Contractor.

5.10.4 Nothing contained in these insurance requirements is to be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from his operations under this contract.

5.10.5 The Contractor is required to obtain and maintain for the full period of the contract the following types of insurance coverage with limits not less than stated below:

5.10.5.1 **WORKMEN'S COMPENSATION INSURANCE:** As required by applicable State or territorial law for all of his employees to be engaged in work at the site of the project under this contract and, in case of any such work sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Workmen's Compensation Insurance. In case any class of employee engaged in hazardous work on the project under this contract is not protected under the Workmen's Compensation Statute, the Contractor shall provide and shall cause each subcontractor to provide adequate employer's liability insurance for the protection of such of his employees as are not
otherwise protected.

### 5.10.5.2 COMPREHENSIVE GENERAL LIABILITY

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Bodily Injury Per Person</th>
<th>Bodily Injury Per Accident</th>
<th>Property Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premises and Operations</td>
<td>500,000</td>
<td>1,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Elevator Liability</td>
<td>500,000</td>
<td>1,000,000</td>
<td></td>
</tr>
<tr>
<td>Contractor's Protective Liability</td>
<td>500,000</td>
<td>1,000,000</td>
<td></td>
</tr>
<tr>
<td>Products Liability Including Completed</td>
<td>500,000</td>
<td>1,000,000</td>
<td></td>
</tr>
<tr>
<td>Operations Coverage</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The above Comprehensive General Liability Policy shall include coverage for the explosion, collapse and underground (XCU) hazards, and loss arising from nuisance, taking, whether inverse taking or direct taking, or negligence.

The Property Damage Liability shall include the “Broad Form Property Damage” endorsement.

### 5.10.5.3 COMPREHENSIVE AUTOMOBILE LIABILITY

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Bodily Injury Per Person</th>
<th>Bodily Injury Per Accident</th>
<th>Property Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Owned Automobiles</td>
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<td>1,000,000</td>
<td></td>
</tr>
<tr>
<td>Non Owned Automobiles</td>
<td>500,000</td>
<td>1,000,000</td>
<td></td>
</tr>
<tr>
<td>Hired Car Coverage</td>
<td>500,000</td>
<td>1,000,000</td>
<td></td>
</tr>
</tbody>
</table>

### 5.10.5.4 UMBRELLA LIABILITY

The Contractor shall maintain a Comprehensive Umbrella Liability Policy in excess of above insurance of $2,000,000 each occurrence.

### 5.10.5.4 SUBCONTRACTOR’S LIABILITY INSURANCE:

Same limits as required of the General Contractor.

### 5.11 ORAL AGREEMENTS:

5.11.1 No oral order, objection, claim or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the Contract Documents, and none of the provisions of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification thereof in writing.
and no evidence shall be introduced in any proceeding of any other waiver or modification.

5.12 **SAFETY:**

5.12.1 In accordance with generally accepted construction practices, the Contractor shall be 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. This requirement will apply continuously twenty-four (24) hours per day until acceptance of the work by the Owner and shall not be limited to normal working hours.

5.12.2 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

5.12.2.1 All employees on the work and all other persons who may be affected thereby;

5.12.2.2 All the work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his subcontractors or sub-subcontractors; and

5.12.2.3 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.

5.12.3 The Contractor shall comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He shall erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying Owners and users of adjacent utilities.

5.12.4 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel. Prior approval of such materials or services must be given by the Engineer.

5.12.5 The Contractor shall 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 Contractor to the Owner and the Engineer.

5.12.6 The Contractor shall not load or permit any part of the work to be loaded so as to endanger its safety.

6. **PROGRESS AND COMPLETION OF WORK**

6.1 **NOTICE TO PROCEED:**

6.1.1 Following the execution of the Agreement by the Owner and the Contractor, written Notice to Proceed with the work shall be given by the Owner to the Contractor. The Contractor shall begin and shall prosecute the work
regularly and uninterruptedly thereafter (except as provided for herein) with such force as to secure the completion of the work within the contract time.

6.2 **CONTRACT TIME:**

6.2.1 The Contractor shall complete, in an acceptable manner, all of the work contracted for in the time stated in Section 01232, Special Provisions. Computation of contract time shall commence the day to be specified in the Notice to Proceed and every calendar days following, except as herein provided, shall be counted as contract time.

6.3 **SCHEDULE OF COMPLETION:**

6.3.1 The Contractor shall submit, at such times as may be reasonable and requested by the Engineer, schedules showing the order in which the Contractor proposes to carry on the work, with dates at which the Contractor will start the various parts of the work, and estimated date of completion of each part.

6.4 **WORK CHANGES:**

6.4.1 The work comprises approximately the quantities shown in the Bid Schedule which will be used as a basis for comparison of Bids and not for final estimate. The Owner does not, by expression or by implication, agree that the actual amount of work shall correspond with the estimated quantities.

6.4.2 The Owner reserves the right to increase the amount of work under the each Bid Item in the Contract by twenty-five percent (25%) of the work contemplated at the unit prices quoted in the Bid. The Owner reserves the right to decrease the amount of work under each Bid Item in the Contract by any amount without any change to the unit prices bid.

6.5 **EXTRA WORK:**

6.5.1 New and unforeseen items of work found to be necessary, and which cannot be covered by any item or combination of items for which there is a contract price, shall be classed as extra work. The Contractor shall do such extra work and furnish such materials as may be required for the proper completion or construction of the whole work contemplated, upon written order from the Owner as approved by the Engineer. In the absence of such written order, no claim for extra work shall be considered. Extra work shall be performed in accordance with these Contract Documents where applicable and work not covered by such shall be done in accordance with the best construction practice and in a workmanlike manner. Extra work required in an emergency to protect life and property shall be performed by the Contractor as required.

6.6 **EXTENSION OF CONTRACT TIME:**

6.6.1 A delay beyond the Contractor's control occasioned by an Act of God, by act or omission on the part of the Owner or by strikes, lockouts, fire, etc., may entitle the Contractor to an extension of time in which to complete the work as agreed by the Owner, provided, however, that the Contractor shall immediately give written notice to the Owner of the cause of such delay.

6.6.2 Act of God shall mean an earthquake, flood, cyclone or other cataclysmic phenomenon of nature. Rain, wind, flood or other natural phenomenon of normal intensity for the locality shall not be construed as an Act of God and no reparation shall be made to the Contractor for damages to the work.
resulting therefrom.

6.6.3 All claims for extension of time shall be made in writing to the Engineer no more than twenty (20) days after the occurrence of the delay; otherwise they shall be waived. In the case of continuing cause of delay only one claim is necessary. Any claim should include complete justification for the extent of the delay claimed.

6.6.4 This Subsection does not exclude the recovery of damages for delay for either party under other provisions of the Contract Documents.

6.7 ENGINEER'S CERTIFICATE OF SUBSTANTIAL COMPLETION:

6.7.1 When the work to be performed under this contract is substantially completed in accordance with the Contract Documents, the Engineer shall prepare an Engineer's Certificate of Substantial Completion to be acknowledged and accepted by the Owner and the Contractor. The Certificate may list items to be completed or corrected but such Certificate shall not relieve the Contractor of his obligation to complete all work, whether listed or not, in accordance with the Contract Documents nor will it preclude any right the Owner may have for recourse in accordance with the Contract Documents.

6.8 TERMINATION OF CONTRACTOR'S RESPONSIBILITY:

6.8.1 The contract will be considered complete when all work has been finished, the final review made up by the Engineer, and the project accepted in writing by the Owner. The Contractor's responsibility shall then cease, except as set forth in his Performance Bond, as provided in Subsection 4.6 Entitled GENERAL GUARANTY, and as provided in Subsection 6.9 entitled CORRECTION OF FAULTY WORK AFTER FINAL PAYMENT.

6.9 CORRECTION OF FAULTY WORK AFTER FINAL PAYMENT:

6.9.1 The making of the final payment by the Owner to the Contractor shall not relieve the Contractor of responsibility for faulty materials or workmanship. The Contractor shall promptly replace any such defects discovered within one year, except where longer periods are specified, from the date of written acceptance of the work.

6.10 PROGRESS SCHEDULE:

6.10.1 Within twenty (20) days after execution and delivery of the Agreement and not less than ten (10) days prior to making an application for partial payment, the Contractor shall prepare and deliver to the Engineer a Progress Schedule.

6.10.2 The schedule shall be set up in a bar chart format and shall show the proposed dates of commencement and completion of the various subdivisions of the work required under the Contract Documents and all activities required to accomplish the work.

6.10.3 The schedule shall be updated monthly. No progress payments will be made unless application is accompanied by the updated schedule.

6.11 SCHEDULES, REPORTS AND RECORDS:

6.11.1 The Contractor shall submit to the Owner such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other
data where applicable as are required by the Contract Documents for the work to be performed.

6.11.2 The Contractor shall also submit, in a format as approved by the Engineer, a schedule of payments that he anticipates he will earn during the course of the work.

6.12 ABANDONMENT OF WORK OR OTHER DEFAULT:

6.12.1 If the work shall be abandoned, or any part thereof shall be sublet without previous written consent of the Owner, or the Contractor or any monies payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing, that the conditions herein specified as to rate or progress are not being complied with, or that the work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or involuntarily, or petitions for an arrangement or reorganization under the Bankruptcy Act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the contract, the Owner may notify the Contractor in writing, with a copy of such notice mailed to the Surety, to discontinue such work or any part thereof; thereupon the Contractor shall discontinue such work or such part thereof as the Owner may designate; and the Owner may, upon giving notice, by contract or otherwise as he may determine, complete the work or such part thereof and charge the entire cost and expense of so completing the work or such part thereof to the Contractor. In addition to the said entire cost and expense of completing the work, the Owner shall be entitled to reimbursement from the Contractor and the Contractor agrees to pay the Owner any losses, damages, costs and expenses, including attorney's fees, sustained or incurred by the Owner by reasons of any of the foregoing causes. For the purposes of such completion the Owner may for itself or for any Contractors employed by the Owner take possession of any and all materials, equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the work. No equipment or materials may be removed from the work without the written consent of the Owner.

6.12.2 All costs, expenses, losses, damages, attorney's fees and any and all other charges incurred by the Owner under this Subsection shall be charged against the Contractor and deducted and/or paid by the Owner out of any monies due or payable or to become due or payable under the contract to the Contractor; in computing the amounts chargeable to the Contractor, the Owner shall not be held to a basis of the lowest prices for which the completion of the work or any part thereof might have been accomplished, but all sums actually paid or obligated therefor to effect its prompt completion shall be charged to and against the account of the Contractor. In case the costs, expense, losses, damages, attorney's fees and other charges together with all payments theretofore made or for the account of the Contractor are less than the sum which would have been payable under the contract if the work had been properly performed and completed by the Contractor, the Contractor shall be entitled to receive the difference and, in case such costs, expenses, losses, damages, attorney's fees and other charges together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Owner.
7. **PAYMENTS TO THE CONTRACTOR**

7.1 **PRICES FOR WORK:**

7.1.1 The Owner shall pay and the Contractor shall receive the prices stipulated in the bid made a part hereof as full compensation for everything performed and furnished and for all risks and obligations undertaken by the Contractor under and as required by the contract.

7.2 **SCHEDULE OF VALUES:**

7.2.1 Except in cases where unit prices form the basis for payment under the contract, the Contractor shall, within twenty (20) days of the execution of the contract and not less than ten (10) days prior to making an application for partial payment, submit to the Owner in a form approved by the Owner a schedule of values showing a breakdown of the contract sum itemized by trade and/or specification sections or as otherwise directed by the Owner and for each item shall show the total value including the Contractor’s overhead and profit. Upon approval by the Owner, this schedule will be used in determining the value of the work done for the purpose of partial payments.

7.2.2 The costs employed in making up any of these schedules will be used only for determining the basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the contract price.

7.3 **APPLICATION FOR PARTIAL PAYMENT:**

7.3.1 Before the first day of each month, or as otherwise directed by the Owner, the Contractor shall make applications for the value of the work done. Payment for materials stored on-site for use in this Contract will be paid minus the specified retainage unless specified otherwise. The materials must be properly stored and documented, and actual invoices must be submitted with the Application for Payment. Such applications shall show the breakdown of the project into the same items as the schedule of values specified in Subsection 7.2, entitled SCHEDULE OF VALUES and showing for each item the total value, the value previously reported as complete, the value completed during the month, the cumulative value completed and the value remaining to be done. The application shall include the total value completed to date minus the amount of the retainage indicated in Subsection 7.4 entitled RETAINAGE minus previous payments made to the Contractor.

7.3.2 The Engineer will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the Owner, or return the partial payment estimate to the Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial payment estimate.

7.4 **RETAINAGE:**

7.4.1 The Owner shall retain ten percent (10%) of the amount of each payment until final completion and acceptance of all work covered by the contract Documents.

7.5 **PAYMENTS WITHHELD:**

7.5.1 The Owner may withhold payment or, on account of subsequently
discovered evidence, nullify the whole or part of any application to the extent necessary to protect himself from loss on account of:

7.5.1.1 Defective work not remedied.

7.5.1.2 Claims filed or reasonable evidence indicating the probably filing of claims.

7.5.1.3 Failure of the Contractor to make payments to subcontractors, material suppliers, or employees.

7.5.1.4 A reasonable doubt that the contract work can be completed for the balance unpaid.

7.5.1.5 Damage to another Contractor.

7.5.2 When the above founds are removed, payment will be made for the amounts withheld because of them.

7.6 PAYMENT OF APPLICATIONS FOR PARTIAL PAYMENT:

7.6.1 Upon verification and approval of the application for partial payment made as specified, the Owner will make payment of the amount found properly due. No payment made to the Contractor nor partial or entire use or occupancy of the work by the Owner shall be an acceptance of any work or materials not in accordance with this contract.

7.7 FINAL INSPECTION:

7.7.1 Upon receipt of written notice from the Contractor that the work has been completed and finished in accordance with the contract, the Owner shall cause an inspection to be made of the work by his authorized representatives. If the Owner and/or Engineer believe the work is not completed, the Contractor will be so advised, and the inspection will not be performed until the outstanding issues are completed or corrected by the Contractor. A list shall be made of all deviations from the contract requirements (commonly termed "punch list") and a copy of such list furnished to the Contractor. The Contractor shall with reasonable haste remedy all defects so noted and shall notify the Owner upon the completion of such work. When inspection by the Owner's authorized representatives shows the work to be complete in accordance with the contract, application for final payment may be made. All defects/deficiencies must be corrected by the Contractor and acceptance of the work must be made by the Owner’s authorized representatives on or before the final completion date specified in the Agreement. Liquidated damages will be assessed for each calendar day after the specified final completion date required to complete all punchlist items and obtain acceptance by the Owner’s representatives.

7.8 RELEASE OF LIENS:

7.8.1 Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver to the Owner a complete and notarized release of all liens arising out of this contract, or receipts in full in lieu thereof, and if required in either case, an affidavit that so far as he had knowledge the information, the releases and receipts include all the labor and material for which a lien could be filed; but the Contractor may, if any subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Owner, to indemnify him against any lien. If any lien remains unsatisfied after all payments are made, the Contractor shall refund
to the Owner all monies that the latter may be compelled to pay in
discharging such a lien, including all costs and a reasonable attorney's fee.

7.9 **USE OR PARTIAL PAYMENT NOT ACCEPTANCE:**

7.9.1 It is agreed that this is an entire contract for one whole and complete work
or result that neither the Owner's entrance upon or use of the work or any
part thereof nor any partial payments by the Owner shall constitute an
acceptance of the work or any part thereof before its entire completion and
final acceptance.

7.10 **PAYMENT FOR UNCORRECTED WORK:**

7.10.1 Should the Owner direct the Contractor not to correct work that has been
damaged or that was not performed in accordance with the Contract
Documents, an equitable deduction from the contract amount shall be made
to compensate the Owner for the uncorrected work.

7.11 **PAYMENT FOR REMOVAL OR REJECTED WORK AND MATERIALS:**

7.11.1 The removal of work and materials rejected in accordance with Subsection
4.3 entitled CORRECTION OF WORK BEFORE COMPLETION and the re-
execution of acceptable work by the Contractor shall be at the expense of
the Contractor, and he shall pay the cost of replacing the work of other
Contractors destroyed or damaged by the removal of the rejected work or
materials and the subsequent replacement of acceptable work.

7.11.2 Removal of rejected work or materials and storage of materials by the
Owner, in accordance with Subsection 4.3 entitled CORRECTION OF
WORK BEFORE COMPLETION, shall be paid by the Contractor within thirty
(30) days after written notice to pay is given by the Owner. If the Contractor
does not pay the expenses of such removal and after ten (10) days written
notice being given by the Owner of his intent to sell the materials, the Owner
may sell the materials at auction or at private sale and will pay the
Contractor the net proceeds therefrom after deducting all the costs and
expenses that should have been borne by the Contractor.

7.12 **PAYMENT FOR EXTRA WORK:**

7.12.1 Written notice of claims for payment for extra work shall be given by the
Contractor within ten (10) days after receipt of instructions from the Owner
to proceed with the extra work and also before any work is commenced,
except in emergency endangering life or property. No claim shall be valid
unless so made. In all cases, the Contractor's itemized estimate sheets
showing all labor and material shall be submitted to the Owner. The
Owner's order for extra work shall specify any extension of the contract time
and one of the following methods of payment:

7.12.1.1 Unit price or combinations of unit prices which formed the basis of
the original contract.

7.12.1.2 A lump sum based on the Contractor's estimate and accepted by
the Owner.

7.12.1.3 Net cost plus a fixed fee. Net costs are defined as follows:

7.12.1.3.1 Labor costs, including time of foreman while engaged
directly upon extra work at rates not greater than the scale rates for each respective classification of labor customary in the area where the work is performed for each respective job classification.

7.12.1.3.2 Labor insurance taxes including amounts paid on a percent of such labor rate or on a cents per hour basis for Workmen's Compensation, Public Liability, Contractor's Contingent Liability and Contractual Liability Insurance and all Federal Old Age and Unemployment Taxes and any other taxes applicable as well as fringe benefits as may be approved by the Engineer.

7.12.1.3.3 Materials and supplies actually used on the work.

7.12.1.3.4 Rental charges for necessary equipment, as agreed upon by the Owner and Contractor. Rental charges shall not exceed those published in Rental Rates for Construction Equipment issued by the American Equipment Distributor, Equipment and tools having a value of $100.00 or less are considered to be "small tools" and, as such, are considered to be part of overhead.

7.12.2 To the cost under 7.12.1.3 there shall be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) of the estimated cost of the work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses. On work performed by subcontractors, the fixed fee shall not exceed five percent (5%) of the cost of the work.

7.13 PAYMENT FOR WORK SUSPENDED BY THE OWNER:

7.13.1 If the work or any part thereof shall be suspended by the Owner and abandoned by the Contractor as provided in Subsection 2.12 entitled SUSPENSION OF WORK, TERMINATION AND DELAY, the Contractor will then be entitled to payment for all work done on the portions so abandoned, plus fifteen percent (15%) of the value of the abandoned work to compensate for overhead, plant expense, and anticipated profit.

7.14 PAYMENT FOR WORK BY THE OWNER:

7.14.1 The cost of work performed by the Owner, in accordance with Subsection 2.10 entitled OWNER’S RIGHT TO DO WORK, shall be paid by the Contractor.

7.15 PAYMENT FOR WORK BY THE OWNER FOLLOWING TERMINATION OF CONTRACT BY OWNER:

7.15.1 Upon termination of the contract by the Owner in accordance with Subsection 2.11 entitled OWNER'S RIGHT TO TERMINATE CONTRACT, no further payment shall be due the Contractor until the work is completed. If the unpaid balance of the contract amount shall exceed the cost of completing the work including all overhead costs, the excess shall be paid to the Contractor. If the cost of completing the work shall exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The costs incurred by the Owner, as herein provided, and the damage incurred through the Contractor's default, shall be certified by the Owner.

7.16 PAYMENT FOR SAMPLES AND TESTING OF MATERIALS:
7.16.1 Samples furnished in accordance with Subsection 4.18 entitled SAMPLES, shall be furnished by the Contractor at his expense.

7.16.2 Testing of samples and materials furnished in accordance with Subsection 4.18 entitled SAMPLES, shall be arranged and paid for by the Owner.

7.17 **ACCEPTANCE AND FINAL PAYMENT:**

7.17.1 When the Contractor shall have completed the work in accordance with the terms of the Contract Documents, he shall certify completion of the work to the Owner and submit a final Request for Payment, which shall be the contract amount plus all approved additions, less all approved deductions and less previous payments made. The Contractor shall furnish evidence that he has fully paid all debts for labor, materials and equipment incurred in connection with the work, and, upon acceptance by the Owner, the Owner will release the Contractor except as to the conditions of the Performance Bond and the Payment Bond, any legal rights of the Owner, required guaranties, and Correction of Faculty Work after Final Payment, and will pay the Contractor's final Request for Payment. The Contractor shall allow sufficient time between the time of completion of the work and approval of the final Request for Payment for the Engineer to assemble and check the necessary data.

7.17.2 The Contractor shall deliver to the Owner a complete release of all liens arising out of the contract before the retained percentage or before the final Request for Payment is paid.

7.18 **ACCEPTANCE OF FINAL PAYMENT AS RELEASE:**

7.18.1 The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor other than claims in stated amounts as may be specifically excepted by the Contractor for all things done or furnished in connection with this work and for every act and neglect of the Owner and other relating to or arising out of this work. Any payment, however, final or otherwise, shall not release the Contractor or his sureties from any obligations under the Contract Documents or the Performance Bond and the Payment Bond.

7.19 **DELAYS AND DAMAGES:**

7.19.1 The date of beginning and the time for completion of the work are essential conditions of the Contract Documents and the work embraced shall be commenced on a date specified in the Notice to Proceed.

7.19.2 The Contractor will proceed with the work at such rate of progress to insure full completion within the contract time. It is expressly understood and agreed by and between the Contractor and the Owner that the contract time for the completion of the work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the work. If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will insure its completion within the time specified in the contract, or any extension thereof, or fails to complete said work within such time, the Owner, may, by written notice to the Contractor and his Surety, terminate his right to proceed with the work or such part of the work as to which there has been a delay. In such event the Owner may take over the work and prosecute the same to completion, by contract or otherwise, and may take possession of and utilize in completing the work such materials, appliances
and plant as may be on the site of the work and necessary therefor. Whether or not the Contractor's right to proceed with the work is terminated, he and his sureties shall be liable for any damage to the Owner resulting from his refusal or failure to complete the work within the specified time.

7.19.3 If fixed and agreed liquidated damages are provided in the contract and if the Owner so terminates the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Owner in completing the work.

7.19.4 If fixed and agreed liquidated damages are provided in the contract, and if the Owner does not so terminate the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until the work is completed or accepted.

7.19.5 The Contractor's right to proceed shall not be so terminated nor the Contractor charged with resulting damage if:

7.19.5.1 The delay in the completion of the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, Acts of God, acts of the public enemy, acts of the Government in either its sovereign or contractual capacity, acts of another Contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather or delays of subcontractors or supplies arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and such subcontractors or suppliers; and

7.19.5.2 The Contractor, within ten (10) days from the beginning of any such delay (unless the Owner grants a further period of time before the date of final payment under the contract), notifies the Owner in writing of the causes of delay.

7.19.6 As used in subparagraph 7.19.5.1, above, the term "subcontractors and suppliers" means subcontractors or suppliers at any tier.

7.19.7 The Engineer shall ascertain the facts and the extent of the delay and extend the time for completing the work when, in his judgement, the findings of fact justify such an extension, and his findings of fact shall be final and conclusive on the parties, subject only to appeal as provided in these General Conditions.

7.19.8 The rights and remedies of the Owner provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

(End of Section 01230)
SECTION 01232

SUMMARY OF WORK AND SPECIAL PROVISIONS

PART 1  GENERAL

1.1  SCOPE OF WORK

A.  PROJECT FUNDING AND CONTRACT AMOUNT:  The Owner’s budget for this Project is $750,000.  The Project budget includes $250,000 of Owner-funds and $500,000 from a SC Rural Infrastructure Authority (RIA) Grant.  The funding will be available in full at Notice to Proceed. The Bid Quantities included in the Bid shall be used to compare bids and determine the lowest, responsive, responsible bidder.  Award will be made based on the Bids as received.  If the low Bid exceeds $750,000, the Owner reserves the right to execute the Agreement (Section 01210) for only $750,000 instead of the dollar amount bid, and bid quantities will be used until $750,000 of work has been performed.

The RIA Grant is a State-funded Grant, and there are no special requirements or contract provisions that the Contractor must abide by (no Davis-Bacon Wage issues, no certified payrolls, etc.).  For payments to the Contractor, the Owner may elect to obtain a reimbursement from RIA prior to paying the Contractor, in which case payment may take up to 60 days.

B.  This Project will be used to rehabilitate sewers throughout the Owner’s Basin 64 area as shown on the Drawings.  Refer to the Drawings for additional information, requirements, scope of work and sequence of construction.  The exact scope of work and required rehabilitation are not known at the time of bidding.  The Engineer will utilize television inspection of the sewers performed by the Contractor and manhole inspections performed by the Engineer to define the work.

The required rehabilitation work may include any of the Bid Items.  The work included in this Project may include any of the following work items.

-  Cleaning and televising existing sewers to evaluate the sewers, identify defects that need repaired, and determine the final rehabilitation to be performed under this Contract
-  Performing point repairs to existing sewers (via excavation) to repair specific sewer defects; point repairs may be stand-alone repairs with no other rehabilitation to that sewer or repairs to facilitate lining the sewer with CIPP
-  Replacing sewers from manhole to manhole and installing new manholes (via excavation) (to be paid under the point repair bid item)
- Lining existing sewers with cured-in-place pipe lining (CIPP)
- Installing new manholes to replace existing manholes or to provide a manhole where one does not currently exist.
- Performing various manhole rehabilitation including coating manholes with a specialty cementitious mortar, locating and raising manholes, replacing and adjusting frames and covers, rebuilding benches and inverts, etc.
- Performing miscellaneous work and restoration

C. The Contractor will be paid for the actual work completed. All quantities stipulated in the Bid Form are approximate and are to be used only (1) as a basis for estimating the probable cost of the Work, and (2) for the purpose of comparing the bids submitted for the Work. The actual amounts of work done under unit price items may differ from the estimated quantities. The basis of payment for work shall be the actual amount of work done. The Contractor agrees that he will make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and the estimated amounts shown on the Bid Form – this specification shall take precedence over any other specification(s) related to bid quantities located elsewhere in these Specifications.

The total value of work shall not exceed the Contract amount unless approved by the Owner in writing (by a change order or written authorization). The Engineer will continuously review the actual quantities and value of work completed with the Contract amount. The Engineer may need to eliminate some of the work so as not to exceed the Contract amount.

Refer to Section 01250 – Description of Bid Items – for description and details of the bid items.

D. Contract Time and Liquidated Damages:

Notice to Proceed for this Contract is expected on or before February 1, 2021. If RIA approval of the bid is received prior to February 1, 2021, then Notice to Proceed will be issued sooner.

The Contractor shall perform work and achieve Substantial Completion with 240 days from Notice to Proceed. The Contractor shall achieve Final Completion within 270 days of Notice to Proceed. Substantial Completion shall be as defined in Section 01230 and shall mean that all work (sewer and manhole rehabilitation) is complete except acceptance testing, final restoration and punchlist work. Final Completion shall mean all work is complete including restoration, acceptance testing, and
punchlist items, all requirements of the Contract have been met, and all final paperwork has been submitted so that final payment can be made to include payment of all remaining retainage.

Liquidated damages in the amount of $800 per day will be assessed for each calendar day beyond Substantial Completion and for each calendar day beyond Final Completion.

E. State and Local Permits, Licenses, Inspections, and Certificates: The Contractor shall obtain such required documents and permits and pay the fees assessed for the work for which such permits, licenses, and inspections are required. The Contractor is advised that a City of Fountain Inn business license will be required for this Project. The Contractor shall contact the City to obtain the license amount and shall include the cost of the license in the various unit prices bid – no separate payment shall be made. The City will not execute the Contract Agreement until the Contractor obtains the business license.

1.2 OWNER AND ENGINEER

A. The OWNER as referenced in these Specifications is the City of Fountain Inn (City).

B. The ENGINEER as referenced in these Specifications is either the City or Frazier Engineering, P.A. who has been retained by the City to design this project and to provide construction administration services on behalf of the City. Communications during this Contract shall be through Frazier Engineering, P.A., located at 6592 Bob White Trail, Stanley, NC 28164 (Phone: 704-822-8444).

C. The Engineer and/or the Owner will have an on-site representative to inspect the work as it progresses.

1.3 QUALIFICATIONS

A. The Contractor shall be fully qualified and experienced to perform the work included in this Project. Specific experience requirements are included in the Specifications for the cured-in-place pipe lining (CIPP) and manhole rehabilitation—refer to Specification Sections 02651 and 02653. For the excavation work, the Contractor shall be fully experienced in sewer rehabilitation construction including handling wastewater flow through bypass pumping, working around existing utilities and in tight corridors, trench shoring and sheeting including around existing utilities, connecting new sewers to existing sewers and manholes, grass and asphalt restoration including patching, dealing with the public and residents, providing
thorough traffic control, and all else required to replace existing sewers and service laterals. Specific project references may be requested by the Owner prior to award of this Contract.

B. The Contractor shall submit the anticipated percentage of work that will be performed with his/her forces and the percentage of work that will be performed by subcontractors (based on the bid quantities) at the preconstruction conference.

C. The Contractor shall have a written Safety Plan. The Owner may request a copy of the Plan. All personnel working on this Project shall adhere to the Contractor’s Safety Plan and all other regulations governing this work. All personnel on the project shall be trained and certified to meet OSHA’s Confined Space Entry regulations. Safety and meeting all regulations is the sole responsibility of the Contractor. Unsafe work and entering manholes without following confined space requirements/procedures may result in immediate termination of this Contract by the Owner. Safety shall be of the utmost importance to the Contractor at all times. The Contractor shall continuously comply with all safety requirements from all regulatory agencies.

D. The Contractor shall hold any and all other necessary qualifications, certifications, training, etc. that may be required to complete this Project, including any traffic control training/certifications that may be required, use of software, use of equipment as recommended by equipment manufacturers and suppliers, etc.

E. Subcontractors shall also meet the specified qualifications and requirements. The Contractor shall submit information on any proposed subcontractor prior to performing any work. The Owner may request this information after receiving bids and prior to Contract award. The Owner must approve any subcontractor and reserves the right to reject any subcontractor. The Contractor shall not be due any additional money if subcontractors are not approved.

1.4 PROJECT MANAGEMENT AND SUPERVISION

A. The Contractor shall provide adequate project management and supervision throughout this Contract. At a minimum, the Contractor shall provide a full-time, Project Manager and a full-time, on-site General Superintendent. The Contractor is advised that management and supervision of this Project will be extensive and take significant time and effort. In addition, each crew, including subcontractor’s crews, must have an experienced, English-speaking foreman. The Contractor’s General Superintendent(s) must be on-site to observe the work at all times when work is being performed,
including work performed by subcontractors. Work shall cease whenever
the General Superintendent(s) is not on-site to observe the work. The
Engineer may allow the Contractor’s foremen to act on behalf of the
General Superintendent if so requested but will not allow subcontractor’s
foremen to act in such a manner. The Contractor’s General
Superintendent(s) must observe all work performed by subcontractors.

B. The Contractor’s full-time Project Manager shall manage and supervise
this Contract throughout its duration. The Project Manager shall have a
minimum of 5 years of experience managing and supervising this type of
construction, including excavation, sewer rehabilitation work, and manhole
rehabilitation, backed up by project references. The references must
clearly indicate that the proposed person acted as the Project Manager. The
Project Manager’s obligations, duties and responsibilities shall include, but
not be limited to, the following:

1) serve as main point of contact for Engineer and the City with authority
to act on behalf of the Contractor
2) prepare, process, submit and administer shop drawings and other
submittals
3) perform field engineering
4) coordinate with property owners and the public
5) coordinate with other utilities
6) coordinate with the DOT
7) prepare and process proposals, change orders, field orders, etc.
8) administer and coordinate subcontracts to ensure that quality work is
being performed
9) coordinate, prepare and submit all required schedules and accurately
update schedules for presentation at progress meetings
10) prepare, modify, coordinate and administer payment applications
11) prepare accurate and complete record drawings
12) provide general quality control to ensure that all Contract work meets
or exceeds the Contract requirements
13) attend all project meetings

C. The Contractor’s full-time, on-site General Superintendent(s) shall be on-
site during all construction activities including work by subcontractors.
The General Superintendent(s) shall have at least 5 years of experience
managing and supervising this type of construction, including excavation,
sewer rehabilitation work, sewer lining, and manhole rehabilitation, and
supervising subcontractors as backed up by project references. The
references must clearly indicate that the proposed person(s) acted as the
General Superintendent. The General Superintendent’s obligations, duties
and responsibilities shall include, but not be limited to, the following:
1) serve as main contact point for Engineer’s on-site representative
2) work with Engineer’s on-site representative to ensure a high quality project that meets the Engineer and the City’s expectations and the Contract requirements - failure to work with the Engineer’s on-site representative in good faith shall result in removal of the superintendent from the job and replacement with a suitable superintendent
3) coordinate all work and work schedules with the Engineer’s on-site representative
4) supervise all field work including work of Contractor’s forces (foreman, laborers, etc) and subcontractors
5) ensure that all discussions with the Engineer’s on-site representative are implemented by Contractor’s forces
6) coordinate with property owners and the public and supervise the distribution of project notifications
7) ensure that all approved submittals and traffic control plans are being followed and implemented by Contractor’s forces
8) review quantities being requested for monthly payment applications with the Engineer’s on-site representative
9) provide general quality control to ensure that all Contract work meets or exceeds the Contract requirements
10) attend all project meetings

D. Each foreman proposed to act as such on this Contract must have a minimum of 2 years experience as a foreman for the specific work he/she is proposed to supervise. References must be submitted to demonstrate that the proposed person(s) have the required experience. The references must clearly indicate that the proposed person(s) acted as a foreman.

E. The resumes and project references (names and phone numbers) of the proposed Project Manager, General Superintendent(s) and foremen shall be submitted to the Engineer and Owner for review and approval prior to the preconstruction conference. The Engineer and Owner will contact references to determine if the proposed persons meet the requirements specified herein. The findings of the Engineer and Owner will be issued prior to the preconstruction conference if adequate time is available or at the preconstruction conference. The Engineer and Owner may request interviews with the proposed person(s). The Engineer and Owner’s decision on the acceptability of the proposed person(s) shall be final, and the Contractor shall immediately propose alternate personnel that meet the specified requirements if the proposed person(s) is denied. No waivers of these requirements shall be permitted. No work shall begin until the Project Manager, General Superintendent and foremen are approved and are on-site working on this project.
F. The Contractor shall not replace or substitute the Project Manager, General Superintendent(s) and foremen without obtaining prior approval from the Engineer and Owner. The Contractor shall make any such request to change supervision in writing, and the Owner and Engineer will respond within 10 business days of the request. Work shall cease on the project any time such a change is made until approval of new supervision is granted to the Contractor. Additional or alternate supervisory personnel must meet all of the above requirements.

G. Payment for all project management and supervision shall be a mandatory subsidiary obligation under the Contract, and no separate payment will be made by the Owner.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS AND PRODUCT OPTIONS

A. The Specifications include specific product names that are approved for installation in this Contract. Whenever a product name is specified followed by the phrase “or equal,” the specific product mentioned shall be the basis upon which bids are to be prepared, and shall be understood as establishing the type, function, dimension, appearance and quality desired.

B. Other manufacturer's or vendor's products not named will be considered as substitutions if a written request for such substitution is made at least seven (7) days prior to the scheduled bid opening. The requests for substitution shall include complete data (including product literature, reference standards and performance and test data) substantiating compliance of the proposed substitution with the requirements stated in the Specifications. A list of product installations by the Contractor and proposed superintendent/foreman including quantities installed, dates of installation, and references (name, address, and phone numbers) shall also be submitted. Any approved substitutions and/or additions may be made by addendum or by written approval (letter or e-mail).

C. The requests for substitution must include a written and signed statement from the Contractor and/or manufacturer stating that the Contractor/manufacturer will adhere to all parts and requirements of the Specifications outlined herein and that no exceptions to any part of the Specifications will be taken.

D. The Owner’s/Engineer's decision regarding evaluation and acceptance of substitutions shall be final and binding.

2.02 SEWER AND MANHOLE MATERIALS
A. All point repairs shall be made using ductile iron pipe (Pressure Class 350) or PVC pipe as specified by the Engineer. In general, PVC pipe shall be used when the point repair will be lined over with CIPP, and ductile iron pipe shall be used when the point repair is a stand-alone repair. New main sewer pipes installed from manhole to manhole shall be either SDR-26 PVC or Pressure Class 350 ductile iron as specified for each replacement. Ductile iron pipe does not require Protecto 401 coating. SDR-35 PVC shall not be used on this contract.

B. New service lateral connections installed within point repair segments shall be made using ductile iron tee-wyes only. When the point repair is made using PVC pipe, provide appropriate transition gaskets to the ductile iron tee-wye. When the sewer is being replaced from manhole to manhole, the service tees or wyes shall match the new main sewer pipe material. New service lateral pipes shall be SDR 26 PVC or Pressure Class 350 as specified.

C. Manholes shall be as specified in the standard specifications and details.

2.03 SPECIAL EXCAVATION AND BACKFILL REQUIREMENTS

A. The standard excavation and backfill requirements for this Project allow the excavated soil to be used for backfill as long as the soil is suitable for backfilling. If the excavated soil is not suitable as agreed to by the Engineer, then imported select fill or ABC stone shall be used for backfill. Such imported material will be paid at the unit prices bid.

B. In some circumstances such as in SCDOT or City/County roads, the excavated soil may not be allowed for backfill and ABC stone or flowable fill may be required for backfilling the trench. Payment will be made for ABC stone and flowable fill as required and as directed by the Engineer at the unit prices bid (as applicable).

C. Soil density testing may be performed and paid for by the City.

PART 3 EXECUTION

3.1 PROJECT MEETINGS

A Preconstruction Meeting shall be held prior to performing any work. The Contractor, his proposed Project Manager and full-time on-site Project Superintendent and any proposed subcontractors shall attend the meeting. The project scope, requirements and submittals as specified herein will be reviewed and discussed. The Contractor shall present the proposed project schedule at the preconstruction meeting. Other meetings will be held throughout the Project as deemed necessary (expected to be monthly at a minimum). The Contractor shall provide updated schedules at all meetings.
3.2 PUBLIC NOTIFICATION

A. The Contractor shall continuously notify the public of the work being performed. At a minimum, the Contractor shall be required to do the following:

1. The Contractor shall distribute a letter describing the overall project and work to be performed to all property owners in the project area. The letter shall be distributed at least 1 week and no more than 2 weeks prior to performing any work in the area. The Engineer will provide the context for the letter. The Contractor shall put the letter on his letterhead and shall include contact names and local phone numbers for the Contractor’s project manager, superintendent, and the Engineer’s or Owner’s on-site representative.

2. The Contractor shall distribute door hangers to each property owner affected by the work 72 hours prior to performing any work. The Contractor shall submit a sample door hanger to the Engineer and Owner for review. The door hangers shall include the specific work to be performed, contact names and local phone numbers for the Contractor’s project manager, superintendent, and the Engineer’s on-site representative. Door hangers will be required for each phase of the work unless approved otherwise by the Engineer.

B. Payment for all public notification shall be a mandatory subsidiary obligation under the Contract, and no separate payment will be made by the Owner.

3.3 WEEKLY WORK SCHEDULES AND WORK COMPLETE FORMS

A. The Contractor shall submit a weekly construction schedule for the upcoming week by noon every Friday. The schedule shall define all construction activities for the week including specific work between specific manholes. If changes occur to the schedule, the schedule shall be immediately updated and resubmitted to the Engineer. The Engineer may request that the construction schedules be submitted to other agencies such as SCDOT. Work not scheduled shall not be performed or approved for payment.

B. In addition, the Contractor shall submit to the Engineer work complete forms every Friday. The work complete forms shall document all work completed during the week, including quantities for each bid item, and shall list all equipment used during the week and all personnel on the job each day.

3.4 WORK HOURS

A. Normal work hours shall be 8:00 am to 5:00 pm, Monday through Friday, except for legal holidays observed by the Owner when no work shall be performed. A normal work week shall be defined as 40 hours. It is anticipated that work in
residential areas and easement areas will be completed during the normal work hours.

B. For work in major thoroughfares, the SCDOT may require that the work be performed between 9:00 am and 4:00 pm or from 7:00 pm to 6:00 am or on weekends. No additional payment shall be made to the Contractor for working within these restricted work hours. Work hours in major thoroughfares must be approved in advance by SCDOT and the Owner/Engineer.

C. Any requests to work at times different from those specified or requests to work longer than the normal 40-hour work week shall be made in writing by the Contractor to the Engineer. Requests shall be made at a minimum of 72 hours prior to the requested change. The Engineer will review such requests and issue a decision on the request. The Engineer’s decision shall be final, and no additional money shall be due the Contractor based on the final decision. The Contractor shall not assume that overtime work will be allowed.

D. If weekend work is required or agreed to by the Engineer, the Contractor shall work the specified weekend (6 hour minimum workday), unless work is prevented due to bad weather. Should the Contractor choose not to work the specified weekend due to reasons other than bad weather, then the Engineer may not allow the Contractor to work the following weekend. This restriction will not be grounds for delay, additional costs, or changes in work. The Contractor shall not assume that weekend work will be approved.

Should bad weather prevent the Contractor from working the specified weekend, then the Contractor may work the following weekend, provided that a proper request is made by the Contractor and the Engineer approves the request, as specified.

3.5 ACCESS TO THE PROJECT SITES

The work under this Contract will be in easement areas along creeks, easement areas in yards, in residential roads and parking lots, and/or in major thoroughfares. The Contractor shall be solely responsible for accessing the sewers and manholes to perform the work, including determining access requirements and developing alternate access points as required, removing and replacing to equal conditions moveable obstacles (such as fences), clearing and mowing right-of-ways as required, negotiating with property owners, and restoring all areas disturbed by the work to equal or exceed preconstruction conditions (including repairing ruts, seeding and mulching, replacing moveable objects, etc.). The Contractor is advised that the easement areas will change throughout the year, and the condition of the easements may be different when the work commences compared to the conditions at the time of bidding. Easement
areas will become wet during rainy periods and may become overgrown with brush and vegetation during typical growing periods.

Access shall be along the existing sewer easements or within the existing road rights-of-way and work shall be maintained within the easements and rights-of-way unless otherwise approved by the individual property owners and/or the Owner. The Contractor shall be responsible for negotiating with property owners for such alternate access and shall pay any and all costs associated with such alternate access as specified above. All such negotiations with property owners shall be in writing, and copies of the agreements shall be submitted to the Engineer prior to using the access. The Contractor shall perform preconstruction videoing and photographing prior to any work, including accessing the sewers, as specified further herein.

The Contractor shall submit his/her proposed plan for accessing the sewers and manholes to the Owner for review and approval. The proposed plan shall be detailed and shall define each access point. The Contractor shall modify the plan as required by the Owner.

The costs for accessing the sewer shall be included in the various unit prices bid. No separate payment will be made for accessing the sewers and manholes.

3.6 TRAFFIC CONTROL

The Contractor shall submit to the Owner a detailed traffic control plan for performing all phases of the work at least two weeks prior to performing the work in residential roads and three weeks prior to working in major thoroughfares. The traffic control plan shall be specific to each road and each sewer and manhole and shall adhere to the requirements of SCDOT”s "Manual on Uniform Traffic Control Devices" (MUTCD). The traffic control plans must be approved and the encroachment permit issued by the City/County and/or SCDOT prior to performing any work on the roads. The traffic control plan shall be modified as necessary in the field, at no additional cost, to accommodate unforeseen traffic control issues and problems and safety concerns as identified by the Contractor, Owner, other City personnel and/or the SCDOT.

The Contractor shall perform and provide all necessary traffic control measures to complete the work. No roads shall be closed for construction activities unless specifically approved in writing by the Engineer. At least one lane of traffic shall be safely maintained at all times while work is in progress. Access to businesses and residences along the roads shall be maintained at all times. All lanes shall be open when work is suspended for one hour or longer. Signs and barricades must be removed from the site when work is no longer being performed, even during short breaks in the work (such as lunch breaks).
The Contractor shall provide all appropriate signage and barricades and shall provide flag persons at all times and places necessary. Traffic control will be strictly enforced in order to provide fire and police protection to the area and access to drives while construction is in progress. Occupants must be notified a minimum of two (2) hours in advance of private drive closings. Closure time will be limited to a maximum of 2 hours. Where businesses have only one means of access, the Contractor shall provide an alternative means of access or perform work during hours when the business is closed.

Traffic control is a mandatory subsidiary obligation under the Contract, and all costs of traffic control shall be included in the various unit prices bid – no separate payment will be made for any traffic control requirements.

3.7 MAINTENANCE OF FLOW IN EXISTING SEWERS

The Contractor is responsible for handling and accommodating all existing wastewater flows during the work. The Contractor will be required to submit, for approval by the Engineer, a detailed plan of the method the Contractor proposes in order to maintain the existing flow during construction.

If bypass pumping is proposed, the plan must include a provision for handling the existing peak flow by pumping. When pumping is used, an identical standby pump(s) shall be on site in the event of failure of the primary pump(s). Pumps 4” and smaller may use flexible piping. Pumps 6” and larger must use rigid piping. All discharge piping must be continuously monitored for leaks. If any problems arise with handling the flow with the available pumps or with the discharge piping, the plugs in the sewers shall be immediately removed, the flow shall be returned to gravity flow, and the work shall cease until repairs/modifications are made. No overnight pumping shall be allowed – temporary tie-ins at the end of the work day or work week shall be made as necessary.

Sewer system overflows will not be tolerated. All fines imposed on the Owner associated with overflows caused by the Contractor’s work shall be paid by the Contractor. Sewer overflows may lead to immediate termination of the Contract.

Maintaining the flow while performing the work is a mandatory subsidiary obligation under the Contract, and all costs shall be included in the various unit prices bid – no separate payment will be made.

3.8 WATER SUPPLY

It shall be the Contractor’s responsibility to purchase and convey the necessary water to any location at which it is required on the Project. Water can be purchased from the Greenville Water Systems (GWS). The Contractor shall meet with GWS to obtain approval/permits to use GWS’s hydrants for this...
Project. The Contractor is responsible for meeting all of GWS’s requirements, obtaining all permits and paying for all water used. The Contractor shall follow all GWS procedures for connecting to hydrants and shall be responsible for any damage caused by improper operation of hydrants. The Contractor is responsible for meeting all requirements whether listed herein or not. Every truck connecting to hydrants must have an air gap or backflow prevention device.

The Contractor shall obtain a letter from GWS stating that the Contractor and any Subcontractors are authorized to connect to hydrants for water usage during this Project. A copy of this letter shall be submitted to the Owner. Upon completion of the Contract and prior to final payment, the Contractor shall obtain a letter from GWS stating that all water has been paid for and shall submit a copy of this final payment letter to the Owner.

3.9 DISPOSAL OF DEBRIS

The Contractor shall be responsible for disposal of all unused or unsuitable trench material excavated or encountered in the work that is not used for completion of the work.

The Contractor shall also be responsible for disposal of all debris removed from the sewers during cleaning operations. A dump site is not being provided by the Owner. However, the Renewable Water Resources (ReWa) in Greenville, SC has previously made their sludge drying beds available for dumping material from sewer cleaning. If approved by ReWa, the Contractor shall meet all of ReWa’s requirements for utilizing their drying beds.

3.10 SHOP DRAWINGS

Shop drawings are required for all materials proposed for installation under this Contract. The Contractor shall submit complete shop drawings for all materials proposed for each bid item within 30 days from the Notice to Proceed. The Engineer will review the shop drawings and provide comments to the Contractor within 14 days of receipt of the shop drawings.

3.11 PRE-CONSTRUCTION VIDEO INSPECTIONS AND PHOTOGRAPHY

The Contractor shall video and photograph all project/work areas (street and off-road areas) prior to performing any work, including accessing the manholes/sewers, to document pre-work conditions in case future complaints arise. The inspections shall be narrated to document locations and dates of video inspections. The photographs shall be date stamped. One digital copy of the photographs and videos shall be submitted to the Owner prior to starting any work. This is a mandatory requirement under this Contract and the costs
associated with this work shall be included in the various unit prices bid – no separate payment will be made.

The purpose of the inspections and photographs shall be to document the pre-construction conditions for comparison with the final restoration work. If the videos/photographs are not complete and not comprehensive to cover all of a work area, the Contractor will be responsible for addressing all complaints that appear to be (or could possibly be) the result of his work, in any manner necessary to completely resolve the complaint, at no additional cost to the Owner.

3.12 COORDINATION OF CONTRACTORS

The City may have additional contractors in the project areas during this contract. These other contracts may pre-date or post-date this contract. The work being performed under these other contracts may include other sewer rehabilitation work or other City work (sidewalks, roads, parks, etc.). The contractor shall coordinate his work with any other City contractor working in the area. No additional payment will be made for this required coordination.

3.13 WORK WITHIN THE SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION (SCDOT) RIGHT-OF-WAY

An encroachment agreement (or similar agreement) will be required when work occurs within the South Carolina Department of Transportation (SCDOT) right-of-way. In such case, the City will obtain the encroachment permit. The Contractor shall provide work plans/details and traffic control plans as necessary and required to obtain the encroachment permit. The Contractor shall perform all work within the SCDOT right-of-way in substantially the manner outlined in the encroachments issued by them and keep a copy of same at the construction site at all times. The Contractor shall hold all certifications required by the SCDOT for working in their road right-of-way, including traffic control, excavation, etc.

The Contractor will notify the City twenty-four (24) hours prior to commencing any construction within the SCDOT’s right-of-way. The SCDOT may require restricted working hours or weekend work as specified elsewhere herein. SCDOT may also require backfilling trenches with ABC stone or flowable fill (to be paid at the unit prices bid).

As always, the Contractor shall be required to maintain all traffic, furnish all barricades and flashers, flagmen and pilot cars when necessary. Refer to the TRAFFIC CONTROL section of these Special Provisions for additional requirements.

The Engineer and/or Owner will identify SCDOT roads as the work progresses.
3.14 MAP CONFIRMATION AND UPDATES

At the start of the project, the Contractor shall walk the sewers to be cleaned and televised to locate manholes and identify additional manholes not shown on the drawings. The Contractor shall note any added manholes and notify the Owner/Engineer so manhole numbers can be assigned prior to starting the TV inspections. In general, additional manholes that are found during the inspections shall be numbered as the downstream manhole number followed by a “A”. The Contractor shall also update the drawings to show any changes based on the actual sewer layout. These “red-line” markups shall be submitted to the Owner/Engineer along with the TV inspections.

3.15 SURVEYING REQUIREMENTS

The Contractor is responsible for performing all surveying required for completion of this Project and the various work items included in the Bid. The costs for all surveying shall be included in the various unit prices bid – no separate payment shall be made.

For sewer replacements from manhole to manhole, the Contractor shall survey the sewers at each manhole (sewer in and out at each manhole) for the extent of the replacement work to identify the existing sewer slopes and any elevation changes through the existing manholes. The Contractor shall also survey the next upstream and downstream manholes so that a comprehensive decision can be made on the extent of the required replacement work. The survey information shall be submitted to the Engineer for review and determination of the slope for the new sewer(s). The survey shall be completed and submitted at least two weeks in advance of the replacement work to provide adequate review time for the Engineer.

3.16 SOIL AND EROSION CONTROL

The Contractor shall protect against soil erosion into nearby streams and storm drains at all times. Minimum erosion control requirements shall be as shown on the Drawings (where applicable). The Contractor shall install silt fence along the downstream side of all construction activities and provide inlet protection around all catch basins/storm inlets whether shown on the Drawings or not. Any water removed from excavations during dewatering shall be filtered to remove sediments before being discharged to the creek or the sanitary sewer system (when approved by the Engineer). The Contractor shall add additional erosion control devices throughout construction as deemed necessary and as required by the Owner, Engineer or regulatory agencies.

The erosion control devices shall be installed prior to performing any work including clearing and shall be maintained throughout construction. Construction
entrances shall be provided at all off-road work sites. All erosion control devices shall be checked continuously and immediately after rain events. Repairs to erosion control devices shall be made immediately when identified. Silt fences shall remain functional until all restoration has been performed and the restoration is accepted by the Engineer/Owner. An adequate stand of grass will be required prior to removing silt fences. The Contractor shall remove all erosion control devices upon completion of the work and completely restore disturbed areas. Contractor shall obtain the Engineer’s approval prior to removing erosion control devices.

As part of the soil and erosion control measures, where practicable, trenches should be filled, covered and temporary seeding applied at the end of each day. Stabilization measures shall be initiated as soon as practicable, but in no case more than 14 days after work has ceased in that area.

3.17 COORDINATION WITH EXISTING UTILITIES

The Contractor shall contact 811 to locate existing utilities in the area prior to performing any excavation. The Contractor shall locate existing utilities and facilities not located by the locating company. The Contractor shall closely coordinate with utility companies including Duke Power, Piedmont Natural Gas, Greenville Water Systems, City/County, cable TV, phone companies and others.

The Contractor shall be responsible for protecting all existing utilities during the work and shall repair any damage to the satisfaction of the utility owner. If the utility company fixes the damage, the Contractor shall pay for the repair if required.

Some existing utilities may be shown on the Drawings. The locations shown shall be considered approximate only. Most (or all) of the existing utilities may not be shown. The Contractor shall determine actual locations of all utilities within the construction area. The Contractor is advised that the project areas may be congested with existing utilities, and existing utilities will cross sewer trenches and run parallel with sewer trenches. The Contractor shall accommodate and protect all existing utilities regardless of location and shall be responsible for repairing all damage to the utilities – no separate or additional payment shall be made for accommodating and protecting existing utilities.

3.18 UTILITY POLES

The Contractor shall note that the work may be located near existing utility pole and guy wires. The Contractor shall make all necessary arrangements with the various utilities to protect the poles and guy wires and make any necessary relocations of same if field conditions require, as determined by the Engineer and the utility owners, and at no additional cost to the Owner.
3.19 TRENCH BACKFILL

A. Backfill of the trench shall be accomplished immediately after the pipe has been installed. No more than fifty (50) feet of trench shall be opened at any given period of time. Backfill of the trench shall commence immediately following pipe installation. This will be enforced in order to minimize the amount of open trench. Backfill and compaction activities will be on-going operations.

B. The Contractor shall backfill around the pipe to an elevation of one (1) foot above the pipe bell by hand only. Remaining backfill and compaction shall be as specified. All excavations will be completely backfilled by the end of each workday.

3.20 TRENCH EXCAVATION

A. The Contractor will be required to provide a trench box or sheeting and shoring in accordance with OSHA regulations. The Contractor will not be allowed by the Engineer to slope trench walls. The Contractor will be required to sheet, shore, and work from within a shoring box, etc., and do all that is necessary to maintain minimal trench widths and still meet OSHA requirements for this construction. No trenches shall be left open overnight. Any additional cost shall be included in the various pay items in the Bid. The Contractor will submit shoring details, when requested by the Engineer, for review and approval by the Controlling Agency. The Contractor is advised that existing utilities will cross and run parallel to sewer trenches, so the sheeting/shoring plan must accommodate any and all existing utilities.

3.21 SHORING AND SHIELDING

A. The Contractor shall comply with OSHA trenching and excavation regulations as revised in Subpart P of Part 1926 in the Federal Register. Shoring and/or shielding systems shall be used as specified in Subpart P to prevent caving of trench banks and to provide a safe excavation. These requirements will also apply to bore pits and/or tunnels.

B. The Contractor will be responsible for excavation safety and shall designate his “competent person” (as defined in Subpart P) for the determination of proper shielding/shoring systems.

C. If, in the opinion of the Engineer, the trench/excavation is not in compliance with OSHA regulations, the Contractor may be directed to stop work. Continued unsafe conditions will be reported to the appropriate regulatory agency. The Contractor will be responsible for paying all fines resulting from safety violations.
3.22 RESTORATION

The Contractor shall be responsible for restoring all areas affected by the work to equal or exceed pre-construction conditions. All restoration work shall be performed in accordance with the standards and specifications.

Restoration work shall be performed daily to restore areas disturbed during that day including pavement. If requested by the Contractor, the Engineer may allow the Contractor to perform the restoration work one day per week (at the end of the work week). However, if complaints are received from the City, State, or residents, the Engineer will require that daily restoration be performed.

3.23 RESTORATION OF GRASSED AREAS

The Contractor shall be responsible for restoring all grassed areas affected by the work to equal or exceed pre-construction conditions. Restoration of grassed areas shall be performed at the end of each day unless otherwise approved by the Engineer. The costs for restoring grassed areas via seeding and mulching including all requirements specified below shall be included in the various bid items - no separate payment will be made. A bid item is included for sod installation. Payment will not be made for the various work items until the restoration is complete and satisfactory to the Engineer unless otherwise approved by the Engineer. The Engineer will consider in such a decision whether the Contractor is using the subject areas for accessing the upstream work in which case the area cannot be restored. Final payment will not be made until all areas are completely restored to the satisfaction of the Engineer and property owner. Refer to the Drawings for additional requirements.

The Contractor or his subcontractor performing excavation work in grassed areas shall initially be considered acceptable to perform the restoration work. However, if the Contractor’s work is not satisfactory to the Engineer, Owner or property owner(s), the Contractor shall hire a local, professional landscaping company to perform the work at no additional cost to the Owner. The Contractor should consider retaining a local landscaping company during the 1-year warranty period to handle all complaints and warranty issues.

All grassed areas disturbed by the work under this Contract may be either seeded and mulched or sodded. The Engineer/Owner must agree with the choice of restoration recommended by the Contractor prior to any grassing being done (some areas on the Drawings may be designated to have specific type or method of grassing at that location). The seeding or sodding work shall be performed as follows:

*Seeding and Mulching:* The grass variety/species shall match the existing grass and shall be new seed and free of weeds and contamination. The
Contractor shall submit the proposed seed mix along with the seed manufacturer’s recommendations for lime, fertilizing, planting, watering, and maintaining. All such recommendations shall be strictly followed.

For easement areas through the woods, where little or no grass may exist, the Contractor shall plant a mixture of fescue and rye. The mixture rate including fertilizer shall be as follows or as recommended by local nurseries for fescue/rye in easement areas (all rates below are in pounds per 1000 square feet):

- 5 lbs Kentucky Fescue No. 31
- 3 lbs Rye Grain
  (sometimes approved to add millet)
- 20 lbs Fertilizer (5-10-10)
- 100 lbs Lime
- 12 lbs Superphosphate

For all seeding work, the Contractor shall provide clean, finely graded topsoil for the top 4 inches. The Contractor may strip the top 4 inches of soil prior to excavation and stockpile this topsoil in a separate pile for use if the existing soil is suitable. If the existing soil is not suitable, the Contractor shall import approved, clean topsoil for use. The cost for providing and importing all necessary topsoil shall be included in the various unit prices bid – no separate payment shall be made.

Prior to any planting, the Contractor shall grade all easement areas (non-yard areas) smooth as approved by the Engineer/Owner in the field. The Owner must be able to drive heavy sewer maintenance equipment along the sewer route to access every manhole unless otherwise approved. In addition, slopes of easements shall be such that the Owner can mow the easements with bush-hog equipment. There shall be no ruts or wash-out areas in the easements and no exposed rock or debris. The Contractor shall install culvert pipes or large stone (such as SCDOT No. 3 surge stone or rip-rap where approved) for draining easement areas as necessary and as required by the Engineer/Owner. All exposed tree roots shall be cut, all trees completely removed or stumps ground to 12 inches below grade (where approved by the Owner), and all damaged tree limbs cut and removed. The final grading of all easement areas must be approved by the Engineer/Owner prior to planting any grass. The top 4 inches of soil shall be clean, fine graded topsoil, either stripped and stockpiled or imported.

For yard/lawn areas, the Contractor shall grade areas to be a smooth, even surface with loose, fine textured soil. The area shall be rolled and raked. High spots shall be removed, and low spots shall be filled with suitable topsoil to meet finish grades. As specified above, the top 4 inches of soil
shall be clean, fine graded topsoil, either stripped and stockpiled or imported.

Fine grading should be limited to areas which can be planted in the immediate future. After fine grading and prior to planting, restore prepared areas to the above specified condition if eroded or otherwise disturbed. Prepared areas shall be moistened before planting lawn.

The Contractor shall lime and fertilize the soil prior to planting as recommended by the seed manufacturer, spread seed at the recommended rates, mulch area with clean wheat straw, and water area immediately after planting as recommended. It is recommended that the Contractor take soil samples so that proper lime and fertilizer rates can be determined.

Contractor shall maintain the planted area for at least 30 days and until completely established. Maintenance shall include watering per the seed manufacturer’s recommendations (at least 1 inch of water per week including rain), re-fertilizing as recommended and required, and cutting the grass to continue healthy growth as required. Contractor to submit watering and maintenance schedule to Engineer. Water used shall be provided by the Contractor. Property owners shall not be involved in watering operations unless the property owner requests that they be allowed to water the grass, and the Engineer approves.

Grassed areas will be acceptable provided requirements, including maintenance, have been complied with, and a healthy, well rooted, even colored, viable grass is established that is free of weeds, bare areas, and surface irregularities, to the satisfaction of the Engineer/Owner and property owner. All bare areas shall be re-seeded and maintained until accepted by the property owner and approved by the Engineer/Owner.

**Sod Restoration:** At the Contractor’s option and in specific areas identified by the Engineer/Owner, the grassed areas disturbed by the work may/shall be sodded. When sod restoration is selected or required, the Contractor shall provide new sod. The Contractor shall match exactly the species of the existing grass including providing strongly rooted (2" minimum thick root mat), certified sod, not less than 2 years old and free of weeds and undesirable native grasses. Sod must be capable of growth when planted.

As specified above for seeding and mulching, the top 4 inches of soil shall be clean, fine graded topsoil, either stripped and stockpiled or imported. The Contractor shall grade lawn areas to a smooth, even surface with loose, uniformly fine texture, roll and rake, remove ridges and fill depressions to meet finish grades, add suitable topsoil to any portion or the
entire area which does not meet finished grades, limit fine grading to areas which can be planted in the immediate future, moisten prepared lawn areas before planting lawn, and restore prepared areas to specified condition if eroded or otherwise disturbed, after fine grading prior to planting.

The Contractor shall lay sod within 24 hours from time of stripping. The sod shall be laid to form a solid mass with tightly fitted joints with ends and sides of sod strips butted, not overlapped. Strips shall be staggered to offset joints in adjacent courses. Work shall be performed from boards to avoid damage to subgrade or sod. The sod shall be tamped or rolled lightly to ensure contact with subgrade. The Contractor shall work sifted soil into minor cracks between pieces of sod, remove excess to avoid smothering adjacent grass and water sod with fine spray immediately after planting so that entire sod blocks are moist but not soggy.

Begin maintenance of lawns immediately after planting and continue for at least 30 days and until completely established. Maintain lawn by watering and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas. Watering schedule shall be as recommended for that type of sod by local nurseries and shall be at least 1 inch of water per week including rainfall. Contractor to submit watering schedule to Engineer. Water used shall be provided by the Contractor – property owner(s) shall not be involved in watering operations unless requested by the property owner(s) and approved by the Engineer. Contractor shall also lime and fertilize as recommended by local nurseries.

Sodded lawns will be acceptable provided requirements, including maintenance, have been complied with, and healthy, well rooted, even colored, viable lawn is established, free of weeds, open joints, bare areas, and surface irregularities, to the satisfaction of the Engineer and property owner. All bare areas shall be re-sodded.

3.24 RESTORATION OF PAVED AREAS

Pavement restoration shall be in accordance with the Drawings, Specifications and SCDOT standards. All materials shall meet SCDOT standards. All installation shall be in accordance with SCDOT standards. Bid items are provided for asphalt restoration in accordance with the various Standard Details.

For asphalt restoration, payment shall be limited to a width equal to the maximum trench width (as defined in the specifications and/or details) plus 5 feet and to a length equal to the length of the required work plus 6 feet. The Contractor shall not be paid for any restoration outside of these limits unless specifically approved by the Engineer prior to the specific work. For concrete restoration, sod
restoration and gravel restoration, the Engineer shall define the limits prior to starting the required work.

The Contractor is advised that the asphalt pavement may be underlain by 12 inches or more of concrete that must be cut through and replaced whenever excavation is performed. The location and extent of such concrete underlayment is not known but has been previously found under SCDOT roads. Bid items are included for removal and disposal of pavement (asphalt and concrete) 6 inches and thicker. The cost to remove asphalt and concrete that is less than 6 inches thick shall be considered incidental to the work and all costs shall be included in the various unit prices bid.

All unit prices bid shall include adjusting manhole frames/covers and appurtenances on all other existing utilities (such as water valve boxes) to final asphalt elevations (after milling and overlay).

3.25 FENCE REPLACEMENT

Existing fences that are disturbed during construction shall be repaired or replaced to a condition equal to or better than the original unless a release is obtained from the property owner and submitted to the Engineer. All fences shall be replaced immediately after construction has cleared the fence line. The costs to remove and replace the existing fences shall be considered incidental to the work and shall be included in the various unit prices bid. If the existing fence is not salvageable and a new section required, as agreed to by the Engineer prior to any work in the area and prior to removing the existing fence, a price shall be negotiated and payment made from the contingency item, as approved and directed by the Engineer. If the Contractor does not obtain the Engineer’s approval for new fence material prior to removing the existing fence, the Contractor will be responsible for installing the new fence at no cost to the Owner.

3.26 MAILBOX/STREET SIGN REPLACEMENT

The Contractor, along with the Owner’s and/or Engineer’s representative(s), will measure all mailboxes and street signs horizontally from edge of pavement and vertically from finish ground prior to removal. The Contractor and the Owner’s and/or Engineer’s representative(s) will log these measurements at each location to ensure proper replacement. Street signs shall be replaced immediately after construction at that location. Mailboxes shall be replaced by the end of the business day or no more than 2 hours after removal. The cost of this work shall be included in the various bid items – no separate payment will be made.

3.27 EQUIPMENT IDENTIFICATION SIGNS
All motorized construction equipment, trucks, vehicles, and storage trailers, etc. used (owned, leased, rented or borrowed) by the Contractor on this project shall be equipped with a pair of signs to identify the Contractor. The signs shall be permanently or magnetically attached to each side of the equipment at all times.

3.28 TREE PROTECTION

All trees located in the road right-of-way and along the sewer easements shall be protected from damage by this construction. Barriers shall be installed around each tree to remain. The barrier shall be a suitable temporary fence and shall be installed around the drip line of the tree (around the outside of the overhanging tree limbs) unless otherwise approved by the Engineer. No equipment, construction materials, topsoil, fill dirt or any other material shall be placed within the barrier. Nothing shall be nailed or attached to the tree.

Any trees that are damaged shall be repaired as approved by the Engineer. An Arborist, paid for by the Contractor, may be required to recommend repair of severely damaged trees. Recommendations by the Arborist shall be strictly followed. Severely damaged trees may require replacement with a like-kind tree. Any tree that dies (including during the warranty period) as a result of the work shall be replaced with a like-kind tree including size to the extent possible. Tree replacement shall be approved by and acceptable to the property owner and Engineer.

3.29 CLEANUP WORK

The Contractor shall completely clean up the work site at the end of each day. The cleanup work shall include washing streets with high pressure water, removing debris, and removing stockpiled materials and equipment from the site as necessary. If requested by the Contractor, the Engineer may allow the Contractor to perform the cleaning operations one day per week (at the end of the work week). However, if complaints are received from the City, State, or residents, the Engineer will require that daily cleanup be implemented.

3.30 ACCEPTANCE TESTING

A. Acceptance testing shall be required for all work performed under this Contract. The costs for all acceptance testing shall be included in the unit prices bid for the various work items – no separate payment will be made.

B. The Contractor shall televise all completed point repair work and new sewer installations to confirm that the installed work meets these Contract Documents. The television inspections shall comply with Section 02650 Sewer Cleaning and Television Inspection. The Contractor will not be paid for the point repair or new sewer until the television inspections are completed and submitted to and
approved by the Engineer. The Contractor shall promptly repair any defects identified from the television inspections and re-televise the completed work. Future Pay Estimates may be withheld by the Owner until such defects are repaired. The new pipes (from point repairs and new sewer installations) shall be on a constant grade and alignment from end to end and connections to the existing pipes shall match without offsets, open joints, or leaks. The cost of the television inspections for acceptance shall be included in the cost bid – no separate payment will be made.

C. The Contractor shall air test all new sewers installed from manhole to manhole (that have no service lateral connections) in accordance with the standard specifications, ASTM F1417-11a for PVC sewers, and ASTM C969 for ductile iron sewers. Payment will not be made until the air testing is completed and approved.

D. The Contractor shall perform mandrel testing on all new PVC sewers installed from manhole to manhole in accordance with the standard specifications. Payment will not be made until the mandrel testing is completed and approved.

E. The Contractor shall vacuum test all new manholes and rehabilitated manholes (those coated with cementitious mortar) in accordance with the standard specifications and ASTM C1244, except the minimum test time shall be 1 minute. Payment will not be made until the vacuum testing is completed and approved.

F. Also refer to Section 02651 – Cured-In-Place Pipe Lining (CIPP) and Section 02653 – Manhole Rehabilitation and for further testing requirements.

3.31 FINAL INSPECTION

A. As work is completed, the Engineer will perform an inspection of the work, including review of post-rehab video inspections, and generate a punchlist of defects, deficiencies and issues for the Contractor to address. Any deficiencies found shall be corrected by the Contractor promptly (within 14 calendar days maximum). Failure to correct deficiencies promptly may result in payment being withheld. The Engineer will not allow punchlist items to build up before repairs are made.

B. After all work is completed (including all restoration and testing), the Engineer will perform a final inspection of all work in all work areas. The Contractor shall notify the Engineer in writing when the work is complete and ready for final inspection. The final inspection will not be performed if any portion of the work is obviously not complete. A punchlist will be developed by the Engineer to identify defects, deficiencies and issues found during the final inspection that must be repaired by the Contractor prior to final payment. After the Contractor
addresses the punchlist to the satisfaction of the Engineer, the final pay estimate for the project can be submitted by the Contractor for payment.

3.32 HANDLING AND STORAGE OF MATERIALS

A. The Contractor shall be responsible for the safe storage of materials furnished by or to him, and accepted by him and intended for the work, until they have been incorporated in the completed project. The interior of all pipes, manholes and other accessories shall be kept free from dirt and foreign materials at all times.

B. The Contractor and his Suppliers are directed to contact the State Department of Transportation to verify axle load limits on State maintained roads (and bridges) which would be used for hauling of equipment and materials for this project. The Contractor and his Suppliers shall do all that is necessary to satisfy the Department of Transportation requirements and will be responsible for any damage to said roads which may be attributed to this project.

C. All materials required to construct this project shall be furnished by the Contractor and shall be delivered and distributed at the site by the Contractor or his material supplier.

D. Ductile iron pipe and cast iron accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. PVC pipe and precast manholes will be unloaded with hoists and/or as recommended by the respective manufacturers. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

E. In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench. Each piece shall be redundantly chocked at each end to prevent movement or rolling. Pedestrian or vehicular traffic shall not be unduly inconvenienced in placing of material along the streets or right-of-way, as applicable.

F. The Contractor will string in advance no more than the amount of pipe and material that can be installed within two (2) weeks unless approved by the Engineer. All the materials shall be placed in such a manner as not to hinder access, endanger or impede traffic, create a public nuisance or endanger the public. Materials strung through residential areas (or any area with maintained lawns) shall be placed in such a manner as not to restrict normal lawn maintenance, and must either be installed within two (2) weeks or removed to an approved storage yard, as required by the Engineer.

G. Storage sites shall be fenced with adequate protection to reasonably prevent people from entering the site. The Contractor shall be responsible for the
safeguarding of materials and equipment against fire, theft, and vandalism and in a manner which does not place the public at risk, and shall not hold the City responsible in any way for the occurrence of same.

H. Precast manholes, pipe and fittings, including rings and covers, steps, straps, etc., shall be so handled that the coating or lining will not be damaged. If, however, any part of the coating or lining is damaged, the repair shall be made by the Contractor at his expense in a manner satisfactory to the Engineer.

3.33 RECORD DRAWINGS

A. The Contractor shall document all work performed and sewers and manholes installed by marking the drawings in red ink to reflect the final, installed work. All changes in sewer and manhole locations, layouts and elevations shall be documented along with the locations for new service laterals.

B. Record Drawings shall be submitted at the end of the project and are a requirement prior to final payment.

3.34 PAY ESTIMATES

A. Pay estimate forms will be provided to the Contractor. The Contractor will provide the following documents with each payment request:

1. Signed Estimate Form.
2. Schedule of values showing work completed.
4. Acceptance testing as specified.

B. Contract Closeout Documents: The Contractor will provide the following documents with the final payment request:

1. Consent of Surety to Final Payment.
2. Contractor's affidavit - Release and Waiver of Claim.
4. Record Drawings.

C. Final payment will not be authorized until these documents have been properly completed and submitted by the Contractor, and all deficiencies noted at the final inspection have been corrected and approved.

D. No payment will be made for stored materials.

3.35 INCLEMENT WEATHER
Work shall not be performed when weather creates work site conditions that are unsafe for workmen or for the general public, or prevent performance of the contract provisions. Inclement weather conditions shall be defined as weather extremes (daily rainfall exceeding 0.25") which exceed the anticipated inclement weather days indicated below:

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<tr>
<th>Month</th>
<th>Anticipated Inclement Weather Days</th>
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<td>January</td>
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<td>February</td>
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<td>November</td>
<td>6</td>
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<td>December</td>
<td>6</td>
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Partial months at the beginning and end of the contract period will be prorated proportionally. Inclement weather occurring on holidays, Saturdays or Sundays are included in the anticipated inclement weather days above. The Contractor shall take into consideration these monthly anticipated inclement weather days when submitting his bid, and therefore these calendar days are included in the Contract time.

The Contractor and Owner’s/Engineer’s representative will agree on any days in which the rainfall exceeded 0.25” at the project site. The Contractor may consider installing a rain gauge to measure and document the rainfall. The Contractor shall submit a report to the Engineer monthly, indicating daily rainfall amounts and the dates when rainfall at the site exceeded 0.25”. The Engineer will compare the actual inclement weather days to the anticipated inclement weather days on a monthly basis. At the end of each calendar quarter, the Engineer will submit a report to the Contractor, indicating any adjustment in the Contract period for inclement weather days. Adjustments to the Contract period will be based on a comparison for the entire calendar quarter.

The Engineer will consider special conditions caused by inclement weather or by continuing adverse weather patterns on a case-by-case basis. Such requests must be submitted in writing to the Engineer within seven (7) calendar days of the occurrence(s) and must be fully documented with the cause and the effect of the occurrence(s) on critical path activities. Within 30 calendar days of receipt of a request from the Contractor, the Engineer will submit a report to the Contractor, indicating any adjustment in the Contract period.
The Contractor’s sole remedy for delays covered by this provision shall be an extension of the contract time only.

3.36 ADJACENT STRUCTURES AND LANDSCAPING

The Contractor shall be entirely responsible and liable for all damage or injury as a result of his operations to all public and private property, structures of any kind, and appurtenances thereto during the progress of the work. The cost of protection, replacement in the original location and condition, and payment of damages for injuries shall be included in the various bid items, and no separate payments will be made.

The Contractor is advised that the protection of buildings, structures, tunnels, tanks, pipelines, etc. and related work adjacent to and in the vicinity of his operations, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the work shall be performed by and shall be the responsibility of the Contractor.

The Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, etc., and record by notes, measurements, photographs, etc., conditions which might be aggravated by his operations. Repairs to or replacement of all damage reasonably attributed to or caused by the construction shall be made to the satisfaction of the affected property owner, the Owner and the Engineer. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the Engineer.

Prior to the beginning of any excavations or other work, the Contractor shall advise the Engineer of all buildings or structures the project work will affect and any pre-existing conditions that need to be brought to the attention of the Engineer.

Lawn areas shall be left in as good or better condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, maintained, and later replaced, or the area where sod has been removed shall be restored with new sod in the manner described in these Specifications. All restoration shall be as specified in these Specifications. The final grade shall match the pre-existing grade as closely as possible unless noted otherwise.

Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good or better condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the
approval of the property owner and the Engineer. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate bid item.

3.37 NOISE CONTROL

The Contractor shall minimize noise at all times and shall make reasonable efforts to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

During construction activities on or adjacent to occupied buildings, and when appropriate, the Contractor shall erect screens or barriers effective in reducing noise in the building and shall conduct his operations to avoid unnecessary noise which might interfere with the activities of building occupants. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

Except in the event of an emergency or where approved or specified by the Engineer, no work which produces noise shall be done between the hours of 7:00 P.M. and 7:00 A.M., or on Sundays. Dewatering equipment and bypass pumping equipment operating during these times shall be quiet or silent pumps or electric motor driven pumps. If the proper and efficient prosecution of specific and limited work requires operations during the night, the written permission of the Engineer shall be obtained before starting such items of the work.

3.38 DUST CONTROL

The Contractor shall take sufficient precautions throughout construction to minimize the amount of dust created. The Contractor shall prevent dust nuisance from his operations or from traffic by keeping roads and/or construction areas clean and sprinkled with water. Construction entrances shall be provided as specified in the standard details.

Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

3.39 SMOKE PREVENTION

The Contractor shall not use equipment which routinely produces substantial visible emissions. Strict compliance with ordinances regulating the production and
emission of smoke will be required. No open fires will be permitted unless approved by the local authorities and the Engineer.

3.40 STAGING AREAS

The Contractor shall be responsible for locating, negotiating and paying for staging areas and equipment and material storage areas.

3.41 PARKING

The Contractor shall provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the project and as required to avoid any need for parking personal vehicles where they may interfere with public traffic, the Owner’s operations, or construction activities.

3.42 CONTRACT MODIFICATION

All changes which affect the cost of the construction of the project must be authorized by means of a Contract Change Order. All Change Orders and Contract modifications must be approved by the Owner prior to becoming effective. The Contract Change Order will include extra work, work for which quantities have been altered from those shown in the Bid Schedule as well as decrease or increase in the quantity of the installed units which are different from those shown in the Bid Schedule because of final measurements. All changes should be recorded on a Contract Change Order as they occur so that they may be included in the partial payment estimate.

3.43 PROTECTION OF WORK

The Contractor shall at all times, until final acceptance of the work, provide protection of the work, either new or previously existing, from all hazards involved in his operations.

3.44 SECURITY

The Contractor shall be responsible for protection of the site, and all Work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons. No claim shall be made against the Owner by reason of any act of any employee or trespasser, and the Contractor shall make good all damage to the Owner’s property resulting from his failure to provide security measures as specified. The Contractor shall provide insurance to cover the cost of all labor, materials and equipment to be supplied under this Contract until the work is completed, acceptance testing has been performed, and the Owner has accepted the project and it is ready to be placed in service.
3.45 PUBLICITY

All prime contractors and their subcontractors shall submit to the Owner for approval all publicity items, including photographs, relating to the work of this project. The Owner shall approve any and all material prior to release for publication.

3.46 SPECIAL PRECAUTIONS

At all times during the construction of the project and its component parts, the Contractor shall provide, install and maintain proper temporary supports, shoring and bracing to prevent any damage to the work due to all causes.

3.47 WARRANTY PERIOD

The Contractor shall warrant all work and materials installed in this Contract for one (1) year from the date of final acceptance. The date of final acceptance shall be the date that final payment is made to the Contractor. Prior to final acceptance, the Contractor shall submit a written plan on how warranty issues will be addressed, including CIPP issues, manhole issues, and restoration issues.

3.48 DRAWINGS AND SPECIFICATIONS

The Drawings and Specifications form a part of this Contract as set forth in Paragraph 1.1, Document 01230, GENERAL CONDITIONS. The Drawings and Specifications are as listed in the Contract Agreement.

3.49 PROJECT FORMS

Notice of Award (2 pages), Notice to Proceed (1 page), Change Order Agreement (2 pages), and Application for Payment (2 pages) follow this Section.

END OF SECTION
NOTICE OF AWARD

To: _______________________________________

_______________________________________

_______________________________________

Project Description:

2020 SANITARY SEWER REHABILITATION PROJECT

The OWNER has considered your BID submitted on _________________, 20___ for the above-described WORK in response to its Advertisement for Bids and Information for Bidders.

The OWNER has approved your BID in the amount of $_______________________________ for award for the above-described WORK pending and conditioned upon the following:

1. Execution of a written contract by both parties and delivery of the executed Contract to the Contractor after approval and certification by the OWNER’s legal counsel;

2. Delivery of the Contractor’s Performance Bond, the Payment Bond and the required Certificates of Insurance within ten (10) calendar days from the date of this Notice.

3. Obtaining any and all required regulatory agency approvals.

4. Procurement of all rights-of-way. In this instance your acceptance of this award will be acknowledgment that you understand no Notice to Proceed will be issued until final procurements of all rights-of-way for the project. The Contractor and the Owner may agree for the Contractor to begin work in other areas of the Project avoiding unprocured properties.

This Notice of Award is not a Contract.

If you fail to execute said Agreement and to furnish said Bonds and Certificates of Insurance within ten (10) calendar days from the date of this Notice, said OWNER may elect to consider all your rights arising out of the OWNER’S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER may also pursue all other rights and remedies it may have under law.

You are required to return an acknowledge copy of this Notice of Award to the OWNER.

DATED THIS _________________DAY OF ____________________, 20__.
CITY OF FOUNTAIN INN (OWNER)

By:____________________________________

Title:____________________________________

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged by __________________, this _______ day of ____________________, 20___.

By:____________________________________

Title:____________________________________
NOTICE TO PROCEED

To: ______________________________ Date: ______________________________

________________________________

Project: 2020 SANITARY SEWER REHABILITATION PROJECT

You are hereby notified to commence Work in accordance with the Agreement dated
______________, 20___ on or before ________________, 20___, and you are to complete the
Work by _________________.

City of Fountain Inn (Owner)

By: ______________________________

Title: ______________________________

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by

________________________________

this ________ day of _________, 20__.

________________________________

By: ______________________________

Title: ______________________________
CHANGE ORDER AGREEMENT

OWNER: CITY OF FOUNTAIN INN                  Change Order No.____________________
                                                Date:______________________________

The following changes are made to the Contract Documents:

(Attach any drawings or other documentation necessary to explain or demonstrate this change.)

Original CONTRACT PRICE:  $______________________________

Current CONTRACT PRICE as adjusted by previous CHANGE ORDERS:

$______________________________

The CONTRACT PRICE due to this CHANGE ORDER will be (increased) (decreased) by:

$______________________________

The new CONTRACT PRICE including this CHANGE ORDER will be:

$______________________________

The CONTRACT TIME will be (increased) (decreased) by _______ calendar days due to this CHANGE ORDER.  The date of completion of all work will be ________________, 20___.

THE CONTRACTOR AFFIRMS, REPRESENTS AND WARRANTS AS OF THIS DATE THAT THERE ARE NO OTHER OUTSTANDING CHANGE ORDERS REQUIRED BY THE CONTRACTOR, OR OUTSTANDING CLAIMS FOR ANY ADDITIONAL MONEY OR COSTS, INCLUDING IMPACT COSTS OR DAMAGES OR CLAIMS FOR TIME EXTENSION, OR CLAIMS OF ANY OTHER KIND OR NATURE AGAINST THE OWNER, EXCEPT THE FOLLOWING: (Describe separately here any such claim, state the total dollar amount and/or time extension sought per claim alleged to be due from the Owner, and the status of the claim as of this date.)

________________________________________________________________________________________

________________________________________________________________________________________

Requested by:___________________________________________________________________________

Recommended by:______________________________________________________________________

(Engineer’s Signature and Title)
AGREED: OWNER – CITY OF FOUNTAIN INN

By:_______________________________
Date:_____________________________

AGREED: CONTRACTOR

By:_______________________________
Date:_____________________________
APPLICATION FOR PAYMENT

OWNER: CITY OF FOUNTAIN INN

CONTRACTOR: ________________________________

ENGINEER: FRAZIER ENGINEERING, P.A.

NAME OF PROJECT: 2020 SANITARY SEWER REHABILITATION PROJECT

APPLICATION FOR PAYMENT NO.: ________

CONSTRUCTION PERIOD: FROM: ___________ TO: ______________

******************************************************************************

SUMMARY OF WORK

Total Contract Work Performed to Date: $__________________________

Materials Stored on Jobsite $__________________________

Total Change Order Work to Date: $__________________________

Subtotal to date: $__________________________

Less 10% Retainage $__________________________

Subtotal: $__________________________

Less Previous Payments: $__________________________

Amount Due This Application for Payment $__________________________

******************************************************************************

THE CONTRACTOR BY PRESENTING THIS PAY ESTIMATE STATES, REPRESENTS AND WARRANTS THAT AS OF THE DATE OF THIS REQUEST THERE ARE NO OUTSTANDING CLAIMS ON HIS BEHALF AGAINST THE OWNER FOR ANY ADDITIONAL MONEY, COSTS OR DAMAGES, (INCLUDING IMPACT COSTS OR DAMAGES), OR CLAIMS ARISING FROM DELAY OR FROM THE DENIAL OR THE GRANTING OF TIME EXTENSIONS, OR FROM CLAIMS OF ANY OTHER KIND OR NATURE EXCEPT FOR THE FOLLOWING: (DESCRIBE HERE THE NATURE OF ANY SUCH CLAIMS, THE DATE EACH CLAIM AROSE, THE DATE NOTICE WAS GIVEN PURSUANT TO THE GENERAL CONDITIONS, THE EXACT AND TOTAL DOLLAR AMOUNT CLAIMED, AND THE STATUS OF EACH CLAIM AS OF THIS DATE:__________________________________________

__________________________________________
The Contractor has attached a Schedule of Values showing all Bid Items included in the BID. The Schedule of Values includes the quantity, location of work performed, and value of work completed for each Bid Item since the previous pay application and the quantity and value of work completed to date for each Bid Item. An itemized spreadsheet is provided with the Application for Payment detailing and documenting the specific location of all work performed since the previous Application for Payment.

In addition, by submitting and signing this Application for Payment, the Contractor certifies that progress payments previously received from the OWNER on account of the work for the PROJECT have been applied by the Contractor to discharge in full all of the Contractor’s obligations incurred in connection with the work covered by all prior Applications for Payment, including full payment of materials purchased and full payment to subcontractors.

SUBMITTED
CONTRACTOR: ____________________
By: ______________________________
Date: _____________________________

RECOMMENDED FOR APPROVAL
ENGINEER: FRAZIER ENGINEERING
By: ______________________________
Date: _____________________________

APPROVED
OWNER:  CITY OF FOUNTAIN INN
By: ______________________________________
Date: ______________________________________
SECTION 01250

MEASUREMENT AND PAYMENT

Bid items have been set up in the Bid Form for all work that is permanent and measurable. The bid for each pay item shall include the cost of all new material, labor, equipment, and all else required to complete that pay item as specified. Payment for work will only be made after the work is complete and has been inspected by the Engineer.

The Bid includes the following abbreviations:

- LF = linear foot
- VF = vertical foot
- EA = each
- CY = cubic yard
- SY = square yard

The total bid price shall cover all work required by the Contract Documents. All costs in connection with the proper and successful completion of the work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction plans, equipment, and tools; and performing all necessary labor and supervision to fully complete the work, shall be included in the unit and lump sum prices bid. All work not specifically set forth as a pay item in the Bid Form shall be considered subsidiary obligations of Contractor and all costs in connection therewith shall be included in the prices bid.

All estimated quantities stipulated in the Bid Schedule or other Contract Documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the Work, and (b) for the purpose of comparing the bids submitted for the Work. The actual amounts of work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished. Contractor agrees that he will 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.

**Item 1 - Sewer Cleaning and Television Inspection:** This item includes all work and equipment required to completely clean (remove debris, roots, grease, pipe tuberculation and other material) and televising existing 8” and 12” sewers to further evaluate the condition of the sewers as specified. The cleaning and CCTV inspections will be used to identify defects in need of repair and as pre-CIPP installation work. Costs shall include any and all debris encountered in the work regardless of severity and disposing of all debris. Costs shall also include submittals of the digital inspections in PACP format to the Engineer as specified. Further, costs shall include any and all costs associated with accessing the sewers and manholes to perform the work as specified including clearing sewer easements, building access roads, negotiating with property owners, traffic control, complete restoration of areas disturbed by the work, etc. This item includes working in any location (unpaved areas, easement areas or paved areas). Bid Items are included for cleaning and televising existing 8” and 12” sewers.

Sewer cleaning and television inspection will be measured and paid for on a linear foot basis to the nearest one-tenth of a foot for main sewers 8” and larger. Measurement will be along the...
horizontal centerline of the pipe with no deductions for manholes and will be from center of manhole to center of manhole.

A bid item is also included for verifying if service laterals are active. A camera shall be deployed in the sewer segment where the service lateral is located. Dye with sufficient color and concentration to readily see if present shall be poured in the clean-out and the camera maneuvered within the sewer segment to find the location where the dye is entering. If a clean-out is not present, the Contractor shall coordinate with home owners or business owners to have the home owners or business owners pour dye into a toilet and flush. The Contractor shall make every reasonable effort to coordinate with the home owners or business owners prior to mobilizing the CCTV truck and document the effort. Payment will be made for each clean-out or home/business where dye is introduced. Video of dye entering the sewer with accurate footage of the location of the service lateral or video proving that the entire sewer segment was televised and no dye was present shall be submitted to the Engineer.

Payment will be made on the basis of the unit price bid in the Bid.

This item does not include televising sewers for final acceptance. Those costs shall be included in the various unit prices for that work – no separate payment will be made.

**Item 2 - Point Repairs to Existing Sewers**: This item includes all materials, equipment, and work required to perform point repairs to existing main sewers. This item will also be used for replacing existing service connections and service laterals. Bid Items are included for existing 8” main sewers at various depths. Bid Items are included for a lump sum payment for performing point repairs up to 8 feet in length and payment per linear foot for each foot over 8 feet. When a point repair exceeds 8 feet in length, the Contractor shall be paid for the first 8 feet of the point repair under the lump sum Bid Item and then on a linear foot basis for each foot over 8 feet. The work shall be performed as specified and in accordance with the details. Note that the point repair bid item may be used if necessary to completely replace a sewer from manhole to manhole. Refer to Detail SS-22.

The base bid includes using PVC pipe for the repair. If ductile iron pipe is required, the add-on price for this pipe material will be paid under Bid Item 2B.

The base bid items include backfilling with the excavated soil. If the excavated soil is not suitable for backfilling or ABC stone or flowable fill are required for backfilling the trench, payment for removing and disposing of the excavated material offsite and importing the specified material will be paid under Bid Items 13D and 13E.

The base bid items include all required restoration of grassed areas disturbed by the work. Restoration of asphalt pavement, concrete and curbs and gutters, sod and graveled areas shall be paid separately under Bid Item 13.

Bid Item 2C is included for installing ductile iron tee-wye connections within point repair segments to reconnect service laterals to the main 8” sewer at any depth and installing 6 feet of PVC or DIP lateral. Refer to Detail SS-16.

These items further include payment for saw-cutting existing asphalt or concrete (up to 6” thick; greater depths paid under Bid Item 13) and disposing of material, excavation, removal and off-site disposal of existing soil and sewer pipe, installation of new sewer, connections to existing manholes and sewers, bedding, backfilling, compaction, bypass sewage pumping during
construction, accessing sewers and manholes as specified, traffic control, compliance with required working hours, coordination with and location of existing utilities, erosion control, and all else incidental thereto for which separate payment is not provided under other Bid Items. This item also includes television inspection after the point repairs are completed to confirm proper installation.

Payment will be made for each point repair at the installed depth. Payment will be made on the basis of the unit price bid.

Payment will not be made for any length outside of the required point repair length as defined by the Engineer unless approved by the Engineer prior to performing the point repair. In addition, no payment will be made for additional repairs located outside of the defined length that are required as a result of the Contractor’s work on the defined point repair.

**Item 3 - Installation of New Precast Concrete Manholes**: This item includes all materials, equipment, and work required to install new 4-foot-diameter precast concrete manholes with solid or watertight covers as specified. The Bid includes a bid item for installation of manholes up to 6 feet deep as a lump sum payment and an add-on bid item for each vertical foot of manhole over 6 feet installed. When a manhole exceeds 6 feet in vertical length, the Contractor shall be paid for the first 6 feet of the manhole under the lump sum Bid Item and then on a vertical foot basis for each foot over 6 feet.

This item includes payment for sawcutting existing asphalt or concrete (up to 6” thick; greater depths paid under Bid Item 13) and disposing of material, excavation, removal and off-site disposal of existing soil, sewer pipe and manhole (when replacing existing manholes or junction boxes), complete installation of new manhole including solid or watertight frame and cover, bedding, backfilling with excavated soil and compaction, installing concrete benching and forming invert channel, surveying services as required, bypass sewage pumping during construction, accessing sewers and manholes as specified, traffic control, compliance with required working hours, coordination with and location of existing utilities, erosion control, complete restoration of disturbed areas except pavement which will be paid under Bid Item 13, and all else incidental thereto for which separate payment is not provided under other bid items.

Bid Item 3B is included for connecting existing sewers and laterals to new manholes with a minimum of 10 feet of new ductile iron or PVC pipe as specified for each connecting sewer and connecting the new ductile iron/PVC pipe to the existing sewer with a rubber sleeve coupling with shear rings (refer to the point repair detail for coupling requirements). This Bid Item will not be used for new sewers installed for point repairs that connect to existing manholes - that cost shall be included under Bid Item 2.

The bid items for new manholes include backfilling with the excavated soil. If the excavated soil is not suitable for backfilling or ABC stone or flowable fill are required for backfilling the trench, payment for removing and disposing of the excavated material offsite and importing the specified material will be paid under Bid Items 13D and 13E.

Payment will be made for each manhole installed based on the unit price bid.

**Item 4 – Cutting Protruding Service Connections Prior to Installing Liner Pipe**: This item includes all materials, equipment, and work required to cut protruding service connections flush with the existing pipe wall via an internal robotic remote cutter prior to installing cured-in-place pipe lining or as required to complete CCTV inspections as specified. This item includes payment
for accessing the sewers and manholes as specified, locating existing service connections, remote cutting of the connections (any lateral pipe material), retrieval and removal of cut pieces of lateral pipe, and all else incidental thereto for which separate payment is not provided under other bid items. This item includes all sizes of main sewer and service laterals.

Payment will be made on the basis of the unit price bid in the Bid.

**Item 5 – Cured-in-Place Pipe Lining - Main Sewer:** This item includes all materials, equipment, and work required to install cured-in-place pipe lining (CIPP) in existing 8” and 12” sewers in any location (unpaved areas, easement areas or paved areas). Various thicknesses (installed final thickness) for each pipe diameter are included in the Bid. Work shall be as specified and in accordance with the Specifications.

The CIPP installation Bid Items include payment for preparing the existing sewer and performing pre-construction inspections including additional pre-cleaning and television inspection of the sewer as required prior to CIPP installation, supplying and installing the pipe lining, coating the invert channel with grout to raise the channel to the liner pipe elevation, bypass pumping of existing wastewater flow during construction, providing a watertight seal at the manhole-pipe interface including covering the entire connection with an approved non-shrink grout, accessing sewers and manholes for lining installation as specified, performing post-rehabilitation television inspections, distributing project notices, traffic control, compliance with required working hours, coordination with and location of existing utilities, erosion control, complete restoration of all areas disturbed by the work, and for all else incidental thereto for which separate payment is not provided under other bid items. Payment will not be made until the final post-rehabilitation television inspections are submitted and reviewed by the Engineer.

Installation of CIPP will be measured in place on a linear foot basis to the nearest one-tenth of a foot. Measurement will be along the horizontal centerline of the pipe with no deductions for manholes and will be from center of manhole to center of manhole. Payment will be made on the basis of the unit prices bid in the Bid.

Bid Item 5C is for reconnecting existing active service connections to the new lined sewers. This item includes all materials, equipment, and work required to reconnect existing active service connections to the main sewer after it is lined via an internal remote cutter as specified. This item includes payment for accessing the sewers and manholes as specified, locating existing service connections, remote cutting through new lining, retrieval and removal of cut-out sections of lining, buffing openings with a wire brush to provide a smooth opening, and all else incidental thereto for which separate payment is not provided under other bid items. This item includes all sizes of main sewer and service laterals.

Bid Item 5D is for performing CIPP product testing as specified. This item includes payment for capturing the sample, labeling the sample as to the sewer segment and date of installation, cutting the samples for testing and providing a 1-inch-wide ring sample to the Engineer as specified, delivering the samples to the independent testing laboratory for testing, correspondence and coordination with the testing laboratory, testing of the samples by the testing lab to determine flexural strength, flexural modulus, tensile strength and thickness, and submitting the results to the Engineer. The CIPP testing shall include determining flexural strength, flexural modulus, tensile strength and thickness of each sample. These four separate individual tests make up one completed CIPP test. Payment will be made for each completed CIPP test at the unit price bid after the test results are submitted to the Engineer.
Item 6 - Installation of 1-inch-thick Cementitious Mortar in Existing Manholes: This item includes all materials, equipment, and work required to install 1-inch-thick cementitious mortar on existing internal manhole walls and benches as specified and in accordance with Detail SS-13. Bid items are included for coating existing 4-foot-diameter manholes (inside diameter) and for installing any specified product (hydrogen-sulfide resistant material not required for this project). This item includes working in any location (unpaved areas, easement areas or paved areas).

This item includes payment for pre-construction inspection of manholes, manhole cleaning, root removal and grease removal, other work required to prepare the manhole for lining including, but not limited to, stopping active leaks and filling voids in the manhole wall or between brick layers, furnishing and installing cementitious mortar lining on the manhole walls to the limits shown on the Details and on the benching to the top of the invert channel, coating the invert channel, sealing around the manhole wall/pipe interfaces, performing specified product tests and vacuum tests and other specified acceptance tests, accessing manholes as specified, traffic control, compliance with required working hours, complete restoration of all areas disturbed by the work, and all else incidental thereto for which separate payment is not provided under other bid items.

Installation of cementitious mortar lining in manholes will be measured in place on a vertical foot (VF) basis to the nearest one-tenth of a foot. Internal measurement will be from the point of intersection between the manhole benching and the manhole invert channel to the point of termination of the lining at the manhole frame as specified by the Engineer and in the details.

Payment will be made on the basis of the unit price bid.

Item 7 - Resetting Existing Frames and Covers: This item includes all materials, equipment, and work required to reset existing frames and covers in unpaved areas and paved areas as specified and in accordance with the details.

This item includes payment for sawcutting existing asphalt or concrete (any thickness) and disposing of material (in paved areas only), excavation, manhole wall and frame preparation, resetting existing frame and cover, removal and off-site disposal of existing materials, backfilling (with imported ABC stone in paved areas) and compaction, accessing manholes as specified, traffic control, compliance with required working hours, coordination with and location of existing utilities, erosion control, complete restoration of disturbed areas including pavement, and for all else incidental thereto for which separate payment is not provided under other bid items.

Payment will be made on the basis of the unit price bid.

Item 8 - Replacing Existing Frame and Cover with New Solid or Watertight Frame and Cover: This item includes all materials, equipment, and work required to replace existing frames and covers with new solid or watertight frames and covers in unpaved areas and paved areas as specified and in accordance with the details. Watertight covers are defined as cam-lock covers. Frames and covers shall be as specified.

This item includes payment for sawcutting existing asphalt or concrete (any thickness) and disposing of material (in paved areas only), excavation, manhole wall and frame preparation, new frame and cover, removal and off-site disposal of existing materials, backfilling (with imported ABC stone in paved areas) and compaction, accessing manholes as specified, traffic control, compliance with required working hours, coordination with and location of existing utilities, erosion control, complete restoration of disturbed areas including pavement, and for all else incidental thereto for which separate payment is not provided under other bid items.
Payment will be made on the basis of the unit price bid.

**Item 9 - Raising Manhole Frames and Covers:** This item includes all materials, equipment, and work required to raise existing manhole frames and covers with bricks or concrete grade rings in unpaved areas and paved areas as specified and in accordance with the details. The frames and covers to be raised may be buried or exposed. Bid Items are included for a lump sum payment for raising existing manhole frames and covers up to 1 vertical foot and payment per vertical foot for each foot over 1 foot. When an existing manhole frame and cover is raised more than 1 vertical foot, the Contractor shall be paid for the first 1 foot under the lump sum Bid Item and then on a vertical foot basis for each foot over 1 foot.

Payment will be made for each manhole raised based on the height raised. Measurement will be from the existing manhole cover elevation to the final cover elevation if the frame and cover is not replaced. If the frame and cover is replaced (in which case will be paid for under Bid Item 8), the height of the new frame and cover shall be excluded.

This item includes payment for locating manholes (see below), sawcutting existing asphalt or concrete (any thickness) and disposing of material (in paved areas only), excavation, manhole wall and frame preparation, new masonry or concrete grade rings, removal and off-site disposal of existing materials, backfilling (with imported ABC stone in paved areas) and compaction, accessing manholes as specified, traffic control, compliance with required working hours, coordination with and location of existing utilities, erosion control, complete restoration of disturbed areas including pavement, and for all else incidental thereto for which separate payment is not provided under other bid items.

Manhole location shall include a minimum of one hour searching for the manhole utilizing a high quality metal detector as appropriate. The Engineer may direct the Contractor to perform CCTV equipped with a sonde at the unit price bid to locate manholes that cannot be found using a high quality metal detector.

Payment will be made on the basis of the unit price bid measured to the nearest one-tenth of a foot.

**Item 10 - Vertical Concrete Slide Channels:** This item includes all materials, equipment, and work required for building or rebuilding concrete slides in manholes for existing service laterals and incoming sewers as specified on the drawings and/or where directed by the Engineer in accordance with Detail SS-7A, any configuration, including bypass pumping, complete in place.

This item includes payment for removal and off-site disposal of existing materials, new concrete, accessing manholes as specified, bypass pumping (based on using pumps smaller than 6 inches), traffic control, and for all else incidental thereto for which separate payment is not provided under other bid items.

Payment will be made on the basis of the unit price bid.

**Item 11 - Rebuilding Existing Manhole Benching and Invert Channels:** This item includes all materials, equipment, and work required to rebuild existing manhole benching and invert channels as specified and in accordance with the details. Refer to Detail SS-7 included on the contract drawings. Re-built benches shall conform to standard specification requirements.
This item includes payment for removal and off-site disposal of existing materials, new concrete, accessing manholes as specified, bypass pumping (based on using pumps smaller than 6 inches), traffic control, and for all else incidental thereto for which separate payment is not provided under other bid items.

Bid Items are included for rebuilding benches and inverts in existing 4-foot-diameter manholes. Payment will be made on the basis of the unit price bid.

**Item 12 - Plugging Existing Abandoned Sewers:** This item includes all materials, equipment, and work required to plug existing abandoned sewers connecting to existing manholes with concrete as specified. This item includes payment for removal and off-site disposal of existing materials, new concrete and bricks as required, accessing manholes as specified, traffic control, and for all else incidental thereto for which separate payment is not provided under other bid items.

Bid Items are included for plugging various size sewers. Payment will be made on the basis of the unit price bid.

**Item 13A(1) - Asphalt Pavement and Concrete Removal:** These Bid Items include all materials, equipment, and work required to remove existing pavement and concrete including sawcutting, jackhammering, and all other required methods for asphalt and concrete removal and disposal of all materials offsite. These Bid Items include asphalt roads/drives/paths, concrete drives/paths, and asphalt roads underlain with concrete. The Contractor is advised that many of the asphalt roads in the project area may be underlain with concrete.

The first 6 inches of depth will be considered incidental to the work and all costs shall be included in the unit prices bid for the new sewers and manholes. Bid Item 13A-1(a) shall be paid when the asphalt and/or concrete thickness is from 6” to 12” thick. Bid Item 13A-1(b) shall be paid when the thickness of the asphalt and/or concrete exceeds 12 inches (any depth greater than 12 inches) and shall be paid as an add-on cost to Bid Item 13A-1(a).

These bid items will be paid per linear foot of trench along the centerline of the trench from one end of the trench to the other (the length of the trench – not the perimeter of the trench).

**Item 13A(2) through Item 13A(6) - Asphalt Pavement Restoration:** These Bid Items include furnishing all new materials, equipment and labor for saw-cutting, removing and disposing of materials offsite, and replacing all pavement (bituminous concrete, penetration and other surface treatments) including roadways and driveways as specified and as directed by the Engineer and in accordance with the standard specifications and details. Refer to Detail SS-36, SS-36A, SS-36B, and SS-37 included on the contract drawings. Pavement shall be replaced to match existing pavement. These pay item include the asphalt, stone base and concrete base when specified.

Bid Item 13A(6) includes all materials, equipment, and work required to mill asphalt pavement prior to installing the asphalt overlay. The milling may not be required on all roads. The Engineer will direct where milling is to occur. Bid Item 13A(6) shall be paid for removing/milling 1.5 inches (depth) of asphalt. This bid item will paid per square yard of asphalt milled/removed at the corresponding depth.

For sewers and service laterals, payment shall be limited to a width equal to the pipe diameter plus 5 feet and to a length equal to the length of the required work plus 6 feet. For manholes, payment shall be limited to a width equal to the manhole diameter plus 4 feet all around (square...
configuration). The Contractor shall not be paid for any restoration outside of these limits unless agreed by the Engineer prior to the work. Damage to existing asphalt outside the specified area shall be repaired as directed by the SCDOT or as directed by the Engineer, but shall not be considered for payment. Payment will be on a square yard basis as measured on a horizontal plane in accordance with the unit price bid.

**Item 13B – Restoration of Concrete Driveways and Walkways:** This item includes furnishing all new materials, equipment and labor for saw-cutting, removing and disposing of materials offsite, and replacing concrete driveways and walkways as specified and as directed by the Engineer. Concrete shall be replaced to match existing thickness and configuration. Bid Items are provided for 4-inch-thick and 5-inch-thick concrete with welded wire reinforcing. Fiber-reinforced concrete may be considered as an alternate. This pay item includes the concrete and stone base as required. Also included in this item is all excavating, forming, stone base material, vibrating, curing, expansion joint material, and all else required to construct the necessary concrete drives and walks.

The Engineer shall define the limits for concrete restoration prior to starting the required work. Damage to existing concrete outside the area specified by the Engineer shall be repaired as directed by the controlling agency or as directed by the Engineer, but shall not be considered for payment.

Payment will be on a square yard basis as measured on a horizontal plane in accordance with the unit price bid.

**Item 13C – Restoration of Concrete Curb and Gutter:** This item includes furnishing all new materials, equipment and labor for sawcutting, removing and replacing concrete curb and gutters to match existing configuration and shape and thickness, as specified and as directed by the Engineer, complete in place. Also included in this item is all excavating, forming, stone base material, vibrating, curing, expansion joint material, and all else required to construct the necessary curb and gutters.

The Engineer shall define the limits for curb and gutter restoration prior to starting the required work. Damage to parallel curb and gutter outside the area specified by the Engineer shall be repaired as specified, or directed by the controlling agency, but will not be considered for payment.

Payment will be made for each linear foot of new curb and gutter installed at the unit price bid.

**Item 13D – ABC Stone Backfill:** This item includes furnishing all equipment, materials and labor required to provide ABC stone to backfill trenches under roads and/or as directed by the Engineer when the existing soil is not suitable for backfill or when stone backfill is required by the controlling agency. Use of ABC stone backfill must be approved by the Engineer and Owner prior to performing the work. The unit price bid for this item shall include removing the existing soil and disposing of it offsite and importing ABC stone material.

Measurement shall be based on volume of material compacted in place. The Engineer shall define the limits prior to starting the required work.

Payment will be on a cubic yard basis as measured on a horizontal plane in accordance with the unit price bid.
**Item 13E – Flowable Fill Backfill:** This item includes furnishing all equipment, materials and labor required to provide flowable fill to backfill trenches under roads and/or as directed by the Engineer when required by the controlling agency. Use of flowable fill must be approved by the Engineer and Owner prior to performing the work. The unit price bid for this item shall include removing the existing soil and disposing of it offsite and importing flowable fill material.

Measurement shall be based on volume of flowable fill material compacted in place. The Engineer shall define the limits prior to starting the required work.

Payment will be on a cubic yard basis as measured on a horizontal plane in accordance with the unit price bid.

**Item 14 - Mobilization:** This item is for the costs incurred prior to beginning work on this contract, including permits, licenses, fees, insurance, bonds, equipment mobilization, signage, etc.

Payment will be limited to 2% of the subtotal bid prior to contingency. One half of the amount bid will be paid with the first pay application and the remainder paid with the second pay application. If an amount greater than 2% of the subtotal is entered for mobilization, the difference in the percentage entered and 2% will be paid on the final payment.

Payment will be made according to the lump sum bid.

**END OF SECTION**
SECTION 02200
EXCAVATION, BACKFILL AND COMPACTION

1. SCOPE OF WORK:

The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, fill, grading and excavation stabilization required to install the piping and structure work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to manholes and chambers; duct, conduit, and pipe; roadways and paving; backfill, fill, and borrow; grading; disposal of surplus and unsuitable materials; and all related work such as sheeting, bracing and water handling.

The Contractor shall examine the site and review available subsurface borings and undertake his own subsurface investigations prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner and Engineer make no representation as to subsurface characteristics at locations other than at available boring locations shown and at the time the subsurface investigation was made.

Excavation and backfill for pipe trenches and structures shall be to the elevations shown on the Drawings.

Prior to construction, the Contractor shall be responsible for taking sufficient measurements, horizontal and vertical, to ensure that all completed work, which includes but is not limited to pavement, curbs, gutters and drainage facilities, are restored to their original lines and grades.

Prior to the start of work and at each change of construction circumstances, the Contractor shall submit his proposed method of dewatering, excavation, backfilling, and compaction to the Engineer to facilitate inspection and testing.

2. CLASSIFICATION OF EXCAVATED MATERIALS:

No classification of excavated materials will be made except for Rock Excavation as stipulated herein. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the Contract Work, regardless of the type, character, composition, or condition thereof.

3. CLEARING:

All clearing on the permanent sewer rights-of-way and temporary construction easements shall be performed as necessary for access, stringing of sewer materials, and construction of the sewers and structures.

The Permanent Sewer Right-of-Way (R/W) or other limits as shown on the Drawings shall be cleared of all logs, trees, roots, brush, tree trimmings, rock and other
objectionable materials and debris. All stumps shall be removed or ground in place to a minimum of 12 inches below the surface. The Owner must approve each stump to be ground in place. All stumps that are ground in place shall be treated to prevent re-growth of the tree from the stump. Subgrades for fills and embankments shall be cleaned and stripped of all surface vegetation, sod, and organic topsoil. All waste materials shall be removed from the site and disposed of by and at the expense of the Contractor.

Trees 6 inches in diameter and larger shall only be removed from the Temporary Construction Easement when it is necessary for the trenching operation and only then with permission of the Owner.

4. EXCAVATION STABILIZATION:

All excavations shall be stabilized to protect the safety of workers in the excavations from earth slides and cave-ins and to protect the structural integrity of the pipe or structure being constructed.

With reference to the terms and conditions of the construction standards for excavations set forth in the OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, the Contractor shall employ a competent person and, when necessary, a registered Professional Engineer in the State of South Carolina, to act upon all pertinent matters of the Work of this section. All OSHA requirements shall be continually adhered to.

Excavations shall provide adequate working space and clearances for the Work to be performed therein and for installation and removal of concrete forms when required. In no case shall excavation faces be undercut for extended footings.

Groundwater control is necessary for creating stable foundations for pipes and structures and for stabilizing excavation slopes.

The type of excavation stabilization systems to be used for different sections of sewers and structures shall be selected by the Contractor based upon geotechnical characteristics, excavation depth, groundwater probability, proximity of existing structures, area available for excavation storage, use of excavation area, etc. The Contractor shall employ the services of a South Carolina Registered Professional Engineer as necessary to evaluate these conditions and to design the necessary excavation stabilization system and groundwater control system for each such section.

The Owner will not permit excavated material to be stored outside of the designated Permanent Sewer R/W and Temporary Construction Easement shown on the Drawings unless approved by the property owner.

The Contractor shall be solely responsible for stabilizing excavations and selecting the appropriate stabilization methods. Options include using movable earth retaining devices (trench boxes) and installing sheeting and shoring systems. The Contractor will not be allowed to slope trench walls instead of providing stabilization systems such as those mentioned herein unless otherwise approved by the Engineer and/or
specified as acceptable elsewhere.

Where trench boxes are used to stabilize excavations for pipes, the trench boxes shall be designed and certified trench boxes purchased from a manufacturer in the business to sell trench box equipment with supporting literature. If the Contractor chooses to build the trench box, it must be designed and certified by a Professional Engineer Registered in South Carolina. Design drawings and computations shall be submitted to the Engineer for information prior to construction. The trench box interior widths shall accommodate the trench widths specified in the details and shall provide adequate space for exterior jointing and compaction of pipe bedding. The lower edges of trench boxes shall not be deeper than the mid-diameter of the pipe.

Sheeting and shoring systems shall also be designed by a Professional Engineer Registered in South Carolina. Sheeting shall be plumb and securely braced in position. Sheeting and shoring systems shall be adequate to withstand all pressures to which they will be subjected. For trench sheeting for pipes, no sheeting closer than one pipe diameter or two feet (whichever is greater) from the outside edge of the pipe shall be withdrawn if driven below mid-diameter of any pipe, and no sheeting shall be cut off at a level lower than the top of any pipe unless otherwise approved by the Engineer. Any sheeting beyond these limits which is withdrawn shall be done in a manner in which the sheeting slides smoothly out of position without any disturbance of adjacent bedding. The remaining hole shall be filled by hand with sand.

All sheeting and shoring shall be carefully removed in such a manner as not to endanger workers, the construction, other structures, utilities, piping, or property. For structures, all sheeting and shoring shall be removed after completion of the substructure or base slab. All voids left or caused by withdrawal of sheeting shall be immediately backfilled and compacted to project specifications.

5. **EXCAVATION DEWATERING:**

The Contractor shall construct and place all pipes, concrete structures, structural fill, and crushed stone bedding in-the-dry and all such work shall stop at any time that water appears in the excavation until the water is completely removed. The Contractor shall maintain the water level a minimum of one foot below proposed bottom of the excavation. For purposes of these Specifications, "in-the-dry" is defined as no free water inside the excavation. Dewatering shall be continuous until all work in the area is complete and backfilled.

Structures, casings, and pipes installed adjacent to streams and at or below the stream water level will be below the natural groundwater table, and thus, extensive groundwater handling will be required and should be expected.

The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to lower the groundwater table below the excavation, to remove promptly and dispose of properly all ground and surface water entering excavations, and to keep such excavations dry so as to obtain a satisfactory undisturbed sub-grade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise
damaged by allowing water levels to return to natural elevations.

Pipes, casings, and structures shall not be installed in water or submerged within 24 hours after being placed. Water shall not flow over new concrete within four days after placement unless otherwise approved by the Engineer. Pipes not meeting this requirement shall be removed as directed by the Engineer.

In no event shall water rise to cause unbalanced pressure on structures until the concrete or mortar has set at least 24 hours. The Contractor shall prevent flotation of pipes by promptly placing and compacting backfill to these Specifications.

Surface drainage shall be controlled so that no surface drainage shall enter the excavation at any time. At no time shall installed sewer pipe be used for dewatering, drainage, or dewatering any surface water conveyance.

Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the sub-grade soils at the proposed bottom of the excavation. The Contractor shall be responsible for correcting any disturbance to natural bearing soils or damage to structures caused by inadequate dewatering systems or by interruption of the continuous operation of the system as specified. If the trench bottom at final excavation is loosened or unstable to the extent that proper support of the bedding or pipe has been compromised in the opinion of the Engineer, the loosened/unstable material shall be removed and replaced with structural fill as directed by the Engineer at no additional cost to the Owner.

The Contractor shall be solely responsible for designing and implementing dewatering systems to meet the requirements specified herein. The Contractor shall retain a Professional Engineer Registered in South Carolina to design the dewatering systems as necessary and/or required by the Engineer. The Contractor shall submit to the Engineer for information a conceptual plan for dewatering systems prior to commencing work. The installed dewatering system shall conform to the conceptual plan. The Contractor and/or his Engineer where required shall monitor the performance of the dewatering systems during the progress of the Work and make modifications as necessary to remain in compliance with the requirements specified herein. Modifications and alternate dewatering methods shall be submitted to the Engineer for review.

The Contractor’s dewatering system may include pumping from well points, deep wells or sumps. The method(s) selected must maintain the ground water levels at least 12 inches below the bottom of the excavation as specified herein. Whenever the selected method(s) do not meet this requirement, the Contractor shall immediately employ additional dewatering measures. The Contractor is advised that pre-drainage of the soil may be required to achieve acceptable soil moisture contents so that the soil can be promptly used for backfilling as specified further herein. Pumping equipment shall be quiet or silent pumps or electric motor-driven pumps. All pumping system must be approved by the Engineer.

The Contractor shall provide for the disposal of the water removed from the excavation in such manner as shall not cause erosion, siltation, or turbidity increases in any water course; injury to public health; degradation or damage to private or
public property or to any portion of the work completed or in progress, or to roads or streets; or cause any impediment to the reasonable use of the site by others. Dewatering and drainage water shall not be discharged into other sewers or storm drains. Discharges to water courses or storm drains shall comply with all applicable requirements of all governmental agencies having jurisdiction. All water shall be filtered or desilted in temporary sedimentation basins before discharge to water courses or storm drains.

Where specified or required by the Engineer on the Drawings or in the Supplemental Conditions, the Contractor shall install groundwater observation wells (piezometer wells) along the sewer route to be used to determine the ground water level prior to and during construction. Locations of the observation wells at structures and along pipes shall be approved by the Engineer prior to their installation. The observation wells shall be extended to 6 inches above finished grade, capped with screw-on caps protected against damage. Where designated by the Engineer, the wells shall be left in place at the completion of this Project. Otherwise the wells shall be filled with concrete and cut off 2 feet below finish grade. The Contractor shall obtain all applicable permits to construct and abandon piezometer wells for the Project from the South Carolina Department of Health and Environmental Control (SCDHEC) and any other governmental agencies having jurisdiction. The Contractor shall comply with the terms and conditions of the permits whether by himself or others. The Contractor shall provide a suitable electronic probe for use by himself and the Engineer for monitoring the water depth in the observation wells.

6. MATERIALS:

Materials for use as fill and backfill shall be as described below. For each material, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample weighing approximately 50 pounds at least ten calendar days prior to the date of anticipated use of such material. Disposal of unsuitable material is specified further herein.

**Structural Fill:** Structural fill shall be used below spread footing foundations, slab-on-grade floors, and other structures not founded on undisturbed earth. Structural fill material shall be well graded stone or clean sand, free of organic, deleterious and/or compressible material. Minimum acceptable density shall be 95 percent of the maximum density as determined by AASHTO T-180. If the moisture content is not within plus or minus 3 percent of optimum moisture content or improper for attaining the specified density, either water shall be added or material shall be dried until the proper moisture content for compaction is reached.


**Common Fill:** Common fill material shall be free from organic matter, muck or marl, and rock exceeding 6 inches in diameter. Rock of 3-1/2 to 6 inches in
diameter can be used in the fill material except that a maximum of 1-1/2 inches shall be within 12 inches of a pipeline and a maximum of 3-1/2 inches within 12 inches of a road sub-grade or a structure. Common fill shall not contain broken concrete, masonry, rubble, wood, roots, plants, or other similar materials. Common fill shall have a moisture content of plus or minus 3 percent of the optimum moisture for maximum compaction density and shall not be frozen or lumpy.

Material falling within the above specification encountered during the excavation may be stored for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be removed for disposal as unsuitable materials.

**Crushed Stone Bedding:** Crushed stone for pipe bedding, structure bases and at other locations indicated on the Drawings shall consist of clean well graded crushed stone. Crushed stone shall comply with all requirements for Gradation 57 as specified in the SCDOT Standards for Highway Construction, 1986 Edition, or latest edition.

**Geofabric:** At locations directed by the Engineer, geofabric shall be placed over the bottom of the excavation prior to placing structural fill or crushed stone bedding. The geofabric shall be Mirafi 140N or equal and shall meet the following properties:

- Weight – 4.5 oz/square yard per ASTM D3376
- Grab Tensile Strength – Average 120 lbs per ASTM D1682
- Grab Tensile Elongation to Break – Average 55% per ASTM D1682
- Mullen Burst Strength – 210 psi per ASTM D-3786-80
- Puncture Strength – Average 70 lbf per ASTM D3787-80
- Water Permeability, $K_v$ – 0.2 cm/sec per Constant head permeability testing
- Equivalent Opening Size (EOS) – 100 Sieve per U.S. Standard COE CW 2215

7. **TEST PITS:**

The Contractor shall excavate test pits at structure locations and on sewer routes sufficiently in advance for the purpose of locating all known and unknown underground utilities or structures and as an aid in establishing the nature of the soils to be excavated including locations of rock. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for the original use until construction starts at the pit locations. If in a paved area, test pit backfill shall be cold patched with bituminous pavement.

Excavation of test pits shall be considered work incidental to the project and the cost shall be included in the various unit prices for the Work.
8. **EXCAVATION:**

Excavation may be done with equipment of the Contractor’s choosing. All excavation shall be stabilized by methods specified herein of the Contractor’s choosing.

No more trench shall be opened in advance of pipe laying than is necessary to expedite the Work. No more than 200 feet of trench shall be open on any sewer under construction. Failure to comply with this requirement shall be cause for the shutdown of that portion of the project until such backfilling is accomplished.

Excavated material which has suitable characteristics for common fill backfill shall be covered and/or stockpiled in such a manner that it will not collect either surface water or rainwater. The stockpile top surface shall be sloped to drain away from the excavation site and graded smooth and compacted to drain rainwater rapidly. Backfill containing excessive moisture shall not be used. It shall be the Contractor’s responsibility to control or adjust the moisture content of excavated materials to the requirements for common fill before such materials may be used for backfill at no cost to the Owner.

Excavation shall be stockpiled within the permanent and temporary rights-of-way of sewers. Trees to remain on temporary rights-of-way shall not be damaged by excavation, stockpiling, and backfilling operations. Any inadvertent damage shall be immediately repaired as specified elsewhere.

All excavation left unattended for more than one hour shall be completely barricaded and provided with warning signs and lights.

All OSHA and other applicable safety regulations shall be observed on all excavation work.

The depth of excavation shall be to the bottom elevation of the bedding for structures and pipes. The width shall be to at least two feet beyond the neat lines of structure footings and as shown on the Drawings or in the Details for sewer pipes.

The Contractor shall over-excavate pipe and structure trenches and backfill with structural fill where approved by the Engineer. Over-excavation will be required when the bottom of the trench is not stable for support of the pipe or structure as determined by the Contractor. The Contractor shall be paid for such over-excavation at the unit prices bid when so provided in the Bid Schedule and when so agreed by the Engineer. The Engineer must approve over-excavation before it is performed, or it will not be paid for. However, if the bottom is not stable due to improper dewatering or other preparatory work by the Contractor then no additional payment shall be made to the Contractor as specified elsewhere herein. It shall be the Contractor’s sole responsibility to provide a stable and solid trench bottom for installation of the sewer facilities.

Where rock is excavated with earth material, care shall be taken not to contaminate the excavation stored for use as common fill with excavated rock larger than the maximum size allowed.
9. **ROCK EXCAVATION:**

Rock excavation shall mean the removal of rock which, in the opinion of the Engineer, requires for its removal drilling and blasting, wedging, sledgering, cutting or barring and which cannot be removed by excavation equipment with a bucket curling force of at least 18,300 pounds. Rock excavation includes boulders which, in the sole opinion of the Engineer, require blasting for removal. Rock excavation will be paid at the unit price bid. The Bid Schedule includes an estimated quantity for rock excavation. The Contractor shall not be due any adjustment to the unit price bid if the estimated quantity is exceeded or not used.

Rock which can be excavated at a reasonable rate with trench excavation equipment shall be considered earth. Boulders up to 1 cubic yard in volume which can be removed without resorting to blasting shall be considered earth.

If blasting is required, the Contractor shall state so in writing with a request to blast. If blasting is approved by Engineer, pre-blasting and post-blasting surveys shall be conducted on and reported for all major structures within the influence range of any blasting operations or within a minimum of 200 feet whichever is greater from any blast site. The surveys shall consist of a visual inspection and recording by notes and photographs of structures, to include specifically cracks or other structural damage previously sustained, and shall be conducted by a qualified technician furnished by the Contractor's Insurance Underwriter. A copy of all notes and photographs shall be submitted to the Owner prior to the beginning of blasting operations and prior to final payment. The records so obtained shall be retained in the Contractor’s file for at least three years after completion of the Contract. In the event of any damage claim, a report shall be prepared by the Contractor on the particular structure involved to include those notes and photographs and submitted to the Engineer. Costs for blasting survey shall be a subsidiary obligation of the Contract and included in the unit price bid for rock excavation. Seismographs shall be used where deemed necessary by the Contractor and/or Engineer.

At least 24 hours advance notice shall be given in writing to the Police and Fire Departments, other City and County officials, all tenants and residents within 1,000 feet of the work, and authorized representatives of all utilities which might be affected by blasting operations before blasting. Care shall be taken to avoid damage to utilities or other structures above and below ground. Unless otherwise permitted, no blasting will be allowed prior to 8:00 A.M. or after 4:00 P.M. local time.

Prior to commencing any blasting operations, the Contractor shall furnish to the Engineer a Certificate of Insurance specifically covering any and all obligations assumed pursuant to the use of explosives.

All blasting operations shall be conducted in strict accordance with any and all decrees, rules, regulations, ordinances, and laws as may be imposed by any regulatory body and/or agency having jurisdiction over the work relative to handling, transporting, use and storage of explosives. All blasting operations shall be conducted by qualified persons licensed in South Carolina and meeting the requirements enumerated in OSHA Regulations Part 1926, Subpart U, Section 02200-8.
1926.901 – Blaster Qualifications. Satisfactory information must be submitted to the Engineer prior to any blasting to document the qualifications of the blasters. All blasting shall be performed with all possible care to avoid injury to persons and property.

In addition to observing all laws, regulations, and ordinances relating to transporting, storage and handling of explosives, conform to any further requirement which the Engineer may deem appropriate.

All rock, dirt and debris from blasting shall be contained within the excavation by use of weighted mats or undisturbed overburden. The Contractor’s blaster shall be fully responsible for determining the method of containment and the weight, size and placement of material required to contain the charge being used.

Charges shall be sized such that no damage to houses, structures, roadways, etc. outside the limits of the excavation will occur. Where there is a possibility of such damage, the charge should be initially set at a very low level and increased in small increments until the proper charge is determined. The Contractor shall be held responsible for any and all injury to persons and damage to public or private property.

If rock below the intended blasting grade is shattered by blasting, caused by holes drilled too deep, or too heavy charges of explosives or any other circumstance due to blasting and if, in the opinion of the Engineer, the shattered rock is unfit for sub-grade, the rock shall be removed and the excavation refilled with structural fill at no additional cost to the Owner.

Excavated rock and boulder material exceeding 6 inches in the largest cross-sectional dimensions shall not be used for backfilling unless otherwise approved. Rock of 3-1/2 to 6 inches in diameter can be used in the fill material except that a maximum of 1-1/2 inches shall be used within 12 inches of a pipeline and a maximum of 3-1/2 inches within 12 inches of a road sub-grade or a structure. All rock used in backfill shall be mixed with granular backfill materials to achieve the required density. Rock used in backfill shall be free from organic matter, muck, or marl.

All rock not used for backfilling shall be removed from the site and disposed of by the Contractor at no additional cost to the Owner. No disposal on Owner property or rights-of-way shall be permitted unless authorized by the Owner. The Contractor shall advise the Engineer in writing of the disposal location and submit a copy of the agreement with the disposal site property owner. The Contractor shall import soil as necessary to fill the volume displaced by the removed rock. The cost for the imported soil shall be included in the unit price for rock excavation.

10. BEDDING:

Bedding stone for structures and pipe shall be placed for the entire depth and width of excavation except when rock is encountered in which case the rock shall be removed to 6 inches below the final elevation. Bedding shall be placed only on dry, compacted sub-grade or on rock.
Pipe bedding shall be placed in the trench to the elevation of the pipe base and thoroughly compacted prior to pipe installation. This bedding shall not be used under any circumstances as a drain for groundwater. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.

Final pipe elevation in the compacted bedding shall be obtained by manual excavations, including additional excavation under the pipe bells. Following jointing, crushed stone bedding shall be brought up to the mid-diameter of or above the pipe level across the full width of the excavation and thoroughly compacted.

Pipes shall be laid to the true lines and grades shown on the Drawings with bedding and backfill as specified in these Specifications. Each section of pipe shall be laid to true alignment and grade as shown and specified on the Drawings. Pipe elevations and locations shall be checked immediately upon setting the pipe in the trench, and the location and elevation of each pipe shall be adjusted to meet the true alignment and grade specified. If the pipe is not installed to the true lines and elevations, the Engineer shall decide on appropriate corrective measures. Such corrective measures may require that the installed sewer be removed and re-installed correctly. The Engineer's decision shall be final and no additional payment or time shall be due the Contractor to comply with the Engineer’s decision.

When pipes are to be encased in concrete, the top and bottom of the bedding shall be lowered by the specified thickness of the concrete encasement.

11. PIPE INSTALLATION:

The trench and bedding shall be prepared in such a manner to prevent contamination of pipe joints with soil or bedding and to provide complete support of each section of pipe except at the bells and spigots.

After the pipe joint is finished, place and compact bedding under and around the pipe bell before continuing the bedding to mid-diameter of or above the sewer pipe.

12. BACKFILLING:

Backfilling of pipes and structures may utilize the excavated material so long as it meets the requirements for common fill and the moisture content is within 3 percent of optimum moisture for compaction to specified density. Otherwise imported common fill meeting these requirements shall be used for backfill. Imported common fill shall be paid at the unit prices bid. Payment for imported soil shall only be made when approved by the Engineer prior to removing and importing soil.

Where excavated material meets the requirements for common fill except for moisture content, the moisture content shall be adjusted upward by sprinkling or downward by spreading and turning and drying. It shall be the Contractor's responsibility to store and prepare such excavated materials to meet the moisture requirement. No additional payment for backfill materials including imported fill shall be paid by the Owner where excavated materials meet the requirements for common fill except for moisture content. All costs associated with adjustment (up or down) of
moisture content of excavated materials to be used for backfill shall be borne by the Contractor.

Backfill shall be placed only on dry compacted surfaces. Any water or soil above its liquid limit shall be removed before placing any backfill. The subgrade shall be compacted before any backfill placement.

Backfill shall be placed in maximum 6-inch layers to 12 inches above the top of the pipe and 8-inch level layers compacted thereafter to at least 95 percent of maximum dry density at optimum moisture content as determined by AASHTO T-180 or ASTM D698. For pipe backfill above the top of the pipe in open areas, where specifically approved in writing by the Engineer, layer thickness may be increased to 12 inches with 85 percent compaction.

In paved areas (roads and driveways), the Engineer may specify that the Contractor remove all excavated soil from the site and import ABC stone to completely backfill the trench to the pavement subgrade. The stone shall be installed and compacted via mechanical means in maximum 12-inch layers. Costs associated with removing and disposing of the excavated soil and supplying and importing the stone shall be included in the unit price bid. SCDOT flowable fill may also be specified at times for backfilling - flowable fill must not come in contact with ductile iron pipe – begin flowable fill at least 12 inches above the top of ductile iron pipe (first 12 inches to be #57 stone).

Compaction shall be by mechanical compactor. For pipe, the size of the compactor shall fit between the pipe and the trench sides below the pipe mid-diameter and between the pipe and the sheeting or trench box above mid-diameter. Larger compaction equipment may be used as desired after backfill has reached at least two feet above the top of the pipe. For structures, the size of the compactor shall fit between the structure and the sheeting until the elevation at which sheeting is withdrawn, at which elevation the entire excavated area shall be compacted.

Particular attention shall be given to compaction where sheeting is withdrawn. Sheet ing holes shall be filled with structural fill or bedding material and manually compacted by ramming after the sheeting is withdrawn.

The Owner may have compaction tests performed on the compacted backfill to verify compliance with these requirements. The Owner will pay for the initial compaction tests. The Contractor shall pay for any re-tests required because the backfill did not meet the specified compaction requirements.

Backfilling of structures shall be deferred until any placed concrete has cured at least seven days unless otherwise approved by the Engineer.

Backfill of sewers in open areas shall be mounded approximately three-inches above finish grade to allow for settlement where approved by the Engineer in writing and/or where specified by the Engineer.

The top 4 inches of backfill shall be of stockpiled or imported topsoil. After final grading, the topsoil shall be prepared and seeded or sodded as specified.
13. DISPOSAL OF EXCESS EXCAVATION:

Excess excavation, excavation which is unsuitable for backfill, and excavated rocks larger than 6 inches shall be disposed of off-site by the Contractor at no additional cost to the Owner except where unanticipated unsuitable excavated material is directed by the Engineer to be disposed of and replaced by imported backfill.

Excess excavation which meets the requirements of common fill shall be stockpiled in a common readily accessible area, graded and/or covered for rain runoff, and used as a source of imported material until all the needs for imported material are identified, at which time the balance of the stockpiled excess material shall be disposed.

In certain areas the nature of the terrain in the right-of-way may be suitable for spreading excess and/or unsuitable excavation on the ground surface prior to preparation and seeding which would eliminate the need for offsite disposal. The Engineer shall solely make this judgment and will so direct the Contractor. The Contractor shall not presume in his bid price that any such areas exist.

The Contractor shall locate and make all arrangements for disposal of excess and unsuitable materials. All handling, hauling, and disposal costs shall be included in the various bid prices. Stockpile areas shall be prepared and seeded or sodded as specified. Disposal shall be in compliance with all applicable regulations.

14. PROTECTION OF UTILITIES:

The Contractor shall locate and protect all utilities which could be affected by the work, including railroads, overhead cables, poles, buried cables, wastewater pipes, water pipes, gas lines, and drainage pipes and appurtenances. Before working in any area, the Contractor shall contact the local utilities locating company to mark the locations of underground utilities. Any underground utilities which could interfere with the work shall be staked and flagged.

Underground pipes and cables which cross the excavations shall be carefully exposed and temporarily supported from overhead beams furnished by the Contractor to the satisfaction of the utility owner. The utility shall be carefully incorporated in the backfill with full support and protection. Should any utilities need to be relocated, the Contractor shall discuss the situation in a meeting with the Engineer and utility owner.

Before operating any equipment near a buried or overhead electric cable, the Contractor shall contact the power company to arrange for protection of the cable and the Contractor’s personnel and equipment. Compliance with the power company’s conditions shall be considered a subsidiary obligation under the contract. The Engineer shall be invited to attend all meetings with the power company for information only.
15. **MAINTENANCE:**

Contractor shall maintain all project areas during the specified warranty period. Maintenance shall include the following:

1. Immediately filling and reseeding any eroded areas.
2. Reseeding any areas where a full stand of grass does not develop.
3. Removal and replacement of any trees which die or show distress.
4. Refilling and reseeding any backfilled areas which settle and develop depressions.
5. Watering newly seeded areas until an adequate stand of grass exists.

END OF SECTION 02200
SECTION 02600

DUCTILE IRON GRAVITY SEWER PIPE AND FITTINGS

1. SCOPE:

This section covers ductile iron gravity sewer pipe for main sewers and service laterals. Ductile iron pipe shall be furnished complete with all fittings, jointing materials, blocking, encasement, and other necessary appurtenances. Ductile iron pipe is approved for all sewer diameters and shall be provided for all sewers through casings and tunnels.

Excavation and backfill are covered in Section 02200.

2. PRODUCT REQUIREMENTS:

Ductile iron pipe shall conform to the requirements of AWWA Standard C-151. Fittings shall be in accordance with AWWA C-110 or AWWA C-153.

Ductile iron pipe shall be furnished with push-on joints in accordance with AWWA C-111 or mechanical joints where necessary to join fittings and connect service laterals.

Restrained joints shall be required for all ductile iron pipe through casings and tunnels. Restrained joints shall be as manufactured by American (Flex-Ring, Lok-Fast or Lok-Ring); US Pipe (TR Flex); Griffin (Snap-Lok); or approved equal.

Ductile iron pipe shall be minimum Pressure Class 350 pipe for 12” diameter and smaller pipe and minimum Pressure Class 250 for 16” diameter and larger pipe. Pipes larger than 16” in diameter shall be specifically designed for the installation conditions and the thickness of the pipe shall be increased as necessary. The pipe class and related wall thickness shall be selected based on the installation conditions and depths per ANSI/AWWA C151/A21.51. The pipe thickness shall be increased as necessary to accommodate the installation conditions. Pipe shall be supplied in lengths not in excess of 21 feet.

Interior Pipe Lining: The interior of all ductile iron pipe and fittings shall be lined as follows:

- **12-inch-diameter and smaller:** Pipe to be lined with cement mortar lining unless ceramic epoxy lining is specified and/or required by the Engineer/Owner for corrosion protection.

- **16-inch-diameter and larger:** All pipe to be lined with either ceramic epoxy lining or bonded polyethylene as specified by the Engineer.

The interior linings/coatings shall meet the following requirements:

**Cement Mortar Lining**
Cement mortar lining shall be installed in accordance with AWWA C-104.

**Epoxy Lining**
The internal ceramic epoxy lining shall be PROTECTO 401 Ceramic Epoxy or approved equal. The epoxy lining shall be applied to a minimum 40 mils dry film thickness and shall cover the entire inside of the pipe from the inside shoulder of the gasket groove to the end of the spigot. The gasket groove and spigot end up to 6 inches back from the end of the spigot end shall be coated with PROTECTO Joint Compound or approved equal. The Joint Compound shall be applied with a brush to ensure coverage and shall be smooth. Fittings shall be coated from gasket groove to gasket groove.

The epoxy lining shall be applied only by a firm certified as an applicator by the epoxy manufacturer. Application of the epoxy lining to the ductile iron pipe shall be in strict accordance with the epoxy manufacturer's specifications and installation procedures. All pipe linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PA-2 film thickness testing. The barrel of all pipe and fittings shall be pinhole detected with a nondestructive 2,500-volt pinhole test. 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. The pipe or fitting manufacturer must supply a certificate attesting to the fact that the Applicator met the requirements of this specification, that the material used was as specified, and that the material was applied as required by the specification.

All pinholes and damaged lined areas shall be repaired in accordance with written repair procedure furnished by the manufacturer of the lining material so that the repaired area is equal in performance to the undamaged lined areas.

The Owner reserves the right to reject any defective pipe delivered to the job site.

**Polyethylene Lining**
Pipe and fittings lined with polyethylene shall be PolybondPlus as manufactured by American Cast Iron Pipe Company.

The lining material for the pipe and fittings shall be virgin polyethylene complying with ASTM 1248 compounded with an inert filler and sufficient carbon black to resist ultraviolet rays. The polyethylene shall be bonded to the interior of the pipe and fittings by heat at the pipe manufacturer's plant. All surface areas to be lined shall be sandblasted clean prior to applying the polyethylene. The pipe and fittings shall be uniformly preheated to a temperature adequate to provide uniform fusing of the polyethylene powders and proper bonding to the pipe and fittings. The lining at the ends shall be hermetically sealed and every pipe and fitting shall be subjected to and pass a 400 volt wet sponge or equivalent spark
test. A sample cut from a production pipe shall pass the 4-hour boil adhesion test as described in ASTM C541.

Polyethylene linings shall cover the inner surface of the pipe and fittings. In pipe utilizing push-on gaskets, the lining shall extend from the spigot end through the socket to the edge of the gasket sealing area. In mechanical joint pipe, the lining shall extend from the spigot end through the socket to the edge of the gauging ring. The lining in fittings shall cover the interior surfaces including the socket areas as defined above. All bell areas which have not been lined shall be given one coat of 5 mils minimum (dry) thickness of epoxy coating Tnemec Series 20 Pota-Pox (Polyamide) or equal or as recommended by the pipe manufacturer. Polyethylene lining thickness shall be 60 mils nominal, 50 mils minimum. The lining shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PA-2 film thickness testing.

All pinholes and damaged lined areas shall be repaired in accordance with written repair procedure furnished by the manufacturer of the lining material so that the repaired area is equal in performance to the undamaged lined areas.

Each section of pipe shall be marked with the date of application of the lining system. The pipe or fitting manufacturer must supply a certificate attesting to the fact that the Applicator met the requirements of this specification, that the material used was as specified, and that the material was applied as required by the specification.

The Owner reserves the right to reject any defective pipe delivered to the job site.

**Exterior Coating:** The exterior of buried pipe and fittings shall receive a bituminous coating as recommended by the pipe manufacturer and in accordance with ANSI A21.51 for pipe and ANSI A21.10 and A21.53 for fittings (minimum 1 mil thick).

**Pipe Couplings:** Pipe couplings will be required whenever the Contractor is repairing existing or new main sewers, when connecting new service laterals to existing sewers using a wye, and when connecting new services to existing services. Pipe couplings shall only be allowed in these specific circumstances. Couplings will not be allowed on new main sewers being installed from manhole to manhole or on new service laterals between the main sewer and cleanout. Pipe couplings shall be rubber sleeve couplings with stainless steel shear rings and compression bands and shall be Mission ARC Couplings or Fernco Strongback Couplings. Refer to the Standard Details for additional requirements. Mechanical joint fittings shall be used for repairing new pipe installations.

**Service Lateral Connections:** All service lateral connections being installed as part of the new main sewer construction shall be connected to the main sewer using a tee-wye or wye connection. Saddles shall not be allowed. The Engineer/Owner may require that new laterals connect to manholes.
Connection to Existing Mains: Strap-on saddles will be required to connect new laterals to existing main sewers. The strap-on saddles shall be ROMAC “CB” saddles as manufactured by Romac Industries, Inc., or approved equal. Saddles shall be provided for the specific type of lateral pipe being installed. Contractor shall provide a listing of all saddles being supplied (model numbers). Refer to the Standard Details for additional requirements.

3. QUALIFICATIONS AND QUALITY ASSURANCE:

All ductile iron pipe and fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the material to be furnished. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

The Contractor shall furnish in duplicate to the Engineer, prior to each shipment of pipe, unless otherwise approved by the Engineer, manufacturer’s certification and certified test reports that the pipe was manufactured and tested in accordance with the ASTM and ANSI/AWWA Standards specified herein.

The manufacturer is responsible for the performance of all inspection requirements as specified in ANSI/AWWA Standards. In addition, all pipe and fittings to be installed under this Contract may be inspected at the plant for compliance with these Specifications by an independent testing laboratory selected by and paid for by the Owner.

Inspection of the pipe and fittings will also be made by the Engineer or representative of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job.

All pipe and fittings shall be permanently marked with the following information:

1. Manufacturer, date.
2. Size, type, class, or wall thickness.
3. Standard produced to (ANSI/AWWA, ASTM, etc).

4. DELIVERY, STORAGE AND HANDLING:

All pipe, fittings, valves and accessories shall be unloaded, stored and handled in accordance with AWWA C-600. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe or coatings. Under no circumstances shall the pipe be dropped or skidded against each other. Slings, hooks, or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or internal lining of the pipe.

Materials, if stored, shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.
Pipe shall not be stacked higher than the limits recommended by its manufacturer. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Pipe in tiers shall be alternated. At least two rows of 4-in by 4-in timbers shall be placed between tiers and chocks affixed to each end in order to prevent movement.

5. **INSTALLING DUCTILE IRON PIPE AND FITTINGS:**

All pipe and fittings shall be examined before installing, and no pipe shall be installed which is found to be defective. All damage to the interior and exterior pipe coatings shall be repaired according to the manufacturer’s recommendations and in a manner acceptable to the Engineer.

All ductile iron pipe shall be installed in accordance with requirements of AWWA Standard Specification C-600 except as otherwise specified herein. As soon as the excavation is completed to grade, as indicated on the Drawings, the Contractor shall immediately place bedding material as specified in Section 02200 in the trench. The pipe shall be firmly bedded in SCDOT No. 57 stone to conform accurately to the line and grade indicated on the Drawings. Embedment of pipe shall conform to the Details. Bell holes shall be excavated so that after installation only the pipe barrel shall bear upon the trench bottom. Proper selection and placement of bedding and backfill materials are necessary to minimize deflection of the pipe diameter. No blocking under the pipe will be permitted.

All pipe and fittings shall be sound and shall be clean before installation.

Pipe shall be laid to the true lines and grades shown on the Drawings with bedding and backfill as shown in Standard Detail No. SS-1 and as specified in Section 02200. Each section of pipe shall be laid to true alignment and grade as shown and specified on the Drawings. Pipe elevations and locations shall be checked immediately upon setting the pipe in the trench, and the location and elevation of each pipe shall be adjusted to meet the true alignment and grade specified. If the pipe is not installed to the true lines and elevations, the Engineer shall decide on appropriate corrective measures. Such corrective measures may require that the installed sewer be removed and re-installed correctly. The Engineer’s decision shall be final and no additional payment or time shall be due the Contractor to comply with the Engineer’s decision.

Under no circumstances shall the pipe be dropped into the trench.

**Jointing Ductile-Iron Pipe:**

1. Push-on joints and restrained joints shall be made in strict accordance with the manufacturer’s instructions. Pipe shall be laid with bell ends looking upstream. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe is to be aligned with the bell of the pipe to which it is to be joined, and pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.
2. Mechanical joints shall be in accordance with the "Notes on Method of Installation" under ANSI Specification A21.11 and the instructions of the manufacturer. To assemble the joints in the field, thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening the bolts. Bolts shall be tightened to the specified torques. Under no condition shall extension wrenches or pipes over the handles of ordinary ratchet wrenches be used to obtain greater leverage.

Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.

When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a push-on bell shall be beveled to conform to the manufactured spigot end. Damaged interior and exterior coatings shall be fully repaired according to the manufacturer’s recommendations and in a manner acceptable to the Engineer. At a minimum, the disturbed areas shall be given one coat of 5 mils (dry) thickness of epoxy coating Tnemec Series 20 Pota-Pox (Polyamide) or equal.

When installation is not in progress, or the potential exists for dirt or debris to enter the pipe, the open ends of the pipe shall be closed with a plug or other approved means.

Refer to Section 02200 for additional requirements.

6. ACCEPTANCE TESTS:

The following acceptance tests shall be performed to verify proper installation of the new ductile iron pipes. The Engineer shall witness all tests.

I. All new main sewers installed from manhole to manhole shall be tested via low pressure air testing in accordance with ASTM CF1417-11a. The tests shall be performed from manhole to manhole and include any service laterals connecting to the main sewer. To perform the test, plugs shall be installed at each manhole and at cleanouts installed at the edge of the property line and road or sewer right-of-way, and the isolated sewers shall be tested as a system. The Contractor shall provide all necessary equipment and pressure gauges to use for the testing. The Owner/Engineer must witness all testing. If new service laterals are not installed from the main sewer to the edge of the sewer or road R/W and/or a new cleanout is not installed, then the air test will not be required.

The air test pressure specified in ASTM F1417-11a shall be increased by 0.5 psi for every foot of ground water above the crown of the sewer pipe. If ground water levels cannot be determined in the field, then the test pressures shall be increased by a minimum of 1 psi.

Refer to ASTM F1417-11a for additional requirements.
2. Service laterals connecting to manholes shall be tested via low pressure air testing in accordance with ASTM F1417-11a as specified above. The test shall be performed by installing a plug in the lateral at the manhole and at the cleanout installed at the edge of the property line and road or sewer right-of-way. The Contractor shall provide all necessary equipment and pressure gauges to use for the testing.

3. All new main sewers and service laterals shall be inspected via closed circuit television (CCTV) inspection after all work is completed. Refer to Section 02650 for requirements.

7. **REPAIRING NEW PIPE INSTALLATIONS:**

   Any defective pipe or unacceptable installations as determined from the acceptance testing and/or field inspections shall be repaired by the Contractor at no additional cost to the Owner. The repair method shall be acceptable to and approved by the Engineer/Owner. The Contractor shall submit all proposed repair procedures to the Engineer/Owner for review and approval prior to performing any repair work.

END OF SECTION 02600
SECTION 02610

POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE AND FITTINGS

1. SCOPE:

This section covers polyvinyl chloride (PVC) gravity sewer pipe for main sewers and service laterals. PVC pipe shall be furnished complete with all fittings, jointing materials, blocking, encasement, and other necessary appurtenances. PVC pipe shall be acceptable for sewers up to 12 inches in diameter with depths of cover not less than 4 feet or more than 20 feet. In some instances, the Engineer/Owner may approve the use of C-900 PVC (as specified herein) at depths of cover less than 4 feet and more than 20 feet.

Excavation and backfill are covered in Section 02200.

2. PRODUCT REQUIREMENTS:

PVC pipe shall be solid wall pipe. PVC pipe may be any of the pipe types listed below. The pipe type shall be as specified by the Engineer on the Drawings or shall be the Contractor’s option.

(a) PVC pipe with a Standard Dimension Ratio (SDR) of 26 meeting all requirements of ASTM D-3034, Cell Classification 12454-B. Fittings shall be in accordance with ASTM D-3034, F-679 and/or D-3212 as applicable with stiffness and wall thickness equal to or greater than the pipe.

(b) PVC pipe and fittings conforming to AWWA C-900, “Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch, for Water”. The pressure class shall meet the requirements of 150 psi and shall comply with a SDR of 18.

Pipe joining shall be push-on elastomeric joints only. Joints shall be manufactured in accordance with ASTM D-3212. The pipe shall be furnished with integral bells with gaskets that are permanently installed at the factory. The pipe shall be furnished in nominal lengths of 13 feet.

All fittings and accessories shall be furnished by one pipe supplier and shall have bell and/or spigot configurations compatible with the pipe. All fittings shall have the same or greater SDR and stiffness as the main pipe.

Pipe Couplings: Pipe couplings will be required whenever the Contractor is connecting new PVC service laterals to existing services. Pipe couplings shall only be allowed in these specific circumstances for PVC pipe. Couplings will not be allowed on new main sewers being installed from manhole to manhole or on new service laterals between the main sewer and cleanout. Pipe couplings shall be rubber sleeve couplings with stainless steel shear rings and compression bands and shall be Mission ARC Couplings or Fernco Strongback Couplings. Refer to the Standard Details for additional requirements.
Service Lateral Connections: All service lateral connections being installed as part of the new main sewer construction shall be connected to the main sewer using a true wye connection. Saddles shall not be allowed. The Owner may require that new laterals connect to manholes.

Connection to Existing PVC Mains: Strap-on saddles will be required to connect new laterals to existing main sewers. The strap on-saddles shall be ROMAC “CB” saddles as manufactured by Romac Industries, Inc., or approved equal. Saddles shall be provided for the specific type of lateral pipe being installed. Contractor shall provide a listing of all saddles being supplied (model numbers).

3. QUALIFICATIONS AND QUALITY ASSURANCE:

All PVC pipe and fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the material to be furnished. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

The Contractor shall furnish in duplicate to the Engineer, prior to each shipment of pipe, unless otherwise approved by the Engineer, manufacturer's certification and certified test reports that the pipe was manufactured and tested in accordance with the ASTM and ANSI/AWWA Standards specified herein.

The manufacturer is responsible for the performance of all inspection requirements as specified in the ASTM and ANSI/AWWA Standards. In addition, all pipe and fittings to be installed under this Contract may be inspected at the plant for compliance with these Specifications by an independent testing laboratory selected by and paid for by the Owner.

Inspection of the pipe and fittings will also be made by the Engineer or representative of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job.

All pipe and fittings shall be permanently marked with the following information:

1. Manufacturer, date.
2. Size, type, class, or wall thickness.
3. Standard produced to (ANSI/AWWA, ASTM, etc).

4. DELIVERY, STORAGE AND HANDLING:

Care shall be taken in loading, transporting and unloading to prevent injury to the pipe. Under no circumstances shall the pipe be dropped or skidded against each other. Slings, hooks, or pipe tongs shall be padded and used in such a manner as to prevent damage.
Materials, if stored, shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.

Pipe shall not be stacked higher than the limits recommended by its manufacturer. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Pipe in tiers shall be alternated. At least two rows of 4-in by 4-in timbers shall be placed between tiers and chocks affixed to each end in order to prevent movement.

5. \textbf{INSTALLING PVC PIPE AND FITTINGS:}

All pipe and fittings shall be examined before installing, and no pipe shall be installed which is found to be defective. All pipe and fittings shall be sound and shall be clean before installation.

All PVC pipe shall be installed in accordance with the manufacturer’s specifications and as specified herein. As soon as the excavation is completed to grade, as indicated on the Drawings, the Contractor shall immediately place bedding material as specified in Section 02200 in the trench. The pipe shall be firmly bedded in SCDOT No. 57 stone to conform accurately to the line and grade indicated on the Drawings. Embedment of pipe shall conform to the Details and ASTM D-2321, "Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe." Bell holes shall be excavated so that after installation only the pipe barrel shall bear upon the trench bottom. Proper selection and placement of bedding and backfill materials are necessary to minimize deflection of the pipe diameter. No blocking under the pipe will be permitted.

Pipe shall be laid to the true lines and grades shown on the Drawings with bedding and backfill as specified in Section 02200. Each section of pipe shall be laid to true alignment and grade as shown and specified on the Drawings. Pipe elevations and locations shall be checked immediately upon setting the pipe in the trench, and the location and elevation of each pipe shall be adjusted to meet the true alignment and grade specified. If the pipe is not installed to the true lines and elevations, the Engineer shall decide on appropriate corrective measures. Such corrective measures may require that the installed sewer be removed and re-installed correctly. The Engineer’s decision shall be final and no additional payment or time shall be due the Contractor to comply with the Engineer’s decision.

No single piece of pipe shall be laid unless it is straight. If a piece of pipe is not straight, it shall be rejected and removed from the site.

Under no circumstances shall the pipe be dropped into the trench.

Push-on joints shall be made in strict accordance with the manufacturer’s instructions. Pipe shall be laid with bell ends looking upstream. The interior of the pipe and the jointing seal shall be free from sand, dirt, and trash before installing in the line. Extreme care must be taken to keep the bells of the pipe free from dirt and rocks so joints may be properly assembled without over-stressing the bells. Each length of the pipe shall be shoved home against the pipe previously laid and held securely until enough backfill has been placed to hold the pipe in place. Joints shall not be "pulled" or "cramped". Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that
the inverts are matched and conform to the required grade. The pipe shall not be
driven down to grade by striking it.

The Contractor shall cut PVC pipe with appropriate cutting equipment where
necessary to cut and machine all PVC pipe in the field. A "full insertion mark" shall
be provided on each field cut pipe end. Field-cut pipe shall be beveled with a
beveling tool made especially for plastic pipe. Bevels shall be in accordance with the
manufacturer's requirements.

When installation is not in progress, or the potential exists for dirt or debris to enter
the pipe, the open ends of the pipe shall be closed with a plug or other approved
means.

Refer to Section 02200 for additional requirements.

6. ACCEPTANCE TESTS:

The following acceptance tests shall be performed to verify proper installation of the
new PVC pipes. The Engineer shall witness all tests.

1. All new main sewers installed from manhole to manhole shall be tested via
low pressure air testing in accordance with ASTM CF1417-11a. The tests
shall be performed from manhole to manhole and include any service laterals
connecting to the main sewer. To perform the test, plugs shall be installed at
each manhole and at cleanouts installed at the edge of the property line and
road or sewer right-of-way, and the isolated sewers shall be tested as a
system. The Contractor shall provide all necessary equipment and pressure
gauges to use for the testing. The Owner/Engineer must witness all testing.
If new service laterals are not installed from the main sewer to the edge of the
sewer or road R/W and/or a new cleanout is not installed, then the air test will
not be required.

The air test pressure specified in ASTM F1417-11a shall be increased by 0.5
psi for every foot of ground water above the crown of the sewer pipe. If
ground water levels cannot be determined in the field, then the test pressures
shall be increased by a minimum of 1 psi.

Refer to ASTM F1417-11a for additional requirements.

2. Service laterals connecting to manholes shall be tested via low pressure air
testing in accordance with ASTM F1417-11a as specified above. The test
shall be performed by installing a plug in the lateral at the manhole and at the
cleanout installed at the edge of the property line and road or sewer right-of-
way. The Contractor shall provide all necessary equipment and pressure
gauges to use for the testing.

3. All new main sewers and service laterals shall be inspected via closed circuit
television (CCTV) inspection after all work is completed. Refer to Section
02650 for requirements.
7. **REPAIRING NEW PIPE INSTALLATIONS:**

Any defective pipe or unacceptable installations as determined from the acceptance testing and/or field inspections shall be repaired by the Contractor at no additional cost to the Owner. The repair method shall be acceptable to and approved by the Engineer/Owner. The Contractor shall submit all proposed repair procedures to the Engineer/Owner for review and approval prior to performing any repair work.

END OF SECTION 02610
SECTION 02650

SEWER CLEANING AND TELEVISION INSPECTION

PART 1  GENERAL

1.1  SCOPE

A.  Work in this section shall consist of furnishing all labor and equipment required to completely clean sewers from manhole to manhole and to inspect and document the interior condition of gravity sanitary sewer mains utilizing closed circuit television (CCTV) equipment.

B.  Related Work.

Section 02651 Cured-In-Place Pipe Lining (CIPP) for Main Sewers
Section 02652 Cured-In-Place Pipe Lining (CIPP) for Service Laterals
Section 02655 Pipe Bursting

1.2  SUBMITTALS

A.  The Contractor shall provide one copy of the CCTV inspections to the Engineer.  The inspections and submittals shall be in digital format as specified herein.  The inspection logs shall also be submitted in hard copy format (one copy of the logs printed in color) and in a pdf file, and the videos shall be submitted on portable hard drives.  Each submittal to the Engineer shall include a transmittal that lists the file names and all sewer segments and video files included with the submittal.  The Engineer will return any submitted hard drive to the Contractor after the inspections have been reviewed.

PART 2  PRODUCTS – NOT USED

PART 3  EXECUTION

3.1  CLEANING AND TELEVISION INSPECTION OF SEWERS

A.  The Contractor shall continuously notify the public of the work being performed.  Refer to Section 01232 for requirements.

B.  The Contractor shall perform and provide all necessary traffic control measures to complete the work.  Refer to Section 01232 for requirements.

C.  Prior to starting the clean and TV work, the Contractor shall walk the sewers to be cleaned and televised to locate manholes and identify additional manholes not shown on the drawings.  The Contractor shall note any added manholes and notify the Owner/Engineer so manhole numbers can be assigned prior to starting the TV inspections.  In general, additional manholes that are found during the inspections
shall be numbered as the downstream manhole number followed by an “A”. The Contractor shall also update the drawings to show any changes based on the actual sewer layout. These "red-line" markups shall be submitted to the Engineer along with the TV inspections.

D. The Contractor shall thoroughly clean and televise the sewers and submit one copy of the final television inspection video and printed log to the Engineer for review as specified herein. The Contractor’s cleaning operations shall fully clean the sewers and remove all roots, grease and debris. The sewers shall be completely cleaned to facilitate CIPP lining installation if so specified. The cleaning shall be performed and completed from manhole to manhole prior to the television inspection. The Contractor shall also clean the next downstream sewer (if included in the project area) prior to performing the TV to make sure there is no debris in the downstream sewer that may back-up flow and impact the TV inspections. No cleaning equipment shall be in the sewers while the television inspections are being performed.

The cleaning shall be performed prior to the pre-rehabilitation television inspection. Acceptance of the cleaning portion of the work shall be dependent upon the results of the pre-rehabilitation television inspection. Lines not acceptably clean as to permit television inspection or the subsequent rehabilitation work shall be re-cleaned, re-inspected and re-submitted to the Engineer for review at no additional cost to the Owner.

E. The equipment used for the cleaning operations shall be specifically designed for cleaning sewers. The Contractor shall use the appropriate equipment to clean all debris, roots and grease from each sewer segment thoroughly. The required equipment may be high velocity water jet cleaning equipment with various attachments or mechanical cleaning equipment such as power buckets or power rodders. The Contractor shall select the cleaning equipment and procedures based on the conditions of the sewers at the time the work commences. All solids shall be removed at the downstream manhole of the section being cleaned - passing material from one sewer segment to another will not be permitted. Cleaning operations shall begin at the most upstream sewers and proceed downstream. The solids shall be removed from the site and properly disposed of at approved locations provided by the Contractor.

F. Prior to inserting any mechanical cutter into the sewer (such as a root cutter), the Contractor shall first quickly televise the sewer to make sure there are no other utilities passing through the sewer pipe (such as gas lines, cable lines, power lines, water lines, etc.). This requirement is intended to prevent any damage to other existing utilities and to protect workers. The television inspection does not need to be recorded or submitted to the Engineer unless there are existing utilities in the sewer, in which case a snapshot video and an accurate location will be required. This quick television inspection shall be considered incidental to the cost and no additional payment will be made. The cost of these inspections shall be included in the unit costs for cleaning and TV inspection.
G. Water for use on this project will be available from selected hydrants. Refer to Section 01232 for requirements.

H. The Contractor shall take precautions to avoid damage or flooding to public or private property being served by the line being cleaned. The Contractor shall be responsible for all flooding and pay for cleanup from flooding to the satisfaction of the property owner. The Contractor shall document all backups and submit documentation to the Engineer including the reason for the backup, the time and date of the backup, the property owner’s name, address and phone number, the resolution to problem, the time and date the problem was resolved, and any special cleanup work that had to be performed. This required documentation shall be submitted for all backups regardless of when they occur. All cleanup shall be completed within 4 hours of the backup.

I. The Contractor shall take care in cleaning older sewers and shall protect existing sewers from damage caused by improper use of cleaning equipment. The Contractor is advised that the sewers to be rehabilitated under this Contract are in poor structural condition.

J. After the sewers are completely cleaned, the sewers shall be inspected via closed circuit television (CCTV). As specified previously, no cleaning equipment shall be in the sewers while the television inspections are being performed. The purposes of the CCTV inspections are to verify that the sewers have been thoroughly cleaned, to document the condition of the existing sewers and the locations of service connections, to locate sewer defects that need repaired, and to confirm that the lining (if specified) can be properly installed and cured.

All CCTV work performed by the Contractor shall be completed in NASSCO PACP format by PACP Certified professionals. A current PACP certification number shall be included for each person creating/gathering inspection reports.

K. The camera equipment used for the CCTV inspections shall be one specifically designed and constructed for such inspection. Lighting for the camera shall be suitable to allow a clear picture for the entire periphery of the pipe. The camera shall be a color, pan-and-tilt camera.

L. The picture quality and definition shall be to the satisfaction of the Engineer. The Contractor shall submit a sample television inspection after the inspection of the first section(s) of sewer(s) is performed so that the Contractor and Engineer can agree on performance and quality of the inspections which must be met throughout the Contract. Sewers not inspected to the Engineer’s satisfaction shall be re-inspected by the Contractor at no additional cost to the Owner.

M. All cameras shall move through the sewers via self-powered tractor assemblies – no skid assemblies shall be permitted. The tractor assemblies used for the inspections shall be the appropriate size assembly for the pipe being televised according to the manufacturer of the television equipment. For example, an 8-inch tractor assembly shall be used to televise 8-inch-diameter sewers.
N. All inspections shall begin above ground with a video look down into the start manhole to completely show the manhole and flow in the invert channel below. The inspections shall then begin from the center of the upstream manhole and end in the center of the downstream manhole. Prior to starting the camera down the line, a tape measure shall be placed at the pipe opening at the upstream manhole to clearly show/verify, on-screen, the pipe diameter of the section of pipe to be televised during the subsequent inspection. The camera shall be moved through the line from upstream to downstream at a uniform rate. The camera shall be stopped at major defects and service connections and shall be panned, tilted and rotated to fully view the defects and connections. All such inspections shall be documented on digital recordings as specified. Particular attention should be paid to service connections and whether the services are active or plugged.

O. Flow levels shall be controlled to a maximum depth of 20% of the pipe diameter. Options for controlling the flow (if it exceeds 20% depth) that will be considered for approval include use of flow-through plugs (with continuous monitoring of upstream flow levels) and bypass pumping. The Contractor may also consider performing the work on off-peak hours when flow is lower (pending approval by the Owner); any such alternate work times must not impact residents (noise, lights, general disruption, etc.). If this controlled flow level is too high to allow the sewer pipe to be clearly visible (flow blocking or inhibiting the TV camera and video), then further flow control (further plugging or bypass pumping) shall be immediately implemented at no additional cost.

Every attempt shall be made to avoid any circumstance where the camera goes under water during the video inspection, specifically when televising through pipe sags. For sag areas, if the camera goes under water or will go under water, the Contractor shall use jet equipment to pull the water out of the sag prior to videoing through the sag (the jet equipment shall be removed from the line before starting the video inspection). This flow control shall be considered incidental to the Contract as this is standard practice prior to televising through any area where the camera goes under water and proceeds “blindly”; no additional payment will be made for performing this work. Some flow needs to remain in the sags if possible so that the extent of the sag (start and end point) is clearly visible. If the camera lens becomes fouled by going under water, the camera shall be removed, cleaned and the inspection shall start over at the start manhole.

P. The inspections shall be complete from manhole to manhole without the need for reverse setups unless approved otherwise by the Engineer. If, during the work, the CCTV inspection is blocked by debris, a protruding lateral or sewer system defect, the Contractor shall remove the blockage or repair the defect as authorized by the Engineer and then continue the inspection. No additional payment will be made for the initial CCTV inspections that were blocked.

Q. Reverse setups will only be allowed and accepted for payment if the blockage or defect preventing the CCTV inspection in the initial direction does not need to be repaired as determined by the Engineer. The Contractor shall notify the Engineer in writing of such situations for the Engineer’s review and approval. If approved, payment will be made for the length of sewer inspected.
R. The accuracy of the measurements cannot be stressed too strongly. Daily calibration of measuring devices shall be performed. Sewer lengths shown and reported on the CCTV inspection video and logs shall be within 3 feet (plus or minus) of the actual sewer length as measured above ground from center of one manhole to the center of the next manhole. CCTV inspections that do not meet these criteria shall be re-performed and re-submitted to the Engineer at no additional cost to the Owner.

S. The Contractor is advised that the sewers included in this Contract are old and in poor structural condition. The Contractor shall use extreme caution during all cleaning and television inspection work.

T. If the Contractor’s cleaning or television equipment become lodged in the sewers during the work, the Contractor shall be responsible for removing the equipment, including excavation of the sewer, and paying all costs associated with the removal unless otherwise agreed to by the Engineer (for example, if the equipment is hung in pipe with major structural damage that definitely needs repaired, the Engineer may agree to pay for removing the equipment).

U. Upon completion of the cleaning and television inspection work, the Contractor shall submit one copy of the final digital television inspections to the Engineer as specified. The inspections must be in order and complete or the Engineer will immediately return the inspections to the Contractor for corrections. The entire work order/work area/basin must be complete prior to submitting – no partial work orders or work areas will be accepted or reviewed by the Engineer unless specifically approved otherwise. The final inspection shall mean that the sewer has been completely cleaned (no roots, debris, grease, tuberculation, etc.), the inspection is complete from manhole to manhole without the need for a reverse setup unless otherwise approved, and all protruding service connections have been cut flush with the existing pipe wall. If point repairs, service lateral replacements or manhole replacements are performed after the inspections are submitted, it shall be the Contractor’s responsibility to confirm that the work was performed properly, including proper alignment, grade and connection to the existing sewer (no offset joints) and that no debris has entered the sewer as specified herein.

V. The Contractor will be paid for all cleaning and television inspections at the unit price bid. The unit price shall include complete cleaning regardless of the severity of debris and roots. The Contractor should expect heavy debris and roots.

W. Payment will be made for the initial cleaning and TV inspection that provides a complete inspection from manhole-to-manhole. Payment will not be made for additional cleaning and TV inspections that are necessary prior to performing any further work on the sewer, such as cleaning/TVing right before installing CIPP pipe lining - the cost of any such additional cleaning and TV inspections shall be included in the other various unit prices bid.

3.2 REMOVAL OF PROTRUDING SERVICE CONNECTIONS
A. Service connections that are protruding into the main sewer shall be cut flush with the pipe wall prior to installing CIPP (refer to Section 02651 Cured-In-Place Pipe Lining (CIPP) for further details and requirements). In addition, any protruding laterals blocking the CCTV inspection shall be cut. The cutting shall be accomplished using an internal robotic cutter specifically designed for such work. The internal remote cutter shall be capable of cutting any pipe material including PVC, vitrified clay, cast iron, ductile iron and orangeburg pipe. All cut pieces of the service connection shall be removed from the main sewer pipe. The costs for removing protruding connections shall be paid at the unit price bid. The Engineer will not approve payment for excavating protruding services in lieu of cutting them internally unless there is a specific reason or circumstance in which the lateral cannot be cut.

3.3 DIGITAL VIDEO INSPECTIONS AND CCTV DATABASE

A. All televised sewer inspections performed under this Contract (including pre-rehabilitation and post-rehabilitation inspections) shall be submitted to the Engineer in electronic (digital) format.

B. Each submittal to the Engineer shall include the database file along with the video files. Video files shall be MPEG4, wmv or other approved format (Engineer to approve). The Contractor shall make all adjustments necessary to adhere to the required format specified herein at no additional cost to the Owner. After the first submittal, the Engineer will notify the Contractor of any required changes in the data and file format, and the Contractor shall make such modifications at no additional cost.

C. The digital recording shall include video information that accurately reproduces the original picture of the video inspection. The video portion of the digital recording shall be free of electrical interference and shall produce a clear and stable image.

D. Video shall include overlay/text display. Each inspection start shall include overlay display of section details including at a minimum:

1. Owner name
2. Project name
3. Contractor name
4. Street name (if applicable)
5. Date/time of inspection
6. MH Start #/MH End #
7. Pipe material
8. Pipe size
9. Direction of Video
10. Weather or Flow Level
11. A constant display of the street name, MH start#/MH End#, date and distance shall appear on screen.
E. CCTV inspector shall move or remove overlay display accordingly so it does not interfere with the inspection review of particular observations/defects as the inspection is occurring. As an observation/defect is noted by the inspector, a text display shall appear with the text describing the observation/defect. Text shall display for a minimum of 4 seconds. Distance shall appear continuously in the lower right corner of the video image as the camera is traveling down the line. It is imperative that distance is accurate. The CCTV inspector shall calibrate/test footage at the beginning of each day as incorrect footage will result in return of inspections.

F. Completed work shall consist of video files captured live off the inspection camera as specified herein. The video file resolution shall be 640 x 480. All video files created shall be consistent with the Owner’s existing codec (as applicable).

G. Each pipe inspection’s observations shall be related to a time point within the video.

H. During the inspection, the video file recording shall pause as the operator selects the observation/defect notation, eliminating “on hold” video. In situations of reverse inspection, the reverse inspection shall be in a separate video file.

I. The video files shall be named as follows (unless directed otherwise by the Engineer):

STARTMH_ENDMHPIPEID_DATE.mp4 (or wmv or approved format)

J. The database file and the corresponding video files shall be submitted to the Engineer on portable external hard drives. The hard drive shall be delivered to the Engineer for reviewing the television inspections. The Engineer will return the hard drive to the Contractor after the inspections have been reviewed. Multiple hard drives will likely be required as the data will be transferred to the Engineer numerous times throughout the Contract.

K. Each hard drive submitted to the Engineer shall include a transmittal listing the file names and all sewer segments and video files included on the hard drive. The Contractor shall maintain a “master” hard drive throughout the Contract that contains all databases and all video files performed during this project. The databases shall be merged to reduce the number of individual database files as required by the Engineer. The Engineer will specify which files to merge.

L. At the end of the Contract, the master hard drive shall be submitted to the Engineer. The master hard drive shall be complete with all files and all changes required by the Engineer. A single master hard drive shall be submitted unless otherwise approved by the Engineer. The master hard drive shall become the property of the Owner. Costs associated with providing the master hard drive shall be included in the various bid items.
M. Recorded Observations for each inspection shall include: observation distance, observation defect/description, video counter time where observation occurs within digital video, and severity rating for each observation/defect.

N. All work submitted by the Contractor shall be completed by PACP Certified professionals. A current PACP certification number shall be included for each person creating/gathering inspection reports.

O. The digital database file of the television inspections shall be submitted in a PACP export file format so that the Owner can import the data into their CCTV software system.

P. All costs associated with providing the digital television inspections as specified, including performing the inspections, shall be included in the various bid items – no separate or additional payment shall be made.

END OF SECTION
SECTION 02651
CURED-IN-PLACE PIPE LINING (CIPP) FOR MAIN SEWERS

PART 1  GENERAL

1.1  SCOPE

A. Work under this section consists of furnishing all materials, labor, and equipment required for the installation of cured-in-place pipe (CIPP) in main sewers.

1.2  DESIGN AND PERFORMANCE REQUIREMENTS

A. The CIPP shall be designed for a life of 50 years or greater in accordance with ASTM F1216, Appendix X.1, for “fully deteriorated gravity pipe conditions.” The minimum installed, cured liner thickness shall be as listed below. The Bid Form and/or Drawings may list alternate thicknesses for installation based on the Engineer’s decision for specific installations and may list specific thicknesses for larger diameter sewers.

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<thead>
<tr>
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<th>Thickness</th>
<th>Depths</th>
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<td>(0’ to 20’ deep)</td>
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<td></td>
<td>7.5 mm</td>
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<td></td>
<td>13.5 mm</td>
<td>(19’ to 24’ deep)</td>
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B. The cured liner shall have the following minimum structural properties:

- Flexural Strength of 4,500 psi in accordance with ASTM D 790
- Flexural Modulus of 250,000 psi in accordance with ASTM D 790
- Tensile Strength of 3,000 psi in accordance with ASTM D 638

02651-1
C. The required structural CIPP wall thickness shall be based on the following design parameters:

- **Design Safety Factor**: 2.0
- **Short-Term Flexural Modulus**: 250,000 psi
- **Long-Term Flexural Modulus**: 125,000 psi
- **Flexural Strength**: 4,500 psi
- **Creep Retention Factor**: 50%
- **Ovality**: 2%
- **Soil Modulus**: 1,000 psi
- **Soil Density**: 120 pounds per cubic foot
- **Soil Coefficient of Friction**: 0.130 r
- **Groundwater Depth**: Ground Surface Elevation
- **Live Load**: H20 Highway
- **Poisson's Ratio**: 0.3
- **Enhancement Factor, K**: 7
- **Service Temperature Range**: 40 to 140 degrees F
- **Maximum Long-Term Deflection**: 5 percent

1.3 SUBMITTALS

A. Submit a contractor statement of qualifications which identifies key personnel and their specific CIPP experience, and recent projects listing the total length installed by host pipe diameter. Work and personnel experience listed must reference projects that used process method and materials to be used on this project. Include project names, references/contacts and phone numbers.

B. Submit product data for the fabric tube, resin, catalysts, and waterstops demonstrating conformance to the specifications.

C. Submit manufacturer material certifications for the fabric tube and resin that state conformance to the specifications. The felt tube manufacturer shall provide in their certification a statement identifying how many years they have produced the felt tube. Material certifications shall be current and must reference the project.

D. Submit manufacturers’ shipping, storage and handling recommendations for all components of the CIPP system.

E. Submit CIPP wet-out information. Wet-out information shall include the identification of the wet-out facility and process description and a sample wet-out form. The wet-out forms shall document, at a minimum, the date and time of wet-out, the wet-out supervisor, the wet-out facility address, the location where the CIPP will be installed (by manhole numbers), the CIPP diameter, the length of wet-tube and dry-tube, the thickness of the CIPP, the roller gap setting for establishing the liner thickness, the felt manufacturer, the resin used (by product name and batch/shipment number) and quantity, the catalyst(s) used (by product name) and quantity, any quality control.
samples taken, and all else pertinent to the wet-out process.

F. Installation procedures and curing schedules shall be submitted. Installation procedures shall include acceptable inversion heads and pressures, heating (“cooking”) and cool-down procedures and temperatures for varying sewer diameters/lengths/depths, times for each stage of the process, and cure logs for the resin/resin system used. The Contractor shall provide this information without delay or claim to any confidentiality. Testing procedures and quality control procedures shall also be submitted.

G. Submit a sample CIPP installation report. The report shall include items such as manhole numbers, location, project number, date, time, temperature, curing temperature, curing time, and liner thickness.

H. With each shipment of CIPP delivered to the jobsite, submit certifications that the CIPP lining was manufactured in accordance with these specifications and the appropriate ASTM standards. The certifications shall include a signed statement by the wet-out manager/supervisor that no fillers were added to the resin system during manufacture of the CIPP. In addition, wet-out forms documenting the wet-out shall be delivered with each section of CIPP manufactured and delivered to the jobsite.

I. With each shipment of resin to the wet-out facility, submit certification that the resin was manufactured under ISO 9002 certified procedures and meets these specifications.

J. Submit a plan for bypassing sewage around the work area and facilities where sewage flows must be interrupted to carry the work. The plan shall be reviewed by the Engineer and shall be acknowledged as acceptable before any work is started.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be shipped, stored, and handled in a manner consistent with written recommendations of the CIPP system manufacturer to avoid damage. Damage includes, but is not limited to, gouging, abrasion, flattening, cutting, puncturing, premature curing, or ultra-violet (UV) degradation. The CIPP shall be maintained at a proper temperature in refrigerated facilities prior to installation to prevent premature curing. All damaged materials shall be promptly removed from the project site at the Contractor’s expense.

1.5 QUALIFICATIONS

A. The Contractor performing the CIPP installation 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. The Contractor must have successfully installed at least 1,000,000 feet of CIPP for a minimum of 10 years in wastewater collection systems utilizing the products and installation methods specified herein. These
requirements may be waived by the Owner if the Owner and/or Engineer have prior experience with the Contractor.

In addition, if steam cure is being proposed for the CIPP installation as specified herein, the Contractor must have successfully installed at least 500,000 feet of CIPP via steam cure for at least 5 years in wastewater collection systems utilizing the products specified herein. If the Contractor does not meet this experience requirement, then water cure shall be used for all installations.

The Contractor shall submit detailed references (project names, dates, owner contact names and numbers, project descriptions with lengths installed, etc.) to the Engineer as requested to demonstrate compliance with the above experience requirements. The Engineer’s decision on whether the Contractor meets the experience requirements shall be final, and the Contractor shall not be due any additional money if the experience requirements are not met and water cure is required.

B. The Contractor’s personnel shall have the following experience with the products and installation method to be used on this project.

Project Manager – Shall have a minimum of 5 years managing CIPP projects for wastewater collection systems.

Superintendent - Shall have a minimum of 5 years of on-site supervision of CIPP projects for wastewater collection systems. The superintendent shall have supervised a minimum of 300,000 feet of installed CIPP in wastewater collection systems of the pipe diameters included in the project.

C. The manufacturer of the felt tube shall have manufactured the product to be used on this project for at least 5 years. The felt material manufacturer and facility shall not change throughout the duration of the contract unless approved by the Engineer in writing.

D. Approved CIPP products are listed in these specifications. Even though the Contractor’s product may be listed as approved, the Contractor shall still meet the experience requirements specified above, or the Contractor will not be approved for this work.

1.6 ENVIRONMENTAL REQUIREMENTS

A. The use of the product shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant.

1.7 PROJECT ACCESS

A. The Contractor shall utilize existing road rights-of-way and sanitary sewer easements to perform the work unless notified otherwise. The Contractor shall coordinate with and meet the requirements of South Carolina Department of
Transportation, the Owner, or any other agency or municipality that may be impacted by the work.

1.8 WARRANTY

A. The materials used for the project shall be certified by the manufacturer for the specified purpose. The manufacturer shall warrant the liner to be free from defects in raw materials for one (1) year from the date of installation and acceptance by the Owner. The Contractor shall warrant the liner installation for a period of one (1) year.

1.9 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. The Contractor shall ensure that the products and work comply with the current version of the following American Society for Testing and Materials (ASTM) standards:

4. ASTM D5813 - Standard Specification for Cured-in-Place Thermosetting Resin Sewer Pipe
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)

PART 2 PRODUCTS

2.1 CURED-IN-PLACE-PIPE LINING

A. Cured-In-Place-Pipe (CIPP) lining shall be one of the following products or approved equal. The products below shall adhere to all requirements specified herein and shall be modified as necessary to meet these requirements

- CIPP Corporation Liners
- Invert-A-Pipe by IPR Southeast LLC
- National Liner by National EnviroTech Group, LLC
- Inliner by Inliner Technologies, Inc.
- Insituform by Insituform Technologies, Inc.
- Diamond Lining Systems by Daystar Composites LLC
B. The CIPP can be installed and cured using water or steam for sewers 18” in diameter and smaller. Only water cure shall be allowed for sewers greater than 18” in diameter.

For sewers 18” in diameter and smaller, the choice of installation method shall be the Contractor’s choice. However, the choice of curing method shall be appropriate for the pipe being lined and must be ultimately approved by the Engineer as stated below. For example, sewers with heavy active leaks shall be lined using water cure unless the Contractor can prove to the Engineer that the steam cure can overcome the heat sink and active water stream.

The Engineer will note any concerns with steam curing methods during his review of the pre-rehabilitation TV inspections. Those concerns will be in writing, and the Contractor shall fully address the concerns. If the Engineer’s concerns are not fully addressed, the Contractor shall install those specific sewers using water cure at no additional cost to the Owner. Water cure and steam cure will be paid at the same unit price bid.

C. The liner shall be composed of tubing material consisting of one or more layers of a flexible non-woven polyester felt with or without other additives such as fiberglass or other reinforcing additives. The felt tubing shall be impregnated with a thermosetting isothalic polyester resin and catalyst or vinyl ester and catalyst. The liner material and resin shall be completely compatible. The inside and/or outside layer of the tube shall be coated with an impermeable material compatible with the resin and fabric. The liner shall cure in the presence of water or steam at the required temperature for the resin system.

D. The felt material shall be manufactured by companies specializing in felt production for CIPP. The manufacturer shall have manufactured felt material for CIPP for at least 5 years as documented by references. The felt manufacturer, references and location of the manufacturing facility shall be submitted to the Engineer for review and approval. The felt material manufacturer and facility shall not change throughout the duration of the Contract unless specifically approved by the Engineer in writing.

E. The polyester or vinyl ester resin shall be PREMIUM, NON-RECYCLED resin only. PET resins, or those containing fillers, additives or enhancement agents shall not be used. The resin manufacturer shall not include any old resin or rework in the product shipped to the wet-out facility. The resin shall be manufactured under ISO 9002 certified procedures. Such certification shall be submitted to the Engineer for each shipment of resin to the wet-out facility. The proposed resin shall equal or exceed the published properties of Reichhold Polylite 33420 resin (for isothalic polyester resin) or Reichhold Atlac 580-20 (for vinyl ester resin).

The Engineer may consider strength enhancing fillers as an acceptable additive to the resin if the fillers can be shown to be for the sole purpose of enhancing the strength of the final CIPP product. The amount of strength enhancing fillers will be limited to 26% by volume. The Engineer’s decision on allowing strength-enhancing resins shall be final. Any strength enhancing fillers added to the resin shall be added by the resin
manufacturer at the resin manufacturer’s plant and not at the wetout facility or any intermediate facility.

F. The exact makeup of the resin shall be submitted to the Engineer including chemical resistance information, cure logs and temperatures. Polyester resins shall have a minimum Heat Distortion Temperature of 212 degrees Fahrenheit per ASTM D648. Vinyl ester resins shall have a minimum Heat Distortion Temperature of 220 degrees Fahrenheit per ASTM D648.

G. The exact mixture ratio of resin and catalyst shall also be submitted. The catalyst system shall be identified by product name. The resin/catalyst ratio shall be approved by the resin manufacturer in writing. The catalyst system shall be made up of a primary catalyst and a secondary catalyst. The primary catalyst shall be Akzo Perkadox 16 or approved equal and shall be added at a maximum of 1% of the resin volume by weight unless otherwise approved by the Engineer. The secondary catalyst shall be Akzo Trigonox or approved equal and shall be added at a maximum of 0.5% of the resin volume by weight unless otherwise approved by the Engineer. The resin/catalyst system shall be formulated so that the CIPP will cure as specified below. Resins, catalysts and resin/catalysts mixing ratios shall not be changed during this Contract unless specifically approved by the Engineer in writing.

H. The cure schedules for the CIPP shall be submitted to the Engineer for review. The curing process/schedules shall be approved by the resin manufacturer in writing. The cure schedules shall include specific information on stepping the temperature up to “cooking” temperatures, “cooking” temperatures and durations, and cool-down procedures – all to be approved in writing by the resin manufacturer. The CIPP shall cure in the presence of water or steam. The minimum cure/“cook” time shall be as recommended by the resin manufacturer. The cure time shall be increased as deemed necessary by the Contractor/resin manufacturer, including but not limited to, longer CIPP installations, active ground water infiltration into the existing sewers, pipe type, pipe location, etc.

I. The resin shall be shipped directly from the resin manufacturer’s facility to the CIPP wet-out facility. The resin shall not be sent to any intermediate mixing facility. Copies of the shipment documents from the resin manufacturer shall be submitted to the Engineer showing dates of shipment, the originating location and the receiving location.

J. The resin shall be used to manufacture the CIPP as shipped. No fillers or additives shall be added at the wet-out facility except for the required catalyst as recommended by the resin manufacturer. The Contractor shall submit a Certificate of Authenticity from the resin manufacturer for each shipment to the wet-out facility (to include the date of manufacture and the Heat Distortion Temperature). This information shall be submitted prior to manufacturing any CIPP.

K. The Contractor shall identify the wet-out facility where all CIPP under this Contract will be manufactured. All CIPP shall be manufactured from this designated wet-out facility throughout the entire Contract unless specifically approved otherwise by the Engineer in writing. Multiple wet-out facilities shall not be allowed.
L. The Engineer, Owner and/or an agent of the Owner may inspect the CIPP during manufacturing (during “wet-out”). The Contractor shall submit a schedule for manufacturing the CIPP to the Engineer every Friday for the following week. The Engineer and Owner must be given an opportunity to witness the manufacturing of all CIPP for this project. If the CIPP is manufactured without providing the required notice to the Engineer, the CIPP will be marked as rejected prior to installation and will not be approved for installation in this project.

M. If the Engineer and/or Owner decide to inspect the manufacturing of the CIPP, the Contractor shall provide full access to witness the wet-out process and shall provide any and all information related to the manufacturing as requested by the Engineer, Owner or the Owner’s agent without delay and without claims of confidentiality or product privacy.

N. The Engineer or Owner may take samples of the resin from the wet-out facility for infrared analyses (IR Scan) throughout the duration of this Contract. This standard analytical test involves shining a beam of light in the infrared frequency region through a thin sample of the subject resin. The frequency of light is then varied across the infrared spectrum. Chemical functional groups present in the resin being analyzed will absorb infrared light at specific frequencies and with characteristic absorption intensities.

The Owner will pay for all such infrared analyses and resin testing. To allow the resin samples to be taken, the Contractor shall place a sampling valve in-line at a point prior to the resin/catalyst mixing stage and after the resin/catalyst mixing stage. These sampling valves shall remain in place throughout the duration of the Contract and shall always be accessible to the Engineer and Owner.

The infrared analyses will be used to verify that the resin and resin/catalyst composition and mixture being used is the approved resin and resin/catalyst system. Payment will not be made for any CIPP manufactured with unapproved resin and resin/catalyst mixtures. The Contractor shall submit results of infrared analyses of the proposed resin and resin/catalyst mixture, performed and certified by the resin manufacturer, prior to manufacturing any CIPP as a shop drawing. The results of these analyses (the resin’s chemical fingerprint) will be used as the standard for verifying the resin and resin/catalyst mixture being used throughout the Contract.

The Engineer will compare the submitted chemical fingerprint with the fingerprint of Reichhold Polylite 33420 resin (for isothalic polyester resin) or Reichhold Atlac 580-20 (for vinyl ester resin) for a baseline comparison. The Contractor and resin manufacturer shall fully describe, explain and justify any differences between the Reichhold and proposed resin fingerprints without delay or claim to confidentiality.

O. When cured, the CIPP shall form a continuous, tight-fitting, hard, impermeable liner which is chemically resistant to any chemicals normally found in domestic sewage. The liner shall be chemically resistant to trace amounts of gasoline and other oil products commonly found in municipal sewerage and soils adjacent to the sewer pipe to be lined.

P. The CIPP shall be fabricated to a size that will tightly fit the sewer being rehabilitated after being installed and cured. The liner shall be capable of fitting into irregularly shaped pipe sections and through bends and dips within the pipeline. Allowance for longitudinal and
circumferential expansion shall be taken into account when sizing and installing the liner. All dimensions shall be verified in the field by the Contractor prior to fabrication of the liner. Field measurements shall be used to ensure maximum closure between the new liner and the existing sewer pipe. There shall be no leakage of groundwater between the existing pipe and the CIPP at the manhole connection or service lateral connections. Any leakage found shall be eliminated by the Contractor at no additional cost to the Owner.

Q. The application of the resin to the felt tubing (wet-out) shall be conducted under factory conditions and the materials shall be fully protected against UV light, excessive heat and contamination at all times.

R. The length of the liner shall be the length deemed necessary by the Contractor to effectively carry out the insertion of the liner and sealing of the liner at the outlet and inlet manholes. The required length of liner shall be verified in the field by the Contractor prior to fabrication of the liner.

S. The installed thickness shall be measured as specified elsewhere herein. The Contractor shall submit his proposed plan for ensuring that the installed CIPP meets the above minimum thickness requirements. The plan shall include the proposed CIPP thickness to be installed (pre-installation thickness) and detailed inversion or pull-in procedures to reduce stretching and to reduce migration of resin.

PART 3 EXECUTION

A. Care shall be taken in shipping, handling and laying to avoid damaging the CIPP. Extra care shall be taken during cold weather construction. Any CIPP damaged in shipment shall be replaced as directed by the Engineer. Any CIPP showing a split or tear or has been mishandled shall be marked as rejected and removed at once from the work. The liner shall be maintained at a proper temperature in refrigerated facilities to prevent premature curing at all times prior to installation. Any liner showing evidence of premature curing will be rejected for use and will be removed from the site immediately.

B. The Contractor shall continuously notify the public of the work being performed. Refer to Section 01232 for requirements.

C. The Contractor shall develop and submit to the Engineer a protocol for addressing odor complaints during the CIPP installation process (primarily styrene odor complaints). The protocol shall include steps to be taken by on-site and management personnel immediately when the complaint is received, including discussing the odor with the property owners/residents to address their concerns and alleviating the odor from the home/residence or business using fans or other means as necessary. The Contractor shall also maintain a calibrated portable styrene test unit to immediately document the atmospheric concentrations of the styrene on the site and in the house/residence/business when a complaint is received. The styrene concentrations must be tested prior to exhausting the odors from the house/residence/business. The Contractor shall also utilize blowers (vacuum blowers) during the CIPP installation to exhaust odors from the sewers and into the atmosphere during the installation as deemed necessary. This will help to minimize the potential for odors to travel up service laterals and into homes/businesses. The blowers shall be strategically placed to exhaust the concentrated odors in an isolated
location. The costs for addressing such odors issues/complaints shall be included in the unit prices bid for CIPP.

D. The Contractor shall perform and provide all necessary traffic control measures to complete the work. Refer to Section 01232 for requirements.

E. The Contractor shall clean and televise each length of pipe to be lined as specified in the Section 02650 – Cleaning and Television Inspection. Prior to lining the main sewer and the pre-rehabilitation television inspection, protruding service lateral connections shall be internally cut/ground down flush with the pipe wall with a robotic cutter specifically designed for this purpose and all required point repairs shall be completed. The internal cutter shall be capable of cutting any pipe material including cast iron, PVC, vitrified clay pipe, ductile iron pipe and orangeburg pipe.

F. Water for use on this project will be available from selected hydrants. Refer to Section 01232 for requirements.

G. The Contractor shall bypass pump sewage flows around the lining work while it is being performed. The Contractor is responsible for handling and accommodating all existing wastewater flows during the work. The Contractor shall submit, for approval by the Engineer, a detailed plan of the method the Contractor proposes in order to maintain the existing flow during construction. The plan must include a provision for handling the existing peak flow by pumping. The peak flow shall be considered the existing pipe flowing full, which is highly possible during rain events. When pumping is used, an identical standby pump(s) shall be on site in the event of failure of the primary pump(s). For sewers 12” in diameter and larger, all pumps shall be sound attenuated pumps and all bypass piping shall be hard piping (HDPE, steel, etc.). Payment for this work shall be included in the individual unit price bid.

If, at any time during construction, effluent from the existing sewer is not fully contained by the bypass system, gravity service will be restored and work shall be suspended until the problem is resolved to the satisfaction of the Engineer. This includes wastewater flow into trenches during excavation work. Sewer system overflows will not be tolerated. All fines imposed on the Owner associated with overflows caused by the Contractor’s work shall be paid by the Contractor.

H. The Contractor shall take precautions to avoid damage or flooding to public or private property being served by the sewer being lined. The Contractor shall be responsible for all flooding and pay for cleanup from flooding to the satisfaction of the property owner. The Contractor shall document all backups and submit documentation to the Engineer including the reason for the backup, the time and date of the backup, the property owner’s name, address and phone number, the resolution to problem, the time and date the problem was resolved, and any special cleanup work that had to be performed. This required documentation shall be submitted for all backups regardless of when they occur. All cleanup shall be completed within 4 hours of the backup.

I. The Contractor shall furnish and install the CIPP lining in the full length of sewer. The installation of the CIPP shall be in complete accordance with the applicable provisions of
ASTM F1216 or ASTM F1743 except as modified herein, these specifications and the manufacturers’ specifications.

J. Water or air shall be used to invert CIPP installed via ASTM F1216 or to invert the calibration hose through CIPP installed via ASTM F1743. The water inversion of the CIPP and calibration hoses shall be accomplished by using natural water pressure (head) achieved by erecting platforms or scaffolding to an elevation determined by the Contractor or by using CIPP installation vessels/units that creates water pressure. The Contractor shall determine the necessary inversion heads (pressure) for each line segment. If an installation vessel/unit is used, a pressure relief valve shall be installed on the vessel so that the necessary pressure/inversion heads are not exceeded at any time during the inversion. Water or air pressure shall not be varied by any means throughout the inversion process except when approved by the Engineer. The Contractor shall submit required inversion heads/inversion processes for each installation as a shop drawing without delay and claim to confidentiality or product/installation privacy.

K. CIPP shall be cured with water or steam in strict accordance with the manufacturer’s recommendations. This shall include achieving cooking temperatures, cooking times, and cool-down procedures. The Contractor shall submit required curing schedules and procedures for each installation as a shop drawing without delay and claim to confidentiality or product/installation privacy.

L. The CIPP shall be neatly cut 2 inches from the manhole walls after installation unless otherwise directed by the Engineer. The CIPP shall be sealed at the manholes to provide a watertight liner connection at the manhole. There shall be no leakage of groundwater into the manhole between the CIPP and existing sewer pipe and between the existing sewer pipe and manhole wall. A hydrophilic waterstop (non-bentonite) comprised of modified chloroprene rubber shall be installed around the liner 6 inches from each manhole wall prior to processing the liner to provide additional waterstop protection. As the CIPP is expanded, the waterstop shall be pressed tightly against the existing sewer to provide a leak-tight seal. The waterstop shall be Hydrotite as manufactured by Greenstreak (St. Louis, Missouri) or equal. All CIPP connections to manholes shall be further sealed with an approved non-shrink grout to completely cover the CIPP/manhole connection point. CIPP lining shall be sealed to manhole linings (where specified) in an acceptable manner as approved by the Engineer. Further, all invert channels shall be coated with an approved grout to match the CIPP elevations in the manhole. Submit detailed drawings of the pipe-manhole connections to the Engineer for approval, including termination points in manholes and transitions with manhole linings where installed.

M. The Contractor shall fully reopen all of the existing active service connections in each length of sewer following lining. The service connections shall be reopened from inside the sewer by means of a closed-circuit television camera controlled cutting device appropriate for the CIPP. All openings shall be clean and neatly cut and shall be flush with the lateral pipe. The openings shall also be buffed with a wire brush to remove rough edges and provide a smooth finish. The bottom of the openings shall be flush with the bottom of the lateral pipe to remove any lip that could catch debris. Openings shall be 100% of the service lateral pipe. The Contractor shall re-open any service lateral that does not meet this requirement as evidenced by the post-rehabilitation inspections at no additional cost to the Owner. The Contractor shall be fully responsible for all backups and

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damage caused by not fully opening a lateral connection, including paying all costs associated with repairing damage as required by the Engineer, Owner and/or property owner.

N. **Preliminary Post-CIPP TV Inspections**: Immediately after the CIPP is installed and the services connections are completely opened and brushed, the Contractor shall televise the installed CIPP to verify and document that the CIPP was properly installed and cured and that all service connections have been opened as specified. The preliminary post-CIPP TV inspection videos shall be submitted to the Engineer within 1 day of the CIPP being installed. This will allow the Engineer to confirm that there are no CIPP issues that need addressed on this sewer and/or future installations and that the service laterals are properly opened. The preliminary post-CIPP inspections shall clearly show the CIPP liner and all service connections.

The Engineer will accept these preliminary post-CIPP TV inspections for approving payment of the installed CIPP with the final post-CIPP inspections as specified herein being required prior to final payment. The Contractor may submit these inspections as the final post-CIPP inspections if all grout/concrete work is finalized in the connecting manholes (including grouting the pipe connections, coating the invert channels, and performing the specified manhole rehabilitation) and all specifications are met. Completing all of the manhole work may be difficult to get finished so that the TV inspections can be submitted within 1 day as specified above. The Contractor's unit price bid for the CIPP shall include preliminary post-CIPP and final post-CIPP TV inspections.

O. Installation reports shall be generated for each segment of liner installed. The reports shall document installation, including manhole numbers, street names/sewer location, project number, date, time, temperature, curing temperature, curing time, liner thickness, etc. A sample report shall be submitted to the Engineer for approval prior to installing any lining. The reports shall be submitted to the Engineer prior to requesting payment.

P. For every sewer segment that is lined (sewer segment is defined as the sewer between two manholes), the Contractor shall remove one restrained sample of the installed liner at least 12 inches in length for testing of installed CIPP flexural properties and thickness. The CIPP testing shall include determining flexural strength, flexural modulus, tensile strength and thickness of each sample. These four separate individual tests make up one completed CIPP test. Payment will be made for each completed CIPP test at the unit price bid after the test results are submitted to the Engineer.

For sewers 12 inches in diameter and smaller, the sample shall be captured by installing the lining through a section of PVC pipe (same diameter as the existing sewer diameter) within the most downstream manhole of the installation and at all intermediate manholes if multiple sewer segments are lined at the same time. For sewers 15 inches in diameter and larger, plate samples shall be taken and cured in the same water as the installed CIPP.

The Contractor shall be responsible for capturing the samples and preparing the samples for testing (cutting the samples to the required dimensions, removing the PVC pipe, etc.). The testing laboratory shall specify the dimensions for the samples. In addition, the Contractor shall cut a 1-inch wide representative sample (taken at least 2 inches from the
end of the specimen) for the Engineer’s records. The Contractor shall label all samples including writing on the samples where they were taken (manhole numbers and work orders) and the date they were taken.

Each day, the Contractor shall forward the samples taken that day to the testing laboratory and shall deliver the 1-inch-wide representative samples to the Engineer. The Contractor shall copy the Engineer on all submittals to the testing laboratory. The testing laboratory shall submit all test results back to the Contractor with a copy directly to the Engineer. The test results shall be returned to the Contractor and Engineer within 21 days from the laboratory receiving the samples. If the results are not received in this timeframe, future pay estimates may be withheld. It shall be the Contractor’s sole responsibility to ensure that the laboratory meets the specified schedule. The Contractor shall pay the laboratory for all tests. The Contractor will be paid for the tests through the Contract at the unit price bid for each completed test.

The Contractor shall select the independent testing laboratory and shall pay the laboratory for all tests. The Contractor will be paid for the tests through the Contract at the unit price bid for each completed test. All testing shall be performed by an independent, accredited, certified and experienced testing laboratory (minimum 5 years of experience with CIPP testing) as chosen by the Contractor. The Contractor shall submit the name and location of the testing laboratory for approval. The submittal shall include the laboratory's experience testing CIPP samples, the laboratory's accreditation/certification to perform CIPP testing from a recognized accreditation body, and a certified statement from the laboratory that they are independent from and not associated with the Contractor in any way.

Q. Any lining that does not meet the specified installed strength and/or thickness requirements, regardless of the amount below the specified requirements, shall be corrected by the Contractor in a manner approved by the Engineer at no additional cost to the Owner. The Engineer's decision on how to correct deficient CIPP installations shall be final. Options for correcting deficient liner that will be considered by the Engineer include removing the liner and re-lining the sewer, excavating and replacing the sewer from manhole to manhole, pipe bursting the sewer from manhole to manhole, re-lining sewers completely from manhole to manhole, or providing the Owner with a substantial credit.

Credits will only be considered for lining that does not meet the required thickness. CIPP lining thickness may be up to 5% below the specified minimum installed thickness before the credit will be applied. For example, if the minimum specified thickness is 6 mm, the credit will only apply if the CIPP is less than 5.7 mm thick. There will be no “re-calculations” of required thicknesses based on actual flexural test results for that sample. The minimum specified thicknesses shall be required regardless of the final flexural properties of the CIPP as installed. If a credit is acceptable to the Engineer and Owner, the credit shall be calculated by multiplying the bid price by the percent that the liner thickness is below the minimum required installed thickness as follows:

\[ \text{Credit} = (1 - (\text{installed CIPP thickness}/\text{min required thickness})) \times \text{Bid Price} \]
The Contractor shall not assume that a credit will be acceptable to the Engineer or Owner or that the above formula will be used in all situations or for all installed CIPP thicknesses. Liner thickness of less than 85% of the required minimum thickness will not be eligible for any payment.

All credits shall be accounted for on the monthly pay estimates (each and every month) as the failed test results are received by the Engineer. Credits shall not accumulate until the end of the Contract. In addition, any other defective CIPP shall be repaired within 21 days of being identified or payment will be withheld and work will not be allowed to continue.

R. Following installation of the CIPP, reopening and brushing of all active service lateral connections, and completion of all manhole rehabilitation including vacuum testing (where applicable), the Contractor shall conduct a final post-rehabilitation television inspection of the completed work to verify that the liner installation is acceptable as defined herein. The sewers shall be thoroughly cleaned prior to performing the television inspections. No cleaning equipment shall be in the sewers during the post-rehabilitation inspections. The pipe shall be dry so that the entire CIPP can be seen. This will require that temporary plugging or bypass pumping be provided for all post-rehabilitation television inspections.

The post-rehabilitation television inspections shall be in accordance with the inspections specified in Section 02650 – Cleaning and Television Inspection. The post-rehabilitation television inspections shall be within 3 feet of the actual sewer length as measured above ground from center of manhole to center of manhole. Any inspection that exceeds this limit shall be re-performed and re-submitted to the Engineer prior to payment at no additional cost to the Owner. One copy of the final post-rehabilitation inspections shall be submitted to the Engineer for review and approval as specified. The inspections must be in order, correct and complete or the Engineer will immediately return the inspections to the Contractor for corrections.

S. Payment will not be made for any sewer lining until the Engineer has reviewed and approved the final CCTV inspection. The final CCTV inspection shall not be performed until all manhole rehabilitation work is completed (including vacuum testing where applicable). As specified previously herein, the Engineer will accept preliminary post-CIPP TV inspections for payment with the final post-CIPP TV inspections being required prior to payment of the manhole rehabilitation work (where applicable) and/or final payment. The Contractor shall submit the required digital inspections a minimum of 10 days in advance of any payment request to provide the Engineer ample time to review the information.

T. There shall be no holes, dry spots, lifts, ribs, wrinkles, blisters, ridges, splits, bulges, cracks, delaminations or other type defects in the CIPP lining. In addition, there shall be no groundwater leakage through the CIPP or between the liner and the existing pipes including at the connections to manholes. Defective lining and groundwater leakage shall be repaired in a manner suitable to and approved by the Engineer at no additional cost to the Owner.
The Engineer’s decision on how to correct defective lining shall be final. Options for repairing defective lining that will be considered by the Engineer include removing the liner and re-lining the sewer, excavating and replacing the sewer from manhole to manhole, pipe bursting the sewer from manhole to manhole, re-lining sewers completely from manhole to manhole, or installing a sectional CIPP patch to repair the defective area.

In addition, the Engineer and Owner may require an additional warranty beyond the standard warranty period (defined elsewhere in these Specifications) for defective CIPP at no additional cost to the Owner. This additional warranty will be for a maximum of five years (one year standard warranty plus four additional years). This additional warranty may also be required on the entire “batch” of CIPP if the defect appears to be material related (resin, felt, catalyst, etc.) or wet-out related regardless of the acceptance test results or visual review of any particular CIPP liner section in that “batch”.

If a CIPP patch is approved as a repair method for manhole-to-manhole CIPP, the Owner will not pay the full bid price for that sewer segment (manhole to manhole). The price reduction (credit) shall be negotiated with the Contractor and shall be acceptable to the Owner. The credit shall be equal to at least 25% of the unit price bid for the CIPP installation and shall apply to the entire CIPP lining from manhole to manhole. The Owner shall have the final decision on the amount of the credit. Any such credits shall be accounted for on the monthly pay estimates (each and every month) as the defective CIPP is repaired. Credits shall not accumulate until the end of the Contract.
SECTION 02653
MANHOLE REHABILITATION

PART 1 GENERAL

1.01 SCOPE

A. The work under this Section includes the rehabilitation of existing manholes throughout the project and/or service area.

B. This Section covers the cleaning, repair, structural restoration, and rehabilitation of existing manholes as required to eliminate leakage into the manholes and to restore structural integrity. The work includes but is not limited to: cleaning entire manhole interior, repair/reconstruction of the failed sections of the structure; stopping active leaks through manhole walls and joints; preparation of surfaces to receive the application of coatings designed to resist the affects of hydrogen sulfide gas or the affects of aging; and, application of those coatings to provide a monolithic liner on the inside walls of the manhole as specified.

C. All ancillary work shall be constructed properly in accordance with the Drawings and Specifications. All defects shall be remedied to the engineer’s satisfaction prior to approval.

1.02 REFERENCE SPECIFICATION, CODES, AND STANDARDS

A. The Contractor shall ensure that the products and work comply with the reference specifications listed in the Contract Documents.

B. The Contractor shall ensure that the products and work comply with the current version of the following American Society for Testing and Materials (ASTM) standards:

1. ASTM C78 Standard Test Method for Flexural Strength of Concrete
2. ASTM C94 Standard Test for Ready Mix Concrete
4. ASTM C234 Standard Test Method for Comparing Concretes on the Basis of the Bond Developed with Reinforcing Steel
6. ASTM C321 Standard Test Method for Bond Strength of Chemical-Resistant Mortars
7. ASTM C496 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
8. ASTM C596 Standard Test Method for Drying Shrinkage of Mortar Containing Portland Cement
9. ASTM C666 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
1.03 QUALIFICATIONS

A. The Contractor performing the work, as a company, must have at least five years of experience coating manholes with cementitious mortar, and shall have successfully installed a cementitious mortar lining product in a minimum of 2,000 manholes as documented by verifiable Owner references.

B. The Contractor performing the work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner and shall be an approved installer as certified and licensed by the product manufacturer.

C. The Contractor’s proposed superintendent/foreman for the work under this Contract shall have successfully installed a cementitious lining product in a minimum of 1,000 manholes as documented by verifiable Owner references. The Contractor shall submit information to demonstrate that the experience requirements are met.

D. The cementitious product shall have been manufactured for installation specifically in manholes for at least five years and shall have been installed in at least 10,000 manholes. References that are documented and that can be verified shall be submitted to demonstrate that the cementitious products meet these requirements. Contact names and numbers shall be included with the references.

E. Approved cementitious products are listed in these specifications. Even though the product may be listed as approved, the product manufacturer and Contractor(s) shall still meet the experience requirements specified above, or the products and Contractor will not be approved for this work.

1.04 SUBMITTALS

A. Three hard copies (one to be returned to Contractor after review, one to remain with the Engineer and one to remain with the Owner) and one pdf of all submittals specified herein shall be submitted to the Engineer.

B. The Contractor shall submit complete shop drawings of the manhole lining system to demonstrate compliance with these specifications, to show materials of construction and to detail installation procedures. Testing procedures and quality control procedures shall also be submitted.
C. Certifications that the manhole lining was manufactured in accordance with these specifications and the appropriate ASTM standards shall be submitted with each shipment.

D. For all products to be used for manhole rehabilitation, the Contractor shall submit manufacturer documents containing product technical information, ASTM test results and certification, application procedures and specifications for approval, and testing and quality control procedures.

E. References for the Contractor, superintendent and products shall be submitted to verify the specified experience.

F. The Contractor shall submit a plan for bypassing sewage around the work area and facilities where sewage flows must be interrupted to complete the work. The plan shall be reviewed by the Engineer and shall be acknowledged as acceptable before any work is started.

1.05 WARRANTY

A. The materials used for the project shall be certified by the manufacturer for the specified purpose. The manufacturer shall warrant the cementitious liner material to be free from defects in raw materials for 1 year from the date of installation and acceptance by the Owner. The Contractor shall warrant the liner installation for a period of 1 year from final acceptance.

PART 2 PRODUCTS

2.01 MATERIALS – CEMENTITIOUS MORTAR LINING SYSTEM

A. The Contractor shall line the interior of the manholes with a cementitious mortar lining system where specified in accordance with the specifications of the manufacturer.

B. The cementitious manhole lining system for the interior of manholes shall be a monolithic system suitable for use as a trowel- or spray-applied monolithic surfacing in sewer manholes. The cementitious lining system shall be one of the following specified products or approved equal:

- Strong Seal MS-2A, MS-2C, or High Performance by Strong Seal Systems
- QM-1s Restore or Aluminaliner by Quadex
- Cemtec Silatec MSM or CAM by A.W. Cook Cement
- Sewpercoat PG by Kerneos, Inc.
- Permacast MS-10,000 or CR-9000 by Action Products Marketing Corp.
- PerpetuCrete MSC or CA by Protective Liner Systems
- Mainstay ML-72, ML-CA or ML-PF by Madewell
- Reliner MSP or Maximum CA Cement by Standard Cement Materials
Where hydrogen sulfide resistance is required and when specified by the Engineer, the cementitious lining system shall be a 100% calcium aluminate product (product comprised of calcium aluminate cement and calcium aluminate aggregate). Partial calcium aluminate products (or blended products) shall not be considered an equal and shall not be approved. The hydrogen sulfide resistant 100% calcium aluminate products shall be one of the following products or approved equal:

- High Performance by Strong Seal Systems
- Aluminaliner PF by Quadex
- Sewpercoat PG by Kerneos, Inc.
- Mainstlay ML-PF by Madewell
- Cemtec HITECH 100 by A.W. Cook Cement
- Maximum CA Plus Cement by Standard Cement Materials

C. The cementitious lining system shall be a pumpable cement mixture. The lining shall be installed via low-pressure application only. The materials shall be suitable for all the specified design conditions. Trowel application may be approved by the Engineer.

D. The cementitious lining shall provide a minimum service life of 25 years. The cured cementitious lining shall be continuously bonded to all the brick, mortar, concrete, chemical sealant, grout, pipe and other surfaces inside the sewer manhole. Provide bond strength data on cured, cementitious lining based on ASTM test methods referenced herein.

E. The cementitious liner when cured shall have the following minimum characteristics at 28 days as measured by the applicable ASTM standards referenced herein:

1. Minimum compressive strength of 6,000 psi
2. Minimum bond strength of 130 psi
3. Shrinkage of less than 0.05%

F. The cementitious lining shall be compatible with the thermal condition of the existing sewer manhole surfaces. Surface temperatures will range from 20°F to 100°F. Provide test data on shrinkage of the cementitious lining based on the ASTM standards referenced herein.

F. Chemical sealants or grouts used to seal active manhole leaks, to patch cracks, to fill voids and to otherwise prepare the manhole surfaces for the lining installation shall be suitable for the intended purpose and shall be compatible with the lining as certified by the manufacturer.

G. External Coating: Whenever the outside of exposed manholes walls are specified to be coated with a special exterior cementitious mortar product, the exterior mortar shall be HB2 Repair Mortar by ThoRoc, Sikatop 123 by Sika Corporation, or approved equal. The installed thickness shall be at least 2 inches, troweled smooth after application.
2.02 MATERIALS – INJECTION GROUTING

A. The grout used to completely stop identified leaks shall be a polyurethane grout and shall be Hydro Active Cut by DeNeef Construction Chemicals, AV-202 Multigrout by Avanti International, or approved equal.

B. The grout shall be suitable for injection and shall expand to seal identified leaks. The grout shall be installed per the manufacturer’s recommendations. The material shall be suitable for all the specified design conditions.

C. The grout shall provide a minimum service life of 25 years. When cured, the grout shall be suitable for sewer system service and chemically resistant to any chemicals or vapors normally found in domestic sewage. The grout shall be compatible with the thermal condition of the existing sewer manhole surfaces. Surface temperatures will range from 20°F to 100°F.

D. The grout shall effectively seal the identified leak in the sewer manhole and prevent any penetration or leakage of groundwater infiltration at this location or other nearby locations or within the same pre-cast manhole joint as a direct result of the injected grout. Any leaks from such migration shall be sealed at no additional cost.

PART 3 EXECUTION

3.01 DELIVERY, STORAGE, AND SHIPPING

A. Care shall be taken in shipping, handling and placing to avoid damaging the lining products. Any lining product damaged in shipment, showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

B. While stored, the lining products shall be adequately packaged and protected. The lining products shall be stored in a manner as recommended by the manufacturer.

3.02.1 INSTALLATION – CEMENTITIOUS LINING

A. The Contractor shall notify all property owners who discharge sewage directly to the manhole being rehabilitated 72 hours in advance, giving the date, start time and estimated completion time for the work being conducted and the impacts to the property owner.

B. Water for use on this project will be available from selected hydrants. Refer to Specification Section 01232 for requirements.

C. The Contractor shall clean each sewer manhole to be surfaced and shall dispose of any resulting material. The cleaning shall be performed using a high power jet wash at a minimum of 3500 psi water pressure to remove all dust, biological growths, grease, oil, paint or any other surface contaminants or coatings. The tip of the nozzle shall be a maximum of 4 inches from the manhole wall during cleaning to ensure that 3,500 psi is being applied to the walls.
D. Coatings that cannot be removed shall be sanded with coarse sand paper to rough the surface sufficient to obtain and insure adequate bonding of the lining. Roots shall be removed by manually cutting the roots from inside the manhole.

E. The Contractor shall conduct a visual inspection of each manhole after it is cleaned. All active, hydrostatic infiltration leaks shall be plugged or sealed with an appropriate grout compatible with the cementitious lining. Injection grouting may be required to seal active leaks including leaks in existing invert channels and benches. All loose mortar and rubble of existing walls, benches and inverts shall be removed.

F. Prior to installing the lining, the Engineer along with the Contractor must inspect and approve the surface preparation work. The Contractor shall notify the Engineer when the manholes are ready for inspection. The Contractor is responsible for ensuring proper preparation and installation conditions including temperature and moisture regardless of the findings by the Engineer during his inspection. The manhole lining shall be completed immediately after the inspection, or the manhole may need to be re-cleaned prior to spraying to remove accumulated debris on the benches and walls.

G. The Contractor shall prepare the manhole to receive cementitious lining as necessary by reshaping and repairing benches, inverts, and walls where required including smoothing out irregular shaped corbel and chimney sections prior to spray application. All interior surfaces shall be prepared as recommended by the manufacturer. Minimum requirements are as listed below.

1. All cracks and other voids must be repaired and filled with suitable non-shrinking cements, sealants or grouts, including all voids between the existing sewer pipes and manhole walls.
2. All patches shall be smooth and even with the manhole wall.
3. All voids around existing manhole rungs/steps shall be filled.
4. All surfaces shall be suitably prepared for the required bonding of the cementitious lining as recommended by the manufacturer.

H. A complete, watertight seal shall be provided at pipe and manhole wall connections including filling in all voids around the connection and completely covering the connection with an approved non-shrink grout. Contractor shall submit details of how the watertight connections will be made to the Engineer for review and approval. The invert channel shall be coated with an appropriate quick-set grout product in complete accordance with the manufacturer’s instructions.

I. When CIPP is installed in the connecting sewer(s), the invert channel shall be coated with an approved grout to build up the invert channel to the invert elevations of the new cured-in-place pipe lining (CIPP); to fill all voids, cracks, holes, etc.; and to form a smooth flow channel. The entire channel shall be coated. The coating shall be a minimum ¼-inch thick. The Contractor shall submit details of the proposed grout for this application.
J. The Contractor shall furnish and place the cementitious lining in each manhole as shown in the Details. The installation of the lining shall be in complete accordance with the applicable provisions of ASTM and the manufacturers’ specifications.

K. The Contractor shall bypass pump sewage flows around the manhole when the work is being performed. Contractor shall submit a detailed bypass pumping plan to the Engineer prior to starting any work. The Contractor is advised that a number of manholes will surcharge during rain events.

L. The walls and benches shall be coated to the required minimum 1-inch thickness by spray-on methods. Invert channels shall also be coated as specified herein. Cementitious mortar may be trowel-applied if approved by the Engineer. Cementitious mortar lining shall be monolithically applied in one pass or application and shall be troweled smooth after application. The manhole lining shall not be installed until all required main sewer rehabilitation and other manhole rehabilitation work are complete.

M. The cementitious lining shall cover the complete interior of the existing sewer manhole including the benches (shelves). The lining shall effectively seal the interior surfaces of the sewer manhole and prevent any penetration or leakage of groundwater infiltration. When cured, the lining shall form a continuous, tight-fitting, hard, impermeable surfacing which is suitable for sewer system service and chemically resistant to any chemicals or vapors normally found in domestic sewage.

N. The Contractor shall plug off and/or protect the connecting pipes while coating the manhole walls to prevent any material from washing down the sewers. If material enters the sewer pipes, the Contractor will be required to clean the sewers from manhole to manhole to remove all material and then televise the sewer to demonstrate that all material is removed at no cost to the Owner.

O. The Contractor shall take precautions to avoid damage or flooding to public or private property being served by the manhole being rehabilitated. The Contractor shall be responsible for all flooding and pay for cleanup from flooding to the satisfaction of the property owner. The Contractor shall document all backups and submit documentation to the Engineer including the reason for the backup, the time and date of the backup, the property owner’s name, address and phone number, the resolution to problem, the time and date the problem was resolved, and any special cleanup work that had to be performed. This required documentation shall be submitted for all backups regardless of when they occur. All cleanup shall be completed within 4 hours of the backup.

P. **External Coating:** Whenever the outside of exposed manholes walls are specified to be coated with a special exterior cementitious mortar product, the exterior mortar shall be HB2 Repair Mortar by ThoRoc, SikaTop 123 by Sika Corporation, or approved equal. The existing surface shall be completely cleaned and all loose material removed prior to applying the cementitious material. Installation shall be in strict accordance with the manufacturer’s recommendations including utilizing any required bonding agents and providing proper curing conditions. The installed thickness shall be at least 2 inches, troweled smooth after application.
3.02.2 INSTALLATION – INJECTION GROUTING

A. The Contractor shall notify all property owners who discharge sewage directly to the manhole being rehabilitated 72 hours in advance, giving the date, start time and estimated completion time for the work being conducted and the impacts to the property owner.

B. The Contractor shall inject grout to seal the specified leaks. The grout shall be injected in accordance with the manufacturer's instructions. Grout shall continue to be pumped until the leak is completely sealed. The hole drilled to inject the grout shall be covered with non-shrink grout.

3.03.1 ACCEPTANCE TESTS - CEMENTITIOUS MORTAR LINING SYSTEM

A. Field acceptance of the cementitious lining shall be based on the Engineer's field inspections and evaluation of the appropriate installation and curing test data. The cementitious lining shall provide a continuous monolithic surfacing with uniform thickness throughout the manhole interior. If the thickness of the lining is not uniform or is less than specified, it shall be repaired or replaced at no additional cost to the Owner.

B. If the Engineer has to enter the manholes to inspect the work, the Contractor shall provide forced air ventilation, gas monitors and detectors, harnesses, lights, confined space entry permits, etc. for the Engineer or Owner to enter the manhole and perform the inspection in complete accordance with OSHA requirements at no additional cost to the Owner.

C. Samples shall be taken of the installed liner each day that cementitious lining is installed as follows: one sample if one to five manholes were coated that day, two samples if six to ten manholes were coated that day, three samples if eleven to fifteen manholes were coated that day, and four samples if sixteen or more manholes were coated that day. Samples shall be taken at equally spaced intervals throughout the day. The frequency of tests may be increased by the Engineer and performed by the Contractor at no additional cost to the Owner when the required tests show that the installed lining does not meet the specifications.

D. Samples shall be cube samples. At least six cubes shall be taken for each sample for testing. All cube samples shall be taken in the field from the material being sprayed. The Contractor shall show the samples to the Engineer each day and the Engineer shall initial the samples for delivery to the testing laboratory. The Contractor shall properly take and store the samples and shall deliver the samples to the testing laboratory. The laboratory shall document that they received the initialed samples. The tests shall be performed by an independent testing laboratory. All costs associated with the tests shall be paid for by the Contractor. The test results shall be submitted to the Engineer immediately when available, no later than 30 days after the lining is installed, or payment will be withheld.

The samples shall be tested in accordance with the applicable ASTM standards to verify that the installed liner meets the compressive strength requirements specified herein and the lining manufacturer's published data on the product. Tests shall include 7-day and 28-day strength tests (3 tests/cubes for each time
period for each sample). Shrinkage and bond strength tests shall be performed on each batch or lot of material shipped to the Contractor.

E. All manholes shall be tested via vacuum testing when all manhole rehabilitation work to that manhole is complete. Manholes shall not be vacuum tested until at least 7 days after the cementitious lining was installed. Vacuum testing shall be performed in accordance with ASTM C-1244 except that the minimum test time shall be 1 minute. The testing shall be paid for by the Contractor and be included in the bid price for manhole lining. The Engineer or Owner shall be present for all testing. The Contractor shall notify the Engineer 48 hours prior to testing.

The Contractor shall submit test reports of the testing which include the project name, manhole tested, data on testing (vacuum pressure, test duration, etc.), and whether the manholes passed or failed the test. Test reports must be submitted for failed tests with the reason for failure noted on the report. The Engineer shall sign all test reports to document that the Engineer was present for the testing. Any manhole that fails the vacuum test shall be repaired and retested immediately by the Contractor at no additional cost.

F. There shall be no groundwater infiltration or other leakage (active or previously active) through the manhole walls, benches, inverts or pipe connections at the manholes after it has been lined. If leakage is found, it shall be eliminated with an appropriate cement mortar, grout or sealant as recommended by the manufacturer and approved by the Engineer at no additional cost to the Owner. Injection grouting may be required to stop leaks around the pipe connections or in the invert channel or benches. The Engineer’s decision on how defective lining is repaired shall be final. If any defective lining is discovered after it has been installed or during the warranty period, it shall be repaired or replaced in a satisfactory manner at no additional cost to the Owner. Repaired manholes including those repaired during the warranty period shall be vacuum tested at no additional cost to the Owner.

G. Payment shall not be made for the installed cementitious lining until (1) the manhole passes the vacuum test, (2) all material tests are submitted, and (3) the final CCTV inspection of the CIPP liner is submitted as specified in Section 02651 (when CIPP is installed; final CCTV performed after manhole rehabilitation is completed).

3.03.2 ACCEPTANCE TESTS – INJECTION GROUTING

A. Field acceptance of the grout shall be based on the Engineer’s visual inspections, the Engineer’s evaluation of the appropriate installation, and the absence of any visible active leaks in the general area of the original leak location or within the same pre-cast manhole joint.

B. If the Engineer has to enter the manholes to inspect the work, the Contractor shall provide forced air ventilation, gas monitors and detectors, harnesses, lights, confined space entry permits, etc. for the Engineer or Owner to enter the manhole and perform the inspection in complete accordance with OSHA requirements at no additional cost to the Owner.
C. There shall be no groundwater infiltration or other leakage (active or previously active) at or near the original leak location or within the same the pre-cast manhole joint after it has been repaired. If leakage is found and deemed to be a direct result of the original repair as determined by the Engineer, it shall be eliminated as approved by the Engineer at no additional cost to the Owner. The Engineer’s decision on how additional leak(s) are repaired shall be final. If any additional leaks are discovered after it has been installed or during the warranty period, they shall be repaired in a satisfactory manner at no additional cost to the Owner.

END OF SECTION
SECTION 02700
PRECAST CONCRETE MANHOLES

1. SCOPE:

This section covers standard and drop sewer manholes. Manholes shall be constructed complete with covers, steps, fittings and other appurtenances specified herein and in accordance with the Details.

Excavation and backfill are covered in Section 02200.

2. PRODUCT REQUIREMENTS:

All new manholes shall be precast concrete manholes except in special circumstances as approved by the Engineer. All precast concrete manholes shall conform to the Details and to ASTM C-478. The following minimum standards also apply:

a) Wall Thickness shall be 1/12 of the inside diameter with a minimum thickness of 5 inches.

b) Concrete shall be in accordance with ASTM C478, C890, C891 and C923. Compressive strength to be minimum 4,000 psi at 28 days. Air content to be maximum of 4%. Air entraining admixtures shall be in accordance with ASTM C260. Chemical admixtures shall be in accordance with ASTM C494 and shall not contain any calcium chloride. Refer to Section 03300 for additional requirements.

c) Aggregate shall be sound, crushed, angular granite stone only, substantially in accordance with ASTM C-33, except that the requirement for gradation in that standard shall not apply. Smooth or rounded stone (river rock) shall not be acceptable.

d) Cement shall be Type II with a maximum tricalcium aluminate content of 8%. In lieu of Type II cement and granite aggregate, Type III cement with calcareous (limestone) aggregate may be used. The manhole manufacturer shall submit lab tests certifying the amount of Alkalinity (minimum 78%) present in the concrete mix. Cement shall be minimum 564 pounds per cubic yard.

e) Steel reinforcement shall be in accordance with ASTM A615 Grade 60 deformed bar, ASTM A82 or ASTM A185 welded wire fabric (WWF).

f) Base sections shall include the bottom slab and the first wall section to include the factory-formed pipe openings. The base sections shall be cast monolithically unless otherwise approved by the Engineer and shall be circular with uniform outside diameter. The thickness of the bottom
slab shall be not less than that of the manhole riser sections or top slab or 6 inches whichever is greater.

g) **Riser sections** shall be circular with uniform outside diameter. Riser sections/joints shall be limited to the maximum extent possible.

h) **Cone sections** shall be eccentric with the inside face of one side vertical and flush with the inside face of the barrel section. Same wall thickness as the base and riser sections.

i) **Joints** between sections shall be tongue and groove joints manufactured in accordance with ASTM C-443. Joints may be sealed with rubber gaskets in accordance with ASTM C-443 or with two pieces of butyl rubber sealant conforming to Federal Specification SS-S-210A and AASHTO M-198, Type B. The cross-sectional area of the butyl rubber sealant shall be no less than the annular space times the height of the joint.

j) **Below grade exterior joints** shall be sealed externally with minimum 8-inch-wide, 1/8-inch-thick butyl rubber sealant.

k) **All above grade exterior joints and all interior joints** shall be sealed with an approved non-shrink grout.

l) **All markings** required by ASTM C-478 shall be clearly stamped on the inside of each section.

m) Manhole riser sections, flat top slabs and cone sections shall be designed for H-20 loadings per ASTM 890.

n) **Manhole benching and invert channels** shall be precast by the manhole manufacturer. Formed and poured in place benches and inverts may be approved in certain situations by the Engineer and shall be used where specifically required such as for a doghouse manhole. Precast inverts shall be constructed using minimum 4,000 psi concrete as specified for the manhole sections above. Poured-in-place benching and invert channels shall be minimum 4,000 psi with fiber reinforcing. Full-pipe invert channels shall be provided for all manholes.

The Contractor shall be responsible for determining exact invert elevations and furnishing the information to the manhole manufacturer prior to the manufacture of the manhole and precast bench and invert. All benching and invert channels shall conform to the Details.

o) **Lifting device** shall be ASTM steel strand. Lifting loops made from deformed bars are not acceptable.

Lifting holes may be on the inside or outside faces of the walls to facilitate handling. The depth of the lifting holes shall not be deeper than the wall thickness minus 2 inches. Lifting holes that penetrate through the wall are not acceptable. Lifting holes shall be filled with non-shrink grout.
p) The manhole manufacturer shall furnish the Engineer with test results on compressive strength and absorption for one section in every fifteen sections poured, and certification from cement manufacturer and aggregate supplier certifying chemical content. The Engineer reserves the right to pick random samples for testing. The manufacturing facility shall be made available for the Engineer at all times for inspections.

q) Pipe Connections to Manholes: Pipes shall be connected to new manholes via flexible rubber boot connectors/seals. Where required and/or necessary and where approved by the Engineer, cored holes may be used. For cored holes, fill all voids with non-shrink grout and pour a concrete collar outside of the manhole. Pipe shall be pushed to the designed stop and no further.

Flexible rubber boot connectors shall conform to ASTM C-923 and shall be A-Lok or Contour Seal. Rubber boots shall be integrally cast into the base section or installed in cored openings with stainless steel compression bands. Openings around the rubber boot connectors shall be filled with non-shrink grout.

The locations of the pipe openings shall vary from the locations shown on the Drawings by no more than ½-inch vertically and 5 degrees horizontally. Pipe openings shall provide clearance for pipe projecting a minimum of 2 inches inside the manhole.

r) Manhole steps shall be furnished in accordance with the Details, ASTM C-478 and current OSHA regulations. Testing requirements to be as specified in ASTM C-478 plus each step shall be tested to resist a 1,000 lb pullout. The manhole manufacturer shall furnish certification of each test with each shipment showing manhole location, date of test and results.

s) Manhole Frames and Covers: Manhole frames and covers shall be as specified and shown in the Details. Manhole covers on private sewer systems shall be the same as shown in the Details.

Frames and covers shall be ASTM A48 Class 35 gray iron per Section 3.1 of AASHTO M306. Frames and covers shall be of uniform quality, free from sand holes, gas holes, shrinkage, cracks and other surface defects. Castings shall be ground smooth and well cleaned by shot blasting. Bearing surfaces shall be cast or machined with such precision to prevent rocking.

Frames and covers shall be rated for traffic loading and shall have first article proof load tests conducted in accordance with AASHTO M306, Section 7, Proof Load Testing. The results of these tests shall be made available to the Engineer upon request. The casting shall be tested on a suitable load testing machine and the casting shall hold a 40,000 pound load for one minute without experiencing any cracks or detrimental permanent deformation.
Each frame and cover shall be clearly marked to show, at a minimum, the name of the producing foundry, country of manufacture, ASTM material designation, individual part number, and cast or heat date.

If corrosion protection of the manhole is specified, the frame and cover shall be protected from corrosion by sandblasting and coating the entire frame and cover at the factory with coal tar epoxy, Koppers 300M or equal, 2 coats at minimum 8-mil dry film thickness each. Any damage to the coating shall be repaired in the field in a manner approved by the Engineer. If the frame and cover are not coated at the factory, all field-applied coating must be applied to the Engineer’s approval.

Frames: All frames shall be equipped to accept a cam-lock cover. Frames may be (1) standard height or low profile for use with cone sections and flat top sections below grade or (2) slab-type for all above grade flat top sections. Frames shall be as manufactured by East Jordan Iron Works.

Covers: All covers shall have a neoprene O-ring or T-gasket permanently installed in a machined groove under the lid. Side or wiper gaskets are not approved.

Watertight covers shall have two 5/8” stainless steel hexagonal head bolts and brass cam lock devices to engage the lock on the frame and provide the watertight seal. The cam-lock shall be capable of locking at any location around the frame.

As the standard, the opening device on covers shall be two 5/8” stainless steel pick bars. In some cases, non-penetrating pickholes may be specified.

Covers to have a nominal opening diameter of 24 inches. Larger openings/cover may be specified by the Engineer for specific installations and/or for large diameter sewers.

Covers may be watertight (with cam-locks), solid (solid with no cam-locks) or vented (no cam locks, two 1” holes in cover). Covers shall be as manufactured by East Jordan Iron Works.

Alternate frames and covers to those specified must be approved by the Owner. A sample of the frame and cover must be delivered to the Owner as part of the review and approval process.

Manhole Adjustment: Manholes shall be ordered such that minimum grade adjustments will be required to achieve the final rim elevation. The manhole base, riser and cone heights shall stack out the manhole as close as possible to the final rim elevation. The maximum allowable height adjustment shall be six inches unless approved otherwise. Adjustments may be made with brick or concrete grade rings as specified below. The Contractor shall submit detailed shop drawings for each
manhole showing all dimensions and elevations. The Contractor shall identify any required height adjustments on the shop drawings. Adjustments must be approved by the Owner/Engineer prior to manufacturing the manholes.

Bricks used for adjusting cover elevations shall meet the requirements of ASTM C32 Grade MS and shall have minimum dimensions of 2 1/4-inches by 3 1/2-inches by 7 1/2-inches. Brick shall be new, solid, sound, hard-burned throughout and uniform in size and quality. Bricks shall be set in a bed of non-shrink grout, minimum 1 inch thick. The outside of all bricks shall also be coated with minimum 1 inch thick non-shrink grout. The exterior grout shall overlap the cone section at least 4 inches and shall extend to above the frame flange to provide a complete exterior coating.

Precast concrete grade rings for setting cast iron frames over manholes shall be circular, 2 inches thick minimum, and have one No. 2 continuous reinforcing steel bar and shall be manufactured in accordance with ASTM C478. Leveling rings shall be set in a bed of non-shrink grout, minimum 1 inch thick. The outside of all rings shall also be coated with minimum 1 inch thick non-shrink grout. The exterior grout shall overlap the cone section at least 4 inches and shall extend to above the frame flange to provide a complete exterior coating.

u) Non-shrink grout shall be Quikrete Commercial Grade Non-Shrink Grout, Master Builders “Masterflow 713 Grout” or “Set-Grout”, Sauereisen Cements “F-100 Level Fill Grout”, U.S. Grout “Five Star Grout” or approved equal.

v) Epoxy grout shall be a two-component, solvent free, moisture insensitive, high modulus, high strength, Type I and II, Grade 3, Class B and C, Epoxy Resin Adhesive meeting the requirements of ASTM C-881.

w) **Steel vent pipes** shall be as specified in Section 02630.

x) **Manhole Pressure Restraints:** Manholes with watertight covers are subject to internal water pressure which could unseat the tops. Therefore, the tops shall be anchored to the first barrel section (which must be at least 5 feet long) with three anchor bars spaced 120 degrees around the manholes unless otherwise approved by the Engineer. The anchor bars shall be 3/8-inch x 3-inch x 24 inches long with a 7/8-inch hole 1-1/2 inches from each end and hot dip galvanized after fabrication. Each bar shall be anchored to the outside of the barrel and top slab with 3/4-inch x 6-inch-long galvanized steel adhesive anchor bolts.

y) **Corrosion Protection:** The Engineer will specify specific manholes to be protected against hydrogen sulfide corrosion. The manholes will be in high corrosion areas, where the potential for corrosion exists or is predicted for the future, and at the discharge of force mains into the gravity sewer.
The corrosion protection shall be accomplished by coating the manhole walls and benches with a specialized cementitious mortar product or an epoxy. The material must be approved by the Engineer.

The specialized cementitious mortar product shall be High Performance by Strong Seal Systems, Aluminaliner PF by Quadex, Sewpercoat PG by Kerneos, Mainstay ML-PF by Madewell, Cemtec HITECH 100 by A.W. Cook Cement, or approved equal. The mortar shall be spray-applied to a minimum thickness of 1-inch and troweled smooth after application. For this option, the invert channels and other exposed surfaces shall be coated with Koppers 300M coal tar epoxy or equal, 2 coats at 8 mil dry film thickness each.

As an alternate, where approved by the Engineer, the manhole walls, benches and invert can be coated with a specialized spray-applied epoxy coating (Raven 405 by Raven Lining Systems or equal) at a minimum dry film thickness of 160 mils. The Engineer will specify the required thickness.

3. QUALIFICATIONS AND QUALITY ASSURANCE:

All precast concrete manholes shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the material to be furnished. The manholes shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

The precast manufacturer shall have a recognized Quality Improvement Process installed at the manufacturing facility. Concrete compressive strength testing shall be performed in a laboratory inspected by the CCRL of the National Bureau of Standards or approved SCDOT laboratory. Testing shall be performed by the Grade I ACI Certified Laboratory Technicians or by Level I PCI Certified Technicians.

The Contractor shall submit to the Engineer shop drawings showing details of construction for each manhole including dimensions for each manhole and manhole section; step locations; reinforcing size, spacing and location; joint construction and details; invert channels and benching details; waterproofing; pipe connection details; concrete mix and design strength; wall thickness; H-20 wheel load confirmation; etc.

The quality of all materials, the process of manufacture, and the finished products shall be subject to inspection and approval by the Engineer. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places, and the products shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though sample sections may have been accepted as satisfactory. Products rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All products which have been damaged after delivery will be rejected and, if already installed, shall be repaired or removed and replaced, as directed by the Engineer, at no additional cost to the Owner.
At the time of inspection, the products will be carefully examined for compliance with the ASTM designation specified herein and these Specifications, and with the approved manufacturer's shop drawings. All products shall be inspected for general appearance, dimension, honeycomb, blisters, cracks, roughness, soundness, etc. The surfaces shall be dense and close-textured.

Imperfections in the concrete may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of seven days and 5,000 psi at the end of 28 days when tested in 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer. Repair material must be approved by the Engineer. A minimum of three coats of mortar material shall be applied for all repair work.

The Contractor shall furnish in duplicate to the Engineer, prior to each shipment of manholes, unless otherwise approved by the Engineer, manufacturer's certification and certified test reports that the manholes were manufactured and tested in accordance with the ASTM Standards specified herein.

All precast manholes shall be permanently marked with the following information:

1. Manufacturer, date.
2. Manhole diameter, manhole number where appropriate.
3. Standard produced to (ASTM, etc).

4. DELIVERY, STORAGE AND HANDLING:

Care shall be taken in loading, transporting and unloading to prevent injury to the manholes. Under no circumstances shall the manhole sections be dropped. Hooks shall not be allowed to come in contact with the joints. Materials, if stored, shall be kept safe from damage.

Precast concrete sections shall not be delivered to the job until representative concrete control cylinders have attained a strength of at least 80% of the specified minimum.

5. INSTALLING PRECAST MANHOLES:

Manholes and other precast structures shall be constructed to the dimensions as shown on the Drawings and as specified in these Specifications. Excavation, bedding and backfilling shall be as specified in Section 02200.

Manhole bases shall be placed on at least 12 inches of compacted SCDOT No. 57 crushed stone (6 inches when placing bedding on solid rock). The surface of the bedding material shall be carefully graded and the base section accurately set so that the connecting pipes will be on proper line and grade. The elevation of the bedding shall be adjusted as required until proper grade and alignment of the base section has been attained. Precast concrete bases and barrel sections shall be set
so as to be vertical and with sections in alignment. No wedging or blocking under precast bases shall be allowed.

Precast bases shall have properly sized and oriented pipe openings. The connecting pipes shall be carefully adjusted to the proper line and grade, and the pipe bedding shall be compacted under the pipe completely for support during installation of the manhole.

The joints of precast barrel sections shall be sealed with preformed flexible joint butyl sealant used in sufficient quantity to completely fill the joint cavity (minimum 2 pieces per joint as shown in the Details) or O-rings. The inside of each joint and the outside of above-grade joints shall be filled with a non-shrink grout resistant to hydrogen sulfide and finished flush with the adjoining surfaces. The outside of below grade joints shall be sealed with an 8-inch-wide, 1/8-inch-thick exterior butyl rubber seal strip as shown on the Details. Allow completed joints to set for 24 hours before backfilling unless approved to be backfilled earlier by the Engineer. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides, as specified in Section 02200. The Contractor shall install the precast sections in a manner that will result in watertight joints.

Holes in the concrete required for handling or other purposes shall be plugged with a non-shrinking grout.

Where additional holes may be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may weaken the joints. Any such cutting shall be performed with appropriate sized concrete coring machines. Epoxy mortar or non-shrink grout shall be used to form smooth openings where rubber connectors are used.

Manhole frames and covers shall be installed as specified and shown in the Details. All frames shall be bolted to cones as shown unless otherwise approved by the Engineer/Owner.

Interior coatings for corrosion protection shall be installed where specified. All internal coatings shall be applied in strict accordance with the manufacturer’s recommendations. The Contractor shall first clean each sewer manhole to be surfaced and shall dispose of any resulting material. The cleaning shall be performed using a high power jet wash at a minimum of 3500 psi water pressure to remove all dust, biological growths, grease, oil, paint or any other surface contaminants or coatings. Coatings that cannot be removed shall be sand-blasted to ensure adequate bonding of the coating. The walls and benches shall be coated monolithically to the required thickness by spray-on methods. Cementitious coatings shall be minimum 1” thick and shall be troweled smooth after application. If epoxy is installed, the coating shall be at least 160 mils thick. The invert channel and any other exposed surface not protected from corrosion shall be coated with Koppers 300M coal tar epoxy or approved equal, 2 coats, minimum 8 mil dry film thickness each.

Install galvanized steel pressure restraints across manhole sections where specified. Pressure restraints are required for all flat-top manholes with watertight covers unless otherwise approved by the Engineer.

02700-8
It shall be the Contractor’s responsibility to protect the structure against flotation regardless of elevation of the groundwater table until structure excavation or backfill is completed.

Concrete benching and invert channels shall be installed and/or finished to meet the requirements shown in the Details.

When installation is not in progress, or the potential exists for dirt or debris to enter the manhole, the manhole shall be covered with wood or other protection. At no time shall surface water or ground water be allowed to enter manholes during construction.

6. ACCEPTANCE TESTS:

All manholes shall be tested via vacuum testing per ASTM C1244 except that the minimum test times shall be as defined in the Table 1 (test times modified from those in ASTM C-1244). Vacuum testing shall not be performed until the manhole is completely finished, including applying any protective coating where specified. Manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind prior to the vacuum testing and then again prior to final inspection as required.

The vacuum test unit shall be placed at the top of the manhole structure to include the frame/cone interface/seal in the test. A plate test unit will likely be required to perform the test. Bladder units can be used as long as the bladder does not cover the interface of the frame and the cone section.

Vacuum tests shall be performed by placing the testing unit at the top of the manhole in accordance with the manufacturer’s recommendations. A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test unit closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of mercury. The manhole shall pass if the time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury meets or exceeds the test times indicated in Table 1 below. The test times in Table 1 are modified from those in ASTM C-1244. Table 1 shall be included on the Contractor’s test reports. Refer to ASTM C-1244 for further requirements.

Any leaks found during the vacuum testing shall be repaired by the Contractor in a manner approved by the Engineer. If a waterproofing compound is approved by the Engineer to repair leaks (such as Thoroseal or approved equal), a minimum of three (3) coats shall be applied in accordance with the manufacturer’s recommendations and as approved by the Engineer/Owner. The manhole shall be vacuum tested again after such repairs are made until the manhole passes the vacuum test at no additional cost to the Owner.
<table>
<thead>
<tr>
<th>Manhole Depth (feet)</th>
<th>Manhole Diameter (inches)</th>
<th>Test Time (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>36</td>
<td>42</td>
</tr>
<tr>
<td>8</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>12</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>14</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>16</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>18</td>
<td>64</td>
<td>76</td>
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<tr>
<td>20</td>
<td>70</td>
<td>84</td>
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<tr>
<td>22</td>
<td>78</td>
<td>92</td>
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<tr>
<td>24</td>
<td>84</td>
<td>102</td>
</tr>
<tr>
<td>26</td>
<td>92</td>
<td>110</td>
</tr>
<tr>
<td>28</td>
<td>98</td>
<td>118</td>
</tr>
<tr>
<td>30</td>
<td>106</td>
<td>126</td>
</tr>
</tbody>
</table>

**TABLE 1. MINIMUM VACUUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS**

Cementitious Coating for Corrosion Protection: Whenever a cementitious mortar coating is applied for corrosion control, samples shall be taken of the installed liner each day that cementitious lining is installed with at least one test for every five manholes coated that day. Samples shall be cube samples. At least six cubes shall be taken for each sample for testing. The samples shall be tested in accordance with the applicable ASTM standards to verify that the installed liner meets the compressive strength requirements specified herein and the lining manufacturer’s published data on the product. Tests shall include 7-day and 28-day strength tests (3 tests/cubes for each time period for each sample). Shrinkage and bond strength tests shall be performed on each batch or lot of material shipped to the Contractor as directed by the Engineer. The tests shall be performed by an independent testing laboratory. All costs associated with the tests shall be paid for by the Contractor. The test results shall be submitted to the Engineer immediately when available, no later than 30 days after the coating is installed.

There shall be no groundwater infiltration or other leakage (active or evidence of being previously active) through the manhole walls, benches, inverts or pipe connections at the manholes. If leakage is found, it shall be eliminated with an appropriate non-shrink cement mortar, grout or sealant as recommended by the manufacturer and approved by the Engineer at no additional cost to the Owner. Injection grouting (Avanti AV-202 Multigrout or approved equal) may be required to stop leaks around the pipe connections or in the invert channel or benches – grout material must be submitted to and approved by the Engineer. If a waterproofing compound is approved by the Engineer to repair leaks (such as Thoroseal or approved equal), a minimum of three (3) coats shall be applied in accordance with the manufacturer’s recommendations. The Engineer’s decision on how defective manholes are repaired shall be final. If any defective manholes are discovered after they have been installed or during the warranty period, they shall be repaired or replaced in a satisfactory manner at no additional cost to the Owner. Repaired manholes including those repaired during the warranty period shall be vacuum tested again at no additional cost to the Owner.

**END OF SECTION 02700**
SECTION 03300

CONCRETE AND GROUTS

1. **SCOPE:**

This section covers all cast-in-place concrete, including reinforcing steel, forms, finishing, curing, and appurtenant work. All concrete shall be air-entrained.

All cast-in-place concrete shall be accurately formed and properly placed and finished, as indicated on the Drawings, in the Details and/or specified herein.

The Contractor shall inform the Engineer at least 24 hours in advance of the times and places at which he intends to place concrete.

2. **MATERIALS:**

   (a) **Cement:** ASTM C150, Type I or II.

   (b) **Fine Aggregate:** Clean natural sand, ASTM C33. Artificial or manufactured sand will not be acceptable.

   (c) **Coarse Aggregate:** Crushed rock, washed gravel, or other inert granular material conforming to ASTM C33, except that clay and shale particles shall not exceed one percent. Smooth or rounded stone will not be acceptable.

   (d) **Water:** Clean and free from deleterious amounts of oil, acids, alkalies, and organic materials.

   (e) **Admixtures:**

      Water-Reducing: ASTM C494, Type A or D.


   (f) **Reinforcing Steel:**

      Bars: ASTM A615, Grade 60, deformed in accordance with ASTM A305, except 1/4” bars may be plain.


      Bar Supports: CRSI Class 1, plastic protected, or Class 2, stainless steel protected.

   (g) **Fiber Reinforcement:** Where fiber reinforced concrete is shown or specified, the concrete shall have added at the time of initial mixing at least 5 pounds of glass fiber per cubic yard of concrete.
(h) **Forms:**

- **Plywood:** Product Standard PS1, waterproof, resin-bonded, exterior type, Douglas fir.
- **Lumber:** Straight, uniform width and thickness, and free from knots, offsets, holes, dents, and other surface defects.
- **Form Oil:** Light-colored paraffin oil or other acceptable nonstaining material.
- **Polyethylene Film:** Product Standard PS17, 6 mils or thicker.

(i) **Membrane Curing Compound:** ASTM C-309, Type 2.

(j) **Non-Shrink Grout:** Quikrete Commercial Grade Non-Shrink Grout, Master Builders “Masterflow 713 Grout” or “Set-Grout”, Sauereisen Cements “F-100 Level Fill Grout”, U.S. Grout “Five Star Grout” or approved equal.

(k) **Epoxy Grout:** Two-component, solvent free, moisture insensitive, high modulus, high strength, Type I and II, Grade 3, Class B and C, Epoxy Resin Adhesive meeting the requirements of ASTM C-881 by Sika, Master Builders, Sauereisen or equal.

The source and quality of concrete materials and the concrete proportions proposed for the work shall be submitted to the Engineer for review before concrete is placed.

3. **LIMITING REQUIREMENTS:**

Concrete shall be watertight, resistant to freeze-thaw cycles and moderate sulfate attack, abrasion resistant, workable, and finishable. Unless otherwise specified, concrete shall be controlled within the following limiting requirements.

3.01. **Minimum Cement Factors.** The quantity of portland cement, expressed in pounds per cubic yard, shall be not less than that indicated in the following table:

<table>
<thead>
<tr>
<th>Coarse Aggregate Size from No. 4 Sieve to</th>
<th>3/8&quot;</th>
<th>1/2&quot;</th>
<th>3/4&quot;</th>
<th>1&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inches</td>
<td>629</td>
<td>592</td>
<td>564</td>
<td>536</td>
</tr>
<tr>
<td>4 inches</td>
<td>639</td>
<td>611</td>
<td>583</td>
<td>555</td>
</tr>
<tr>
<td>5 inches</td>
<td>658</td>
<td>630</td>
<td>602</td>
<td>573</td>
</tr>
</tbody>
</table>
3.02. **Ratio of Fine to Total Aggregates.** The ratio of fine to total aggregates based on solid volumes (not weights) shall be:

<table>
<thead>
<tr>
<th>Coarse Aggregate Size</th>
<th>Minimum Ratio</th>
<th>Maximum Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 inch</td>
<td>0.45</td>
<td>0.60</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>0.40</td>
<td>0.55</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>0.35</td>
<td>0.50</td>
</tr>
<tr>
<td>1 inch</td>
<td>0.30</td>
<td>0.46</td>
</tr>
</tbody>
</table>

3.03. **Total Water Content.** Total water content of concrete shall not exceed 5.4 gallons of water per hundred pounds of cement in the mix.

3.04. **Slump.** Concrete slump shall be kept as low as possible consistent with proper handling and thorough compaction. Unless otherwise authorized by the Engineer, slump shall be a minimum of 3 inches and a maximum of 5 inches.

3.05. **Total Air Content.** The total volumetric air content of concrete after placement shall be 5 percent plus or minus one percent.

3.06. **Admixtures.** The admixture content, batching method, and time of introduction to the mix shall be in accordance with the manufacturer's recommendations. A water-reducing admixture and an air-entraining admixture shall be included in all concrete. No calcium chloride or admixture containing chloride from other than impurities from admixture ingredients will be acceptable.

3.07. **Strength.** The minimum acceptable compressive strength, as determined by ASTM C39, unless otherwise specified shall be:

<table>
<thead>
<tr>
<th>Age</th>
<th>Minimum Compressive Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 days</td>
<td>3,000 psi</td>
</tr>
<tr>
<td>28 days</td>
<td>4,000 psi</td>
</tr>
</tbody>
</table>

4. **STORAGE OF MATERIALS:**

Cement shall be stored in suitable moisture-proof enclosures. Cement that has become caked or lumpy shall not be used.

Aggregates shall be stored so that segregation and the inclusion of foreign materials are prevented. The bottom 6 inches of aggregate piles in contact with the ground shall not be used.

Reinforcing steel shall be carefully handled and shall be stored on supports that will keep the steel from contact with the ground.

5. **BATCHING AND MIXING:**

Concrete shall be furnished by an acceptable ready-mixed concrete supplier and shall conform to ASTM C94.
5.01. **Consistency.** The consistency of concrete shall be suitable for the placement conditions. Aggregates shall float uniformly throughout the mass, and the concrete shall flow sluggishly when vibrated or spaded. The slump shall be kept uniform.

5.02. **Delivery Tickets.** A delivery ticket shall be prepared for each load of ready-mixed concrete. A copy of each ticket shall be handed to the Engineer by the truck operator at the time of delivery. Tickets shall show the quantity delivered, the amount of each material in the batch, the outdoor temperature in the shade, the time at which the cement was added, and the numerical sequence of the delivery.

6. **FORMS:**

Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions indicated on the Drawings or in the Details. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment.

Forms for pavement, curbs, or gutters shall be made of steel and shall be supported on thoroughly compacted earth. The top face of pavement forms shall not vary from a true plane more than 1/4 inch in 10 feet.

Forms shall be thoroughly cleaned and oiled before concrete is placed.

Where concrete is placed against gravel or crushed rock which does not contain at least 25 percent material passing a No. 4 sieve, such surfaces shall be covered with polyethylene film to protect the concrete from loss of water. Joints in the film shall be lapped at least 4 inches. Film shall not be used under roads.

6.01. **Form Ties.** Form ties shall be of the removable end, permanently embedded body type, and shall have sufficient strength and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders.

6.02. **Edges and Corners.** Chamfer strips shall be placed in forms to bevel all salient edges and corners, except the top edges of walls and slabs which are to be tooled and edges which are to be buried. Unless otherwise noted, bevels shall be 3/4 inch wide.

6.03. **Form Removal.** Forms shall not be removed or disturbed until the concrete has attained sufficient strength to safely support all dead, live, and construction loads. Care shall be taken in form removal to avoid surface gouging, corner or edge breakage, and other damage to the concrete.

7. **REINFORCEMENT:**

Reinforcement shall be accurately formed and positioned, and shall be maintained in proper position while the concrete is being placed and compacted. Unless otherwise indicated on the drawings, the details of fabrication shall conform to ACI 315 and 318. In case of conflict, ACI 318 shall govern. Mechanical connections shall be used only as indicated on the Drawings.
All reinforcing bars and supplies shall be stored off the ground, and protected from oil, paint, grease, rusting, or scale. Bending of bars shall be done in accordance with the requirements of ACI 315. All bars shall be bent cold and in the shop.

Steel reinforcing shall be accurately positioned and secured against displacement by using concrete or metal chairs, spacers, or other devices to properly support and fasten the reinforcing. Splices shall not be made at points of maximum stress, nor shall all bars be spliced at the same location. All bars shall have a splice of a minimum 30 bar diameters.

Metal accessories shall include all spacers, ties, chairs, bolsters, and other devices required to support and fasten and hold the reinforcing steel in place, shall meet the requirements of ACI 315.

Wire mesh reinforcing shall have the spacing and gage shown on the Drawings or in the Details. Mesh shall be pulled taut and furnished with sufficient support to hold it in position during placing of the concrete. Mesh shall be lapped one space at all splices and wired together at every other interval.

8. PLACEMENT:

Concrete shall be conveyed to the point of final deposit and placed by methods which will prevent segregation or loss of ingredients. During and immediately after placement, concrete shall be thoroughly compacted and worked around all reinforcement and embedments and into the corners of the forms. Concrete shall be compacted by immersion-type vibrators, vibrating screeds, or other suitable mechanical compaction equipment. The use of jitterbug tampers to compact concrete flatwork will not be permitted.

Concrete shall not be placed in any forms until all reinforcing steel, pipes, sleeves, inserts, anchors, and other appurtenances have been installed and inspected.

Concrete that has contained its mixing water for more than 45 minutes shall not be placed. Concrete shall not be placed when the temperature is 40 degrees F and falling or when freezing temperatures are predicted for the next 24 hours. All concrete placed in weather above 90 degrees F shall be covered by shading, sprinkling, or other approved means for a minimum of 24 hours. Construction joints shall be made where shown on the Drawings or in the Details. When replacing existing concrete, the concrete shall be sawed, thoroughly cleaned and all laitance removed.

9. TESTING:

9.01. Air Content. An air content test shall be made from each batch of concrete from which concrete compression test cylinders are made. The Contractor shall provide all equipment and supplies necessary for the testing. Air content shall be determined in accordance with ASTM C173 or ASTM C231.

9.02. Slump. A slump test shall be made from each batch of concrete from which concrete compression test cylinders are made. Slump shall be determined in accordance with ASTM C143.
9.03. **Test Cylinders.** Compression test specimens shall be made, cured, stored, and delivered to the laboratory in accordance with ASTM C31 and C39.

One set of concrete test cylinders shall be cast for each concrete pour. A set of test cylinders shall consist of four cylinders, two to be broken and to have compressive strengths averaged at 7 days, and two to be broken and to have compressive strengths averaged at 28 days. All concrete required for testing shall be furnished by the Contractor. No additional compensation will be paid to the Contractor for concrete so used.

Testing of the cured cylinders shall be performed by an independent testing laboratory at the expense of the Owner. The Contractor shall deliver the cylinders to the Engineer at the end of each day that concrete pours are made.

10. **FINISHING:**

Recesses from form ties shall be filled flush with mortar. Fins and other surface projections shall be removed from all formed surfaces, except exterior surfaces that will be in contact with earth backfill.

Unless otherwise specified, unformed surfaces shall be screeded and given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance, with no unnecessary working of the surface.

Initial floating shall be followed by a second floating at the time of initial set. The second floating shall produce a finish of uniform texture and color. The completed finish for unformed surfaces shall be the finish produced by the second floating.

10.01. **Pavement.** Following placement, consolidation, and the disappearance of bleed water, the concrete surface shall be broom finished with a broom acceptable to the Engineer. The broom shall be not less than 18 inches wide and made from good quality bass or bassine fibers not more than 5 inches long. The broom finishing shall produce regular corrugations not over 1/8 inch deep. The broom shall be pulled square across the surface, from edge to edge, with adjacent strokes slightly overlapped, and shall not tear the concrete surface.

The surface of pavements shall not vary more than 1/8 inch under a 10 foot straightedge placed parallel to the center line.

10.02. **Curb and Gutter.** Curb and gutter shall be finished to the shape indicated on the Drawings, in the Details or to match existing shapes. After the forms have been removed, all exposed edges shall be rounded, using an edging tool having a 1/8 inch corner radius. Exposed surfaces shall be float finished and given a light broom finish at the time of initial set, using a horsehair broom applied at right angles to the length of curb and gutter.
10.03. **Sidewalks.** Concrete surfaces shall be screeded to the proper elevation and contour. All aggregates shall be completely embedded in mortar. Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance, with no unnecessary working of the surface. Initial floating shall be followed by a second floating at the time of initial set.

Floated surfaces shall be given a light broom finish, using a horsehair broom, to provide a non-slip surface. Brooming shall be done at right angles to the length of the walk.

Sidewalks shall be edged, using a 3 or 4 inch wide edging tool having a 1/8 inch corner radius. Edger lap marks at corners of each slab shall be carefully removed. False joints shall be provided at right angles to the length of the walk, using a grooving tool with 1/8 inch radius. The finished edge on each side of the joint shall be the same width as the edging tool used. False joints shall divide each sidewalk into sections having a length equal to the width of the walk unless specified otherwise.

The finished surface of all sidewalks shall match the existing surfaces, shall be neat in appearance, shall be sloped to drain, and shall not pond water.

11. **CURING:**

Concrete shall be protected from loss of moisture by water saturation or by membrane curing for at least 7 days after placement.

Water saturation of concrete surfaces shall begin as quickly as possible after initial set of the concrete. Unformed surfaces shall be covered with polyethylene film, tarpaulins, or sand to retain the water. Water shall be applied as often as necessary to keep the concrete saturated for the entire curing period.

Membrane curing compound may be used in lieu of water curing on concrete which will not be covered later with mortar or additional concrete. Membrane curing compound shall be spray applied at a coverage of not more than 300 square feet per gallon. Unformed surfaces shall be covered with curing compound within 30 minutes after final finishing. If forms are removed before the end of the specified curing period, curing compound shall be immediately applied to the formed surfaces before they dry out. Curing compound shall be suitably protected against abrasion during the curing period.

Concrete shall be protected against freezing for at least 7 days after placement.

12. **REPAIRING DEFECTIVE CONCRETE:**

Defects in concrete surfaces shall be repaired to the satisfaction of the Engineer. All concrete which is honeycombed or otherwise defective shall be cut out and removed to sound concrete, with edges square cut to avoid feathering.
Concrete repair work shall conform to Chapter 9 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. Repair work shall be adequately cured.

13. CONCRETE FOR MANHOLES:

Concrete for manholes shall conform to the requirements specified herein.

14. CONCRETE FOR PIPE BLOCKING AND PIPE ENCASEMENT:

Concrete for buried blocking and encasement of pipe shall conform to the limiting requirements specified herein, except that the cement factor and total water content may be adjusted to provide a minimum compressive strength of 3,500 psi at 28 days. Concrete shall have a slump of not less than 3 inches or more than 5 inches when placed. Prior to placing concrete, the excavation shall be dry and free of standing water.

15. DATA AND DRAWINGS:

All submittals of data and drawings shall be in accordance with these Specifications.

END OF SECTION 03300