COUNTRY CLUB & DOVE POINT SANITARY SEWER PHASE I - LINE A
Orangeburg County, SC

MAY 2012
PROJECT NUMBER: 05-049A
# TABLE OF CONTENTS

## General
- Invitation for Bid ................................................. 1
- Scope of Work ..................................................... 2
- Instructions to Bidders ........................................... 3
- Bond Requirements ............................................... 4
- General Provisions ............................................. 5-6
- General Conditions ............................................. 7-9
- Special Terms and Conditions .................................. 9-12
- Special Conditions ............................................... 13
- Proposal ............................................................. 14
- Bid Schedule ..................................................... 15-16
- Certificate of Familiarity ....................................... 17
- Addendum Acknowledgement .................................... 18
- Vendor Qualifications and Information ....................... 19
- Certificate of Preference(s) ................................... 20
- Code and Articles of Acknowledgement ....................... 21

## DIVISION I – GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Section No.</th>
<th>Section Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>011000</td>
<td>Summary</td>
</tr>
<tr>
<td>012100</td>
<td>Allowances</td>
</tr>
<tr>
<td>012200</td>
<td>Unit Prices</td>
</tr>
<tr>
<td>012600</td>
<td>Contract Modification Procedures</td>
</tr>
<tr>
<td>012900</td>
<td>Payment Procedures</td>
</tr>
<tr>
<td>013100</td>
<td>Project Management and Coordination</td>
</tr>
<tr>
<td>013300</td>
<td>Submittal Procedures</td>
</tr>
<tr>
<td>014000</td>
<td>Quality Requirements</td>
</tr>
<tr>
<td>017839</td>
<td>Project Record Documents</td>
</tr>
</tbody>
</table>
Technical Specifications

DIVISION 22 – UTILITIES

221313 Facility Sanitary Sewers

DIVISION 31 – EARTHWORK

311000 Site Clearing
312000 Earthmoving

DIVISION 32 – EXTERIOR IMPROVEMENTS

321216 Asphalt Paving

DEPARTMENT OF PUBLIC UTILITIES (DPU) SANITARY SEWER SPECIFICATIONS
(These specifications shall govern over all other specifications when more stringent)
INVITATION FOR BIDS

OWNER: Orangeburg County, S.C.

PROJECT: Country Club and Dove Point Sanitary Sewer Phase 1 – Line A

OPENING DATE AND TIME: August 9th, 2012 at 3:00 P.M.

OPENING LOCATION: Orangeburg County Administration Building (Third Floor Training Room) 1437 Amelia St. Orangeburg, S.C. 29115

PROCUREMENT FOR: Installation of 1161 LF of 8” PVC sewer and nine manholes.

Subject to the conditions, provisions and the enclosed specifications, sealed bids will be received at this office until the stated date and time and then publicly opened.

DIRECT ALL INQUIRES TO: James Hazzard, EIT, LEED AP
Project Manager
Phone: 803-781-3141 ext. 303
Fax: 803-781-3142

NOTICE TO BIDDERS: Each bidder shall fully acquaint himself with conditions relating to the scope and restrictions attending the execution of the work under the conditions of this bid. The failure or omission of a bidder to acquaint him with existing conditions shall in no way relieve him of any obligation with respect to this bid or to the contract.

MANDATORY PRE-BID CONFERENCE: A mandatory pre-bid conference will be held at the Orangeburg County Administration Building (Third Floor Training Room) 1437 Amelia Street on Thursday, July 19, 2012 at 3:00 P.M.

A General Contractors License is required and the number shall be shown on the outside of the bid envelope.
SCOPE OF WORK

This job will consist of, but not limited to:

- General clearing and grading for installation of sewer line.
- Pavement cut, patch and overlay for installation of sewer line.
- Installation of 1616 linear feet of 8” PVC sewer main.
- Installation of nine (9) manholes.
- Adjustment of existing utilities.
INSTRUCTIONS TO BIDDERS

1. Only one copy of bid invitation is required, unless otherwise stated.

2. Bids, amendments thereto or withdrawal request must be received by the time advertised for bid openings to be officially considered. It is the contractor's sole responsibility to ensure that these documents are received by Orangeburg County office at the time indicated in the bid document. NO FAXED COPIES WILL BE ACCEPTED.

3. When specifications or descriptive papers are submitted with the bid, enter bidders’ name thereon.

4. Submit your signed bid on the bidder's schedule provided. Show bid description on the envelope as instructed. Orangeburg County assumes no responsibility for unmarked or improperly marked envelopes.

5. Bidders must clearly mark as "Confidential" each part of their bid which they consider to be proprietary information that could be exempt from disclosure under Section 30-4-4C Code of Laws of South Carolina, 1976, (1986 Cum Supp) Freedom of Information Act. The Commission reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against the Commission or its agents for its determination in this regard.

6. By submission of a bid, you are guaranteeing that all goods and services meet the requirements of the solicitation during the contract period.

7. This solicitation does not commit the Commission to award a contract, to pay any cost incurred in the preparation of the bid, or to procure or contract for goods or services listed herein.

8. CORRECTION OF ERRORS ON THE BID FORM: All prices and notations shall be printed in ink or typewritten. Errors should be crossed out, corrections entered and initialed by the person signing the bid. Erasures or use of typewriter correction fluid may be cause for rejection. No bid shall be altered or amended after specified time for opening.
BOND REQUIREMENTS

1. **BID BOND**: Each offer shall submit with his Bid a Bid Bond with a good and sufficient surety or sureties company licensed in South Carolina, in the amount of 5 percent of the total Bid amount. The Bid Bond penalty may be expressed in terms of a percentage of the Bid price or may be expressed in dollars and cents.

2. **CERTIFIED CHECKS**: If a certified check is submitted in lieu of a Bid Bond, it will be made payable to Orangeburg County, in the amount of 5 percent of the total Bid amount.

   Bid Bonds/Certified Checks will be returned to the unsuccessful bidders after award and will be returned to the successful offer after acceptance of the final contract by the bidder.

3. **PERFORMANCE SURETY**: The successful contractor must furnish within ten days after written notice of acceptance of Bid, a Performance Bond, Certificate of Deposit, Cashier's Check or irrevocable letter of credit.

   **OPTION 1- PERFORMANCE BOND**: The successful Contractor shall provide and pay the costs of a Performance Bond and it shall be issued in the amount of 100 percent of amount of contract. Bond must be issued by a Surety Company licensed to do business in South Carolina, with an "A" minimum rating of performance as stated in the most current publication of "Best's Key Rating Guide, Property Liability" which shall show a financial strength rating of at least five times the contract price. Each bond shall be accompanied by a Power of Attorney, authorizing the attorney-in-fact to bind the surety and certified to include the date of the bond.

   **OPTION 2 - CERTIFICATE OF DEPOSIT**: The successful contractor shall provide to Orangeburg County, a Certificate of Deposit issued by a Financial Institution which is insured by the FDIC or FSLIC. The value of the Certificate must be in the amount of 100 percent of the contract amount. The Certificate shall be retained by Orangeburg County for the duration of the contract. In the event the contractor defaults or contract is terminated for cause, the Commission shall have at its option, the right to present the Certificate for redemption. If redeemed, the principle of the Certificate shall be retained by the Commission and all accrued interest will be returned to the contractor. The contractor shall be responsible for all penalties incurred from early redemption.

   **OPTION 3 - A CERTIFIED CHECK**: Equal to 100 percent of the contract amount to be retained by Orangeburg County until satisfactory completion of the contract.

   **OPTION 4 - IRREVOCABLE LETTER OF CREDIT**: Shall be issued by a Financial Institution insured by the FDIC or FSLIC in the amount of 100 percent of contract amount.

**Failure To Submit Correct Bid Guarantee Will Result In Rejection Of Your Bid.**
GENERAL PROVISIONS

1. Orangeburg County reserves the right to reject any and all bids, to cancel a solicitation, and to waive any technicality if deemed to be in the best interest of the Commission.

2. Unit prices will govern over extended prices unless otherwise stated in this bid invitation.

3. PROHIBITION OF GRATUITIES: Amended section 8-13-420 of the 1976 Code of Laws of South Carolina states: "Whoever gives or offers to any public official or public employee any compensation including a promise of future employment to influence his action, vote, opinion or judgment as a public official or public employee or such public official solicits or accepts such compensation to influence his action, vote, opinion or judgment shall be subject to the punishment as provided by Section 16-9-210 and Section 16-9-220."

4. BIDDERS QUALIFICATION: Bidders must, upon request of the Commission, furnish satisfactory evidence of their ability to furnish products or services in accordance with the terms and conditions of these specifications. The Commission reserves the right to make the final determination as to the bidder's ability to provide the products or services requested herein.

5. BIDDERS RESPONSIBILITY: Each bidder shall fully acquaint himself with conditions relating to the scope and restrictions attending the execution of the work under the conditions of this bid. It is expected that this will sometimes require on-site observation. The failure or omission of a bidder to acquaint himself with existing conditions shall in no way relieve them of any obligation with respect to this bid or to the contract.

6. AWARD CRITERIA: The contract shall be awarded to the lowest responsible and responsive bidder(s) whose bid meets the requirements and criteria set forth in the Invitation for Bid. The award can be made to one or a multiple of vendors; whichever is in the best interest of the Commission, or unless otherwise stated on bidders schedule.

   6.1 All things considered equal, a tie bid will be resolved by the flip of the coin.

7. WAIVER: The Commission reserves the right to waive any Instruction to Bidders, General or Special Provisions, General or Special Conditions, or specifications deviation if deemed to be in the best interest of the Commission.

8. COMPETITION: This solicitation is intended to promote competition. Orangeburg County encourages bids from minority businesses for this project. Award shall be made without regard to race, religion, color, creed, national origin, gender, and age or handicap condition. If any language, specifications, terms and conditions, or any combination thereof restricts or limits the requirements in this solicitation to a single source, it shall be the responsibility of the interested vendor to notify Orangeburg County in writing within five days prior to the opening date. The solicitation may or may not be changed but a review of such notification will be made prior to the award.
9. REJECTION: Orangeburg County reserves the right to reject any and all bids and waive any technicalities and to reject any bids that contains prices for individual items or services that are inconsistent or unrealistic when compared to other prices in the same or other bids or ambiguous bids which are uncertain as to terms, delivery, quantity or compliance with specifications may be rejected or otherwise disregarded if such action is in the best interest of the Commission.
GENERAL CONDITIONS

1. The Purchase Order and all references to contractual requirements issued by the county shall be considered the contract for this project.

2. DEFAULT: In case of default by the contractor, Orangeburg County reserves the right to purchase any or all items in default in the open market, charging the contractor with any excessive costs. Should such charge be assessed, no subsequent bids of the defaulting contractor will be considered until the assessed charge has been satisfied.

3. NON-APPROPRIATION: Any contract entered into by the Orangeburg County resulting from this bid invitation shall be subject to cancellation without damages or further obligation when funds are not appropriated or otherwise made available to support continuation of performance in a subsequent fiscal period or appropriated year.

4. INDEMNIFICATION: The contractor agrees to indemnify and save harmless Orangeburg County and all commission officers, agents and employees from claims, suits, actions, damages and costs of every name and description, arising out of or resulting from the use of any materials furnished by the Contractor, provided that such liability is not attributable to negligence on the part of the Commission or failure of the Commission to use the materials in the manner outlined by the Contractor in descriptive literature or specifications submitted with the Contractor's bid.

5. CONTRACT ADMINISTRATION: Questions or problems arising after award of this contract shall be directed to the Construction Manager. Copies of all correspondence concerning this contract shall be sent to the Construction Manager. All change orders must be authorized in writing by the County Administrator. Orangeburg County shall not be bound to any change in the original contract unless approved in writing by the County Administrator.

6. FORCE MAJEURE: The Contractor shall not be liable for any excess costs if the failure to perform the contract arises out of causes beyond the control and without fault or negligence of the contractor. Such causes may include, but are not restricted to acts of God or of the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; but in every case the failure to perform must be beyond the control and without the fault or negligence of the contractor. If the failure to perform is caused by default of a subcontractor, and if such default arises out of causes beyond the control of both the contractor and subcontractor and without excess costs for failure to perform, unless the supplies or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the contractor to meet the required delivery schedule.

6. PUBLICITY RELEASES: Contractor agrees not to refer to award of this contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by the User. The contractor shall not have the right to include the Commission's name in its published list of customers without prior approval of the Commission. With regard to news releases, only the name of the Commission, type and duration of contract may be used and then only with prior approval of the Commission. The contractor also agrees not to publish, or cite in any form, any comments or quotes from the Commission staff unless it is a direct quote from the Public Information Officer.
7. QUALITY OF PRODUCT: Unless otherwise indicated in this bid it is understood and agreed that any items offered or shipped on this bid shall be new and in first class condition unless otherwise indicated herein.

8. S.C. LAW CLAUSE: Upon award of a contract under this bid, the person, partnership, association or corporation to whom the award is made must comply with the laws of South Carolina which require such person or entity to be authorized and/or licensed to do business with this State. Notwithstanding the fact that applicable statutes may exempt or exclude the successful bidder from requirements that it be authorized and/or licensed to do business in this State, by submission of this signed bid, the bidder agrees to subject himself to the jurisdiction and process of the courts of the State of South Carolina as to all matters and disputes arising or to arise under the contract and the performance thereof, including any questions as to the liability for taxes, licenses, or fees levied by the State.

9. ASSIGNMENT: No contract or its provisions may be assigned, sublet, or transferred without the written consent of the County Administrator.

10. AFFIRMATIVE ACTION: The successful bidder will take affirmative action in complying with all Federal and State requirements concerning fair employment and treatment of all employees, without regard or discrimination by reason of race, color, religion, sex, national origin or physical handicap.

11. BIDDING CONDITION OF PRICE: All bid prices submitted shall remain effective for a minimum period of 90 days. The Commission reserves the right to make additional purchases at the submitted bid prices, during the specified period.

12. PAYMENT TERMS: Payment will be made within thirty (30) days after acceptance of completed order/project in accordance with the payment schedule. Payment applications for construction contracts are to be submitted on an AIA Application for Payment form. Retainage for construction contracts will be as follows: Upon reaching 50% completion of project, 5 percent of completed work, 5 percent of stored materials. Prior to reaching 50% completion of project it shall be 10 percent of completed work and 10 percent of stored materials.

13. BID REQUIREMENTS: Bid requirements on the equipment specified are not intended to be restrictive to potential bidders, but indicate the required features for satisfactory performance. Orangeburg County will determine if minor deviations from these features are acceptable.

14. DEVIATIONS FROM SPECIFICATIONS: Deviation from the enclosed specifications is not allowed and shall not be accepted with the Bid. Any accepted deviations to the enclosed specifications will be addressed in an addendum(s) prior to the bid opening.

15. CONTRACT: This bid and submitted documents, when properly accepted by Orangeburg County along with a written purchase order, shall constitute a contract equally binding between the successful offeror, and the Commission. No different or additional terms will become a part of this contract with the exception of a Change Order.
16. CHANGE ORDERS: No oral statement of any person shall modify or otherwise change, or affect the terms, conditions or specifications stated in the resulting contract. All change orders to the contract will be made in writing by the County Administrator.

17. AMENDMENTS: All amendments to and interpretations of this solicitation shall be in writing and issued by the County Administrator. The Commission shall not be legally bound by any amendment or interpretation that is not in writing.

18. BID EVALUATION: Bids received will be evaluated by the Engineer/Owner and County Administrator or their designee. Factors to be considered during the evaluation process include, but are not limited to:


19.2. Qualifications, reputation and dependability of the contractor.

19. ARBITRATION: Under no circumstances and with no exception will the Commission act as arbitrator between the Contractor and any subcontractor.

20. DELIVERY: When applicable, the Orangeburg County may require that delivery be made to the specified destination within the shortest time frame possible. Delivery shall arrive between the hours of 8:00 a.m. and 3:00 p.m., Monday through Friday, provided that such day is not a legal holiday and only after a 48 hour written notice to the owner and shall be received by the responsible contractor. The current purchase order number must be indicated on all delivery tickets.

21. SHIPPING: All deliveries shall be shipped F.O.B. point Destination-freight prepaid, the seller pays and bears all freight charges; collect shipments will not be accepted. It is agreed by the parties hereto that delivery by the contractor to the common carrier does not constitute delivery to the Commission. Any claim for loss or damage shall be between the contractor and the carrier.

22. "OR APPROVED EQUAL": Certain processes, types of equipment or kinds of material are described in the specifications and/or on the drawings by means of trade/brand names and catalog numbers. In each instance where this occurs, it is understood and inferred that such description is followed by the words "or approved equal". Such method of description is intended merely as a means of establishing a standard of comparability. However, the Owner reserves the right to select the items, which, in the judgment of the Owner, are best suited to the needs of the Owner, based on price, quality, service, availability and other relative factors. Bidders must indicate brand name, model, model number, size, type, weight, color, etc., of the item bid, if not exactly the same as the item specified. Vendor's stock number or catalog number is not sufficient to meet this requirement. If any bidder desires to furnish an item different from the specifications, the bidder shall submit all appropriate data at least ten (10) days prior to the bid date, along with pictures, designs, cuts, etc., of the material they plan to furnish so as to enable the Owner to compare such to the material specified; and give it due consideration. If the substitution is accepted, it shall be included in an Addendum. The Owner reserves the right to insist upon, and receive items as specified.

23. ALTERNATE BIDS: Alternates to the bid shall not be accepted as part of the bid.
SPECIAL TERMS AND CONDITIONS

1. LICENSES, PERMITS, INSURANCE, BOND and TAXES: All costs for required licenses, permits, insurance, bonds and taxes shall be borne by the Contractor.

2. BUILDING CODES: The Contractor will be solely responsible for compliance with applicable Building Code requirements, all dimensions, and all conditions relating to his work under this contract.

3. WORKMANSHIP: Workmanship shall be first quality in every respect. All measures necessary to ensure a first class job shall be taken.

4. WATCHMEN: It is not required that a full-time watchman be employed on this job; however the contractor shall be responsible for the safekeeping of materials and protection of the public during the entire construction period via security fencing, storage containers or other similar means.

5. INTERFERENCE: The construction work must be carried on in such a manner, consistent with the practical conditions involved in the erection of the new work, as to cause the least amount of interference and inconvenience to the occupants of nearby or adjoining buildings or property.

6. PROTECTION OF ADJACENT WORK: Protect work and adjacent work at all times with suitable covering or by other approved methods. All damage to work in place caused by the contractor shall be repaired and restored to the original good and acceptable condition using same quality and kinds of materials, as required, to match and finish with adjacent work at the contractor’s expense.

7. SITE CLEANING: The park will be in use daily by employees. Maintain clear and safe access to all points of entry into the park and buildings. The contractor shall keep the construction site clean and free from an accumulation of debris or materials during the construction. At the completion of the work, the entire facility and premises shall be left clean. All accumulations of trash and other materials, which are not to be used in the construction, must be removed from the premises on a daily basis.

8. TIME LIMIT: It is hereby understood and agreed by the parties hereto that time is of the essence in this contract and that great energy and diligence shall characterize all operations carried on under this agreement, upon receipt of the written Notice to Proceed.

9. FINAL INSPECTION: At the completion of the contract work, a representative of the Owner shall accompany the contractor on an inspection of the work. All defects found in the work will be corrected by the contractor before final payment will be authorized.

10. GUARANTEE: Upon completion of the work and before final payment is made, the contractor shall furnish the Owner a guarantee stating that the contractor shall keep his entire portion of the work in repair, without expense to the Owner, as far as concerns defects of workmanship for a period of one (1) year from the date of final Certificate (unless specified for a longer time elsewhere) and he shall be responsible for, and make
good any damage to his work caused by such defect; but this clause shall not be interpreted as holding him responsible for making good any deterioration on his part of the work due to its use or abuse by the Owner.

11. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE:

11.1 Contractor shall not commence work under this contract until he has obtained all insurance required hereunder and such insurance has been approved by Orangeburg County, nor shall the contractor allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been obtained and approved. Approval of the Insurance by the Commission shall not relieve or decrease the liability of the Contractor hereunder.

11.2 Compensation and Employer's Liability Insurance: The contractor shall take out and maintain, during the life of this contract, the statutory Workmen's Compensation and Employer's Liability Insurance for all of his employees to be engaged in work on the project under this contract, and in case any such work is sublet, the contractor shall require the subcontractor similarly to provide Workmen's Compensation and Employer's Liability Insurance for all of the latter's employees to be engaged in such work.

11.3 Bodily Injury and Property Damage Liability Insurance: The contractor shall take out and maintain, during the life of this contract, such Bodily Injury Liability and Property Damage Liability Insurance and Automobile Bodily Injury Liability and Property Liability Insurance as shall protect him and any subcontractor performing work covered by this contract from claims for damages for personal injury, including accidental death, as well as from claims for property damage, which may arise from operations under this contract, whether such operations be by himself or by any subcontractors or by anyone directly or indirectly employed by either of them and the amounts of such insurance shall be no less than:

11.3.1 Workers Compensation Statutory Limits: $100,000.00

11.3.2 Commercial General Liability: $1,000,000.00 Each Occurrence
   $2,000,000.00 Aggregate
   $1,000,000.00 Operation Aggregate

11.3.3 Automobile Liability Combined Single Limit: $500,000

11.4 Owner's Protective Liability Insurance: The contractor shall take out, furnish to the Commission, and maintain during the life of this contract, complete Owner's Protective Liability Insurance in an amount as specified above, for Bodily Injury Liability Insurance and for Property Damage Liability Insurance.

12. PROOF OF REQUIRED COVERAGE: The Contractor shall furnish Orangeburg County with certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of policies. Information shall be provided on an ACORD Certificate Form. Such certificates shall also contain substantially the following statements: "The insurance covered by this certificate will not be canceled or materially altered, except after ten (10) days written notice has been received by Orangeburg County." Contractor shall also name Orangeburg County as an additional insured with Right of Notice on the policy.
13. **RAIN DAYS:** Delays in the project due to inclement weather will be officially counted and logged by representatives of the Contractor. The Contractor will log the date of inclement weather, the time at which work was halted due to the weather and the reason why construction progress was halted. The contractor or a contractor’s representative must notify the Commission or their representative (CM) that work has stopped due to inclement weather or credit for rain days will not be considered when assessing any Liquidated Damages at the completion of the project if actual construction time is longer than the allotted time. The contractor shall submit with each Payment Application an updated Inclement Weather Log showing work days missed due to inclement weather (See note #5 under Special Conditions).

14. **TEMPORARY FACILITIES:** The contractor shall provide temporary bathroom facilities for all workers.
SPECIAL CONDITIONS

1. The Purchase Order and all references to contractual requirements issued by the county shall be considered the contract for this project.

2. All pay requests will be submitted on AIA document G702 in triplicate.

3. Any Change Orders will be submitted on AIA document G701.

4. The Contractor shall submit a Release of Lien with each Payment Application.

5. The Contractor shall submit with each Payment Application a letter stating the number of “Rain Days” requested for the time period between the last Payment Application submitted to the current Payment Application. (It is recommended that the contractor keep backup information for Rain Days from the National Weather Service. Reports can be obtained through www.Accuweather.com)

6. The Contractor shall submit along with the final Pay Request the following:
   a. AIA G706 Contractors Affidavit of Payment of Debts and Claims.
   b. AIA G706A Contractors Affidavit of Release of Liens.
   c. AIA G707 Consent of Surety to Final Payment.
PROPOSAL

Date: __________________________

To: County Administrator

Dear Sir:

The undersigned, herein after called the Bidder, having visited the site of the above project, having familiarized himself with the local conditions affecting the cost of the work including the availability of materials and labor, and having examined the construction plans and specifications and related documents, including Addenda Numbers:

(Insert Addenda Number or write the word "None" if no Addenda issued)

hereby proposes to furnish all labor, materials, tools, equipment, insurance, taxes, etc., to construct the project in accordance to the plans and specifications, all in accordance with the contract documents, within the time set forth herein, for the sums entered on the attached "Bid Form". These prices are to cover all expenses incurred in performing the work required under the contract documents, of which this proposal is a part.

The Bidder hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" from the Owner or his representative and to reach Substantial Completion as follows:

Ninety (90) consecutive calendar days

Bidder further agrees to pay as liquidated damages, the sum of two hundred and fifty dollars ($250.00) for each consecutive calendar day thereafter.

________________________________________
Bidder

________________________________________
Title
## BID SCHEDULE

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>DESCRIPTION</th>
<th>EST. QUANT.</th>
<th>UNIT PRICE</th>
<th>TOTAL PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>8&quot; PVC GRAVITY SEWER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. 6.00 – 7.99 FT</td>
<td>138</td>
<td>LF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. 8.00 – 9.99 FT</td>
<td>682</td>
<td>LF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. 10.00 – 11.99 FT</td>
<td>706</td>
<td>LF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D. 12.00 – 13.99 FT</td>
<td>77</td>
<td>LF</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>4’ DIA. PRE CAST MANHOLES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. 8.00 – 9.99 FT</td>
<td>4</td>
<td>EA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. 10.00 – 11.99 FT</td>
<td>2</td>
<td>EA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. 12.00 – 13.99 FT</td>
<td>2</td>
<td>EA</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>4’ DIA. OUTSIDE DROP MANHOLES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. 10.00 – 11.99 FT</td>
<td>1</td>
<td>EA</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>6&quot; SERVICE LINES</td>
<td>641</td>
<td>LF</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>CLEAN OUTS</td>
<td>20</td>
<td>EA</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>SERVICE WYE (8” x 6”)</td>
<td>19</td>
<td>EA</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>ASPHALT CUT &amp; PATCH (FOR GRAVITY SEWER)</td>
<td>825</td>
<td>SY</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>ASPHALT CUT &amp; PATCH (FOR SERVICE LATERALS)</td>
<td>160</td>
<td>SY</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>ROADWAY RE-SURFACE</td>
<td>4,612</td>
<td>SY</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>GRASSING</td>
<td>250</td>
<td>SY</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>SILT FENCE</td>
<td>200</td>
<td>LF</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>TIE IN WITH EXISTING MH</td>
<td>1</td>
<td>EA</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>MOBILIZATION &amp; DEMOBILIZATION</td>
<td>1</td>
<td>EA</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>ALLOWANCE</td>
<td>1</td>
<td>EA</td>
<td>1 $30,000.00</td>
</tr>
</tbody>
</table>

TOTAL OF BID $_______________________

**TURN KEY INSTALLATION OF LINE “A” (Ex MH to MH A-9) ONLY**

**NOTE:**
1. **BID SCHEDULE REFLECTS ITMES AND COSTS FOR TURN KEY INSTALLATION OF LINE “A”**
2. **BIDS SHALL INCLUDE SALES TAX AND ALL OTHER APPLICABLE TAXES AND FEES**

3. **PLEASE RETURN BID EVEN IF NOT GOING TO BID AND MARK IT “NO BID”**

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc. to cover the finished work called for.

The Bidder declares that he understands that the quantities shown in the Proposal are subject to adjustment by either increase or decrease and that should the quantities of any of the items of the work be increased, the undersigned proposal to do the additional work at the unit prices stated herein, and should the quantities be decreased, he also understands that payment will be made on actual quantities at unit price bid, and will make no claim for anticipated profits for any decrease in the quantities and that actual quantities will be determined upon completion of the work, at which time adjustment will be made to the contract amount by direct increase or decrease.

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informality in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 90 calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required by Paragraph of the General Conditions. The bid security attached in the sum of $________ Cents ($_______) is to become the property of the owner in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

Respectfully submitted:

__________________________________  ______________________________
Signature       Address

__________________________________  ______________________________
Title        Date

______________________________
License Number (if applicable)

**SEAL – (if BID is by a corporation)**
CERTIFICATE OF FAMILIARITY

The undersigned, having fully familiarized them self with the information contained within this entire solicitation and applicable amendments, submits the attached bid and other applicable information to the Commission, which I verify to be true and correct to the best of my knowledge. I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a bid for the same materials, supplies or equipment, and is in all respects, fair and without collusion or fraud. I agree to abide by all conditions of this bid and certify that I am authorized to sign this bid. By submission of a signed bid, I certify, under penalties of perjury, that the below company complies with section 12-54-1020(B) of the SC Code of Laws 1976, as amended, relating to payment of any applicable taxes. I further certify that this bid is good for a period of ninety (90) days, unless otherwise stated.

Company Name as registered with the IRS  
Authorized Signature

Correspondence Address  
Printed Name

City, State, Zip  
Title

Date  
Telephone Number

Remittance Address  
Fax Number

City, State, Zip  
Toll-Free Number if available

Telephone Number  
Federal Tax ID Number  
SC Sales Tax Number

Option: Other commodities/services provided by your company.
Addendum Acknowledgement

Request for Bid No. FY12- 8/09/2012

Vendor acknowledges receipt of the follow Addendum to the above-described procurement, agrees that same is/are hereby incorporated and made a part of the above-described procurement as if the Addendum had been included in the original procurement documents:

<table>
<thead>
<tr>
<th>Addendum No.</th>
<th>Addendum Date</th>
<th>Initials of Vendor’s Authorized Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>______</td>
<td>_____________</td>
<td>______</td>
</tr>
<tr>
<td>______</td>
<td>_____________</td>
<td>______</td>
</tr>
<tr>
<td>______</td>
<td>_____________</td>
<td>______</td>
</tr>
</tbody>
</table>

Printed Vendor Name

______________________________________________________
Signature of Vendor’s Authorized Agent

______________________________________________________
Printed Name of Vendor’s Authorized Agent

______________________________________________________
Title with Vendor of Vendor’s Authorized Agent
Vendor Qualifications and Information

Request for Bid No. FY12- 8/09/2012

Vendor shall provide with its proposal, the following which should be collated, fastened together and clearly labeled “Vendor’s Certification of Qualifications and Information for RFB No. FY12-08/09/2012

1. Documentation of vendor’s specific comparative experience(s) to demonstrate that vendor has a minimum of one successfully completed, one year period of being the exclusive consultant provider of this type projects. The minimum specific comparative experience required for this procurement is one successfully completed, one-year period of being the exclusive consultant for roads and bridges.

2. Documentation of a contractual relationship between vendor and a client for a current or recent contract pursuant to which vendor has been a consultant for said services as stated in Scope of Work. The minimum contractual relationship required for this procurement is one successfully completed, one-year period. Please limit documentation to no more than five (5) contracts.

3. Three positive client references.

4. Documentation of the vendor’s financial stability, such as but not limited to a copy of its most recent annual report

5. A description of any litigation within the last 10 years to which vendor has been a party.

6. Contractor shall have a Certificate of General Liability Insurance showing Workmen Compensation Coverage.
Certification of Preference(s)

Request for Bid FY12 - 08/09/2012

The Code authorizes specific preferences. See Article 3. If a vendor is qualified for one or more preferences and desires to exercise the preference(s), then the vendor must complete and submit this form with its proposal. If a vendor is either (1) not qualified for any preference OR (2) is qualified, but does not desire to exercise any preference, then the vendor does not need to complete or submit this form with its proposal.

Vendor is qualified for and desires to exercise the following preference(s) as vendor has marked, below:

Preference 1. Vendor is a resident of the State of South Carolina: ___ Yes ___ No
Preference 2. Vendor is a resident of Orangeburg County, SC: ___ Yes ___ No
Preference 3. Vendor is an MBE: ___ Yes ___ No

The undersigned vendor hereby certifies that vendor is qualified for the preference(s) above to which the vendor has indicated “Yes”. In addition, the undersigned vendor understands and agrees that if it is not qualified for a preference, but claims to be qualified for a preference on this form, the County shall have the right to suspend and/or debar the vendor in accordance with the Code.

Printed Vendor Name ____________________________

Signature of Vendor’s Authorized Agent ____________________________

Printed Name of Vendor’s Authorized Agent ____________________________

Title with Vendor of Vendor’s Authorized Agent ____________________________
Code and Articles Acknowledgement

Invitation to Bid No. FY12 – 08/09/2012

Incorporation by Reference.
Articles 1 through 7 of the Code are incorporated by reference as if set forth verbatim in this Request for Proposal. As stated in the Code, by submitting a bid, the vendor agrees that the Code governs this procurement from solicitation through completion of the resulting contract, including disputes, if any.

ACCESS TO CODE. On November 16, 2009, Orangeburg County Council, the governing body of Orangeburg County, repealed all aspects of its procurement policy and enacted the Orangeburg County Procurement Code (the “Code”). The Code may be accessed online without charge at http://www.orangeburgcounty.org/Purchasing/code.html. In addition, a copy of the Code is available for review without charge at the Office of the Procurement Director. If neither of those options meets your needs, a hard-copy of the Code is also available for purchase at the Office of the Procurement Director.

Method of Source Selection.
The source selection method applicable to this procurement is Request for Bid Construction Services, Code §5-301.

The undersigned vendor understands and agrees to be bound to the Code regarding all matters arising from the Invitation to Bid identified above.

Printed Vendor Name

Signature of Vendor’s Authorized Agent

Printed Name of Vendor’s Authorized Agent

Title with Vendor of Vendor’s Authorized Agent
SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of the Contract.
3. Products ordered in advance.
4. Use of premises.
5. Owner's occupancy requirements.
6. Work restrictions.
7. Specification formats and conventions.

B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Country Club and Dove Point Sanitary Sewer Phase 1 – Line A

1. Project Location: Putter Path (in Orangeburg Country Club)

B. Owner: Orangeburg County

1. Owner's Representative: Mr. Harold Young, County Administrator

C. Engineer: Bruce Todd, P.E., RB Todd Consulting Engineers, Inc.

D. Contractor: N/A.

E. The Work consists of the following:
• General clearing and grading for installation of sewer line.
• Pavement cut, patch and overlay for installation of sewer line.
• Installation of 1616 linear feet of 8” PVC sewer main.
• Installation of nine (9) manholes.
• Adjustment of existing utilities.

1.4 TYPE OF CONTRACT
A. Project will be constructed under a single prime contract.

1.5 USE OF PREMISES
A. General: The Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.
B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Owner Occupancy: Allow for Owner occupancy of Project site.
   2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.6 WORK RESTRICTIONS
A. On-Site Work Hours: 8:00 a.m. – 6:00 p.m. Monday – Saturday. No work on Sunday
B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Engineer and Owner not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Engineer's and/or Owner's written permission.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000
SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.

C. Related Sections include the following:

1. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

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

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

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

1.4 SUBMITTALS

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

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

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

1.6 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.7 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Engineer, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Engineer, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

A. Allowance No. 1: General Items

END OF SECTION 012100
SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

B. Related Sections include the following:
   1. Division 01 Section "Allowances" for procedures for using unit prices to adjust quantity allowances.
   2. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

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

1.4 PROCEDURES

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

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

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

D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

   A. 1. See BID SCHEDULE

END OF SECTION 012200
SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections include the following:
   1. Division 01 Section "Allowances" for procedural requirements for handling and processing allowances.
   2. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Engineer will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, in written form.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

   1. Proposal Requests issued by Engineer are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Engineer.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.


1.5 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner has the right to reject claims submitted later than 21 days after such authorization.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Contractor will submit to Engineer a Change Order for signatures of Owner and Contractor on AIA Document G701.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600
SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:
   1. Division 01 Section "Allowances" for procedural requirements governing handling and processing of allowances.
   2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
   3. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices.
   4. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS
A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES
A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule
   1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms with Continuation Sheets.
      b. Contractor's Construction Schedule.
2. Submit the Schedule of Values to Engineer at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use AIA Document G702

1. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents.

2. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

3. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

4. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

5. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

6. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

7. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment may involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Submittals Schedule (preliminary if not final).
5. Copies of building permits.

H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
6. AIA Document G707, "Consent of Surety to Final Payment."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900
SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Coordination Drawings.
   2. Administrative and supervisory personnel.
   3. Project meetings.
   4. Requests for Interpretation (RFIs).

B. Related Sections include the following:
   1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
   2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

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

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

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

1.5 SUBMITTALS

1. Submit five (5) copies to the Engineer for review and comments.

1.6 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within three days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 5 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:
   
   a. Tentative construction schedule.
   b. Critical work sequencing and long-lead items.
   c. Designation of key personnel and their duties.
   d. Procedures for processing field decisions and Change Orders.
   e. Procedures for RFI's.
   f. Procedures for testing and inspecting.
   g. Procedures for processing Applications for Payment.
   h. Distribution of the Contract Documents.
   i. Submittal procedures.
   j. Preparation of Record Documents.
   k. Use of the premises and existing building.
   l. Work restrictions.
   m. Owner's occupancy requirements.
   n. Responsibility for temporary facilities and controls.
   o. Construction waste management and recycling.
   p. Parking availability.
   q. Office, work, and storage areas.
   r. Equipment deliveries and priorities.
   s. First aid.
   t. Security.
   u. Progress cleaning.
   v. Working hours.

3. Minutes: Record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

   1. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

   2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

      a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to
do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) RFIs.
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

3. Minutes: Record the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Engineer.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
   a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Engineer's Action: Engineer will review each RFI, determine action required, and return it. Allow seven working days for Engineer's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for coordination information already indicated in the Contract Documents.
   d. Requests for adjustments in the Contract Time or the Contract Sum.
   e. Requests for interpretation of Engineer's actions on submittals.
   f. Incomplete RFIs or RFIs with numerous errors.

2. Engineer's action may include a request for additional information, in which case Engineer's time for response will start again.

3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.
E. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at Progress Meetings. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Engineer.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Engineer's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100
SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections include the following:
   1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
   2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
   3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
   4. Division 01 Section "Closeout Procedures" for submitting warranties.
   5. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
   6. Divisions 02 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Engineer’s responsive action.

B. Informational Submittals: Written information that does not require Engineer’s responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

C. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Engineer and to Engineer's consultants, allow 15 days for review of each submittal. Submittal will be returned to Engineer before being returned to Contractor.

E. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information on label for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name and address of Engineer.
   d. Name and address of Contractor.
   e. Name and address of subcontractor.
   f. Name and address of supplier.
   g. Name of manufacturer.

F. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

G. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Engineer.
2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.
H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return submittals, without review received from sources other than Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp>.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals with mark indicating approval notation from Engineer's action stamp> taken by Engineer.

1.5 CONTRACTOR'S USE OF ENGINEER'S CAD FILES

A. General: At Contractor's written request, copies of Engineer's CAD files will be provided to Contractor for Contractor's use in connection with Project after executing Engineers Release Form.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

   a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operation and maintenance manuals.
k. Compliance with specified referenced standards.
l. Testing by recognized testing agency.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. Engineer will return two copies. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Engineer's CAD Drawings are otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
   f. Shopwork manufacturing instructions.
   g. Templates and patterns.
   h. Schedules.
   i. Design calculations.
   j. Compliance with specified standards.
   k. Notation of coordination requirements.
   l. Notation of dimensions established by field measurement.
   m. Relationship to adjoining construction clearly indicated.
   n. Seal and signature of professional engineer if specified.
   o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
3. Number of Copies: Submit four opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. Engineer will retain two copies;
D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of appropriate Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three sets of Samples. Engineer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
E. Submittals Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
F. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Engineer will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Engineers and owners, and other information specified.

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

G. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
J. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

K. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

L. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

M. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

N. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

O. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

P. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.
Q. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

R. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Engineer.

1. Engineer will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S / ACTION

A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

C. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300
SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and
   quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or
   indicated. These services do not relieve Contractor of responsibility for compliance with the
   Contract Document requirements.

   1. Specific quality-assurance and -control requirements for individual construction activities
      are specified in the Sections that specify those activities. Requirements in those Sections
      may also cover production of standard products.

   2. Specified tests, inspections, and related actions do not limit Contractor's other quality-
      assurance and -control procedures that facilitate compliance with the Contract Document
      requirements.

   3. Requirements for Contractor to provide quality-assurance and -control services required
      by Engineer, Owner or authorities having jurisdiction are not limited by provisions of this
      Section.

C. Related Sections include the following:

   1. Division 01 Section "Construction Progress Documentation" for developing a schedule of
      required tests and inspections.

   2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during
   execution of the Work to guard against defects and deficiencies and substantiate that proposed
   construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after
   execution of the Work to evaluate that actual products incorporated into the Work and
   completed construction comply with requirements. Services do not include contract
   enforcement activities performed by Engineer.
C. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.
1.5 SUBMITTALS

A. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. **NVLAP**: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

F. **Factory-Authorized Service Representative Qualifications**: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1. **Testing Agency Responsibilities**: Submit a certified written report of each test, inspection, and similar quality-assurance service to Engineer, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.7 **QUALITY CONTROL**

A. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. **Manufacturer's Field Services**: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

C. **Retesting/Reinspecting**: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. **Testing Agency Responsibilities**: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Contractor will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Contractor, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Engineer with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. **Retesting and reinspecting corrected work.**

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

**PART 3 - EXECUTION**

**3.1 TEST AND INSPECTION LOG**

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Engineer.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

**3.2 REPAIR AND PROTECTION**

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000
SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Sections include the following:
1. Division 01 Section "Closeout Procedures" for general closeout procedures.
2. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:
1. Number of Copies: Submit copies of Record Drawings as follows:
   a. Submittal: Submit, one set of Record CAD Drawing files (version 2004 or later), three copies printed from record plots. Plot and print each Drawing, whether or not changes and additional information were recorded.
   1) Electronic Media: CD-R.

B. Record Product Data: Submit one copy of each Product Data submittal.
1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.
PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an understandable drawing technique.
   c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Changes made by Change Order or Construction Change Directive.
   k. Changes made following Engineer's written orders.
   l. Details not on the original Contract Drawings.
   m. Field records for variable and concealed conditions.
   n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Transparencies: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Engineer. When authorized, prepare a full set of corrected transparencies of the Contract Drawings and Shop Drawings.
1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
2. Refer instances of uncertainty to Engineer for resolution.
3. Print the Contract Drawings and Shop Drawings for use as Record Transparencies. Engineer will make the Contract Drawings available to Contractor's print shop.

C. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Engineer. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:

1. Format: Same CAD program, version, and operating system as the original Contract Drawings.
2. Format: DWG, Version 2004 or later, operating in Microsoft Windows operating system.
3. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
4. Refer instances of uncertainty to Engineer for resolution.
5. Engineer will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.
   a. Engineer makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.

D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
   a. Project name.
   b. Date.
   c. Designation "PROJECT RECORD DRAWINGS."
   d. Name of Engineer.
   e. Name of Contractor.

2.2 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and Record Drawings where applicable.

2.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.

END OF SECTION 017839
SECTION 22 13 13
FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. DPU Specifications included in this document shall govern.

1.2 SUMMARY

A. Section Includes:

   1. Pipe and fittings.
   2. Nonpressure and pressure couplings.

1.3 SUBMITTALS

A. Product Data: For the following:

B. Record Drawings: The Contractor shall furnish to the Engineer record drawings of the sanitary
   sewer system. This information shall be presented electronically using the electronic file of the
   Grading and Utility Plan sheet. Marked up Construction Documents drawings are not
   acceptable. Record drawings shall include by not be limited to the following:

   1. Sanitary – All pipe invert elevations, length of pipe and gradient between cleanouts
      including pipe size and material.

   2. Sufficient data to determine and reproduce at the site, locations of all mains, service lines,
      and other appurtenances. Location data shall be referenced from two stable physical
      features or monuments. Also provide locations of improvements in State Plane
      Coordinate table form. Provide pipe sizes, materials and lengths between fittings. Provide
      location data in State Plane Coordinate Table also.

C. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.
C. Handle manholes according to manufacturer's written rigging instructions.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of service.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON, GRAVITY SEWER PIPE AND FITTINGS

A. Pipe: ASTM A 746, for push-on joints.

B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.

C. Compact Fittings: AWWA C153, ductile iron, for push-on joints.

D. Gaskets: AWWA C111, rubber.

2.2 PVC PIPE AND FITTINGS

A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.

2. Fittings: ASTM D 3034, PVC with bell ends.


2.3 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.

2. Diameter: 48 inches (1200 mm) minimum unless otherwise indicated.

3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.

4. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.

5. Riser Sections: 4-inch (100-mm) minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
8. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps or FRP ladder; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).
10. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser, with 4-inch- (100-mm-) minimum-width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."

2.4 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R (ACI 350M/350RM), and the following:

1. Cement: ASTM C 150, Type II.

B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
a. Invert Slope: 2 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.
   a. Slope: 8 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water/cementitious materials ratio.
   1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK
   A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION
   A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

   B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

   C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

   D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

   E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

   F. Install gravity-flow, nonpressure, drainage piping according to the following:
      1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
      2. Install ductile-iron, gravity sewer piping according to ASTM A 746.
      3. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:
   1. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
   2. Join dissimilar pipe materials with nonpressure-type, flexible or rigid couplings.

3.4 MANHOLE INSTALLATION

A. General: Install manholes complete with appurtenances and accessories indicated.
B. Install precast concrete manhole sections with sealants according to ASTM C 891.
C. Install FRP manholes according to manufacturer's written instructions.
D. Form continuous concrete channels and benches between inlets and outlet.
E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches (76 mm) above finished surface elsewhere unless otherwise indicated.
F. Install manhole-cover inserts in frame and immediately below cover.

3.5 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.6 CONNECTIONS

A. Make connections to existing piping and underground manholes.
   1. Make branch connections to underground manholes by cutting opening into existing unit large enough to allow 3 inches (76 mm) of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches (150 mm) of concrete for minimum length of 12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.
      a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi (20.7 MPa) unless otherwise indicated.
      b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
2. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.7 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.8 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:
   a. Alignment: Less than full diameter of inside of pipe is visible between structures.
   b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
   c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
   d. Infiltration: Water leakage into piping.
   e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
   a. Fill sewer piping with water. Test with pressure of at least 10-foot (3-m) head of water, and maintain such pressure without leakage for at least 15 minutes.
b. Close openings in system and fill with water.
c. Purge air and refill with water.
d. Disconnect water supply.
e. Test and inspect joints for leaks.

6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

   a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
   b. Option: Test concrete gravity sewer piping according to ASTM C 924 (ASTM C 924M).

7. Manholes: Perform hydraulic test according to ASTM C 969 (ASTM C 969M).

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.9 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 22 13 13
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Retain subparagraph below if erosion- and sedimentation-control measures are not included in Division 01 Section "Temporary Facilities and Controls."
8. Temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.

D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.
1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Use sufficiently detailed photographs or videotape.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: N/A

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.

F. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

I. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Refer to construction drawing titled “South Carolina State University Engineering/Computer Science Complex Construction – Stormwater Pollution Prevention Plan” sheet C400.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Engineer.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
   1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
   1. Arrange with utility companies to shut off indicated utilities.
   2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Engineer not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Engineer's written permission.

E. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
3. Use only hand methods for grubbing within protection zones.
4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING
   A. Remove sod and grass before stripping topsoil.
   B. Strip topsoil to depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.
      1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter, trash, debris, weeds, roots, and other waste materials.
   C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
      1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
      2. Do not stockpile topsoil within protection zones.
      3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
      4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS
   A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
   B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
      1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
      2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antitrust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.
3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00
SECTION 31 20 00
EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses, and plants.
   2. Subbase course and base course for asphalt paving.
   3. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:
   1. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional
excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Bulk Excavation: Excavation more than 10 feet (3 m) in width and more than 30 feet (9 m) in length.

3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. (0.76 cu. m) for bulk excavation or 3/4 cu. yd. (0.57 cu. m) for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,700 lbf (128 kN) and stick-crowd force of not less than 18,400 lbf (82 kN) with extra-long reach boom; measured according to SAE J-1179.

2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp (172-kW) flywheel power and developing a minimum of 47,992-lbf (213.3-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:
1. Geotextile: 12 by 12 inches (300 by 300 mm).
2. Warning Tape: 12 inches (300 mm) long; of each color.

C. Qualification Data: For qualified testing agency.

D. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
   1. Classification according to ASTM D 2487.
   2. Laboratory compaction curve according to ASTM D 698.

E. Seismic survey report from seismic survey agency.

F. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

G. Co-Permittee Agreement for Storm Water Management: This submittal shall be submitted prior to beginning work.

H. Permits: Contractor shall review the DHEC Storm Water Management and Sediment Control Permit issued for the project and shall comply fully with all requirements.

1.5 QUALITY ASSURANCE

A. Blasting: Not allowed

B. Seismic Survey Agency: N/A

C. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

D. Preexcavation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
   1. Do not proceed with work on adjoining property until directed by Engineer.
C. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 31 Section "Site Clearing," are in place.

E. Do not commence earth moving operations until plant-protection measures specified in Division 01 Section "Temporary Tree and Plant Protection" are in place.

F. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
   1. Liquid Limit: <35
   2. Plasticity Index: <20

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

J. Sand: ASTM C 33; fine aggregate.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf (700 N); ASTM D 4632.
3. Sewn Seam Strength: 142 lbf (630 N); ASTM D 4632.
4. Tear Strength: 56 lbf (250 N); ASTM D 4533.
5. Puncture Strength: 56 lbf (250 N); ASTM D 4833.
6. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf (1100 N); ASTM D 4632.
3. Sewn Seam Strength: 222 lbf (990 N); ASTM D 4632.
4. Tear Strength: 90 lbf (400 N); ASTM D 4533.
5. Puncture Strength: 90 lbf (400 N); ASTM D 4833.
6. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Self-compacting flowable concrete material produced from the following:

1. Portland Cement: ASTM C 150, Type I.
2. Fly Ash: ASTM C 618, Class C or F.
5. Water: ASTM C 94/C 94M.

B. Produce low-density, controlled low-strength material with the following physical properties:

1. As-Cast Unit Weight: 30 to 36 lb/cu. ft. (480 to 576 kg/cu. m) at point of placement, when tested according to ASTM C 138/C 138M.
2. Compressive Strength: 80 psi (550 kPa), when tested according to ASTM C 495.

C. Produce conventional-weight, controlled low-strength material with 80-psi (550-kPa) compressive strength when tested according to ASTM C 495.

2.4 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.
PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:

   a. 24 inches (600 mm) outside of concrete forms other than at footings.
   b. 12 inches (300 mm) outside of concrete forms at footings.
   c. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
   d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
e. 6 inches (150 mm) beneath bottom of concrete slabs-on-grade.
f. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

2. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches (300 mm) each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of
pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course if necessary. Hand-excavate deeper for bells of pipe.

   1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. Trenches in Tree- and Plant-Protection Zones:

   1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
   2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
   3. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.8 SUBGRADE INSPECTION

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes) to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
   2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Engineer.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

D. Backfill voids with satisfactory soil while removing shoring and bracing.

E. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the pipe or conduit. Coordinate backfilling with utilities testing.

G. Place and compact final backfill of satisfactory soil to final subgrade elevation.

H. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

I. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTATION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 18 inches (450 mm) of existing subgrade and each layer of backfill or fill soil material at 98 percent and the upper one (1) foot of floor slab and footing area compacted to 100 percent of its maximum dry density.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 95 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent in lawn areas and 95 percent under paved areas.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Walks: Plus or minus 1/2 inch (13 mm).
3. Pavements: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.
3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase course and base course to required crown elevations and cross-slope grades.
4. Place subbase course and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
5. Place subbase course and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
6. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL

A. Special Inspections: Contractor will engage a qualified special inspector to perform the following special inspections:
1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material and maximum lift thickness comply with requirements.
3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.

E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length, but no fewer than two tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 20 00
SECTION 32 12 16
ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Hot-mix asphalt paving.
   2. Pavement-marking paint.
   3. Macadam Base.

B. Related Sections:
   1. Division 31 Section "Earth Moving" for aggregate subbase and base courses and for aggregate pavement shoulders.
   2. South Carolina Department of Transportation Specification: 2007 Standard Specifications for Highway Construction. These specifications apply to all work within the SCDOT right of way and are approved in coordination with the project specifications.

1.3 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
   1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
   2. Job-Mix Designs: For each job mix proposed for the Work.

B. Qualification Data: For qualified Installer.

C. Material Certificates: For each paving material, from manufacturer.

D. Material Test Reports: For each paving material.
1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.

B. Installer Qualifications: Imprinted-asphalt manufacturer's authorized installer who is trained and approved for installation of imprinted asphalt required for this Project.

C. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

D. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of SCDOT for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

E. Preinstallation Conference: Conduct conference at Project site:

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

   a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
   b. Review condition of subgrade and preparatory work.
   c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
   d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
2. Slurry Coat: Comply with weather limitations in ASTM D 3910.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4.4 deg C) for oil-based materials, 55 deg F (12.8 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

C. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: ASTM D 242 or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, PG 64-22.

B. Asphalt Cement: ASTM D 3381 for viscosity-graded material.

C. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt.

D. Fog Seal: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.

E. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Sand: ASTM D 1073 or AASHTO M 29, Grade Nos. 2 or 3.
B. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

1. Color: White, Yellow, Blue

C. Glass Beads: AASHTO M 247, Type 1. (SCDOT R/W only)

D. Wheel Stops: Precast, air-entrained concrete, 2500-psi (17.2-MPa) minimum compressive strength, 4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1800 mm) long. Provide chamfered corners, drainage slots on underside, and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch (19-mm) diameter, 10-inch (254-mm) minimum length.

2.4 MIXES

A. Hot Mixed Asphalt Pavement: Comply with South Carolina State Highway Department Standard Specifications for Highway Construction, Edition of 2007, Section 401 and Section 403, Type B & C.

B. Emulsified-Asphalt Slurry: ASTM D3910 Type II

2.5 Macadam Base Course: Comply with South Carolina State Highway Department Standard Specifications for Highway Construction, Edition of 2007, Section 305.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction[, repeating proof-rolling in direction perpendicular to first direction]. Limit vehicle speed to 3 mph (5 km/h).

2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.
3.2 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
   1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.3 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

3.4 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
   1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
   2. Place hot-mix asphalt surface course in single lift.
   3. Spread mix at minimum temperature of 250 deg F (121 deg C).
   4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
   5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.
   1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AIMS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.6 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
   1. Base Course: Plus or minus 1/2 inch (13 mm).
   2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
   1. Base Course: 1/4 inch (6 mm).
   2. Surface Course: 1/8 inch (3 mm).
   3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.8 SURFACE TREATMENTS

A. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.
   1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.9 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).
1. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb/gal. (0.72 kg/L). (SCDOT R/W only)

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.

2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
   a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than 3 cores taken.
   b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION 32 12 16
DEPARTMENT OF PUBLIC UTILITIES
CITY OF ORANGEBURG

SANITARY SEWER SPECIFICATIONS
REVISED: April 20, 2010

1. Location and Grade

The location and grade of the sanitary sewer will be specified in drawings furnished by the Department of Public Utilities (owner) and must conform to the 10 State Standards. All sewers and manholes must conform to the grades and locations as shown on the drawings. All other utilities must be located and depths determined by contractor.

a) Locations Within Streets: At Locations where the sewer is to be constructed in streets or roadways, the Contractor shall take all precautions and comply with all requirements as may be necessary to protect the improvements, including installation and maintenance of warning signs, lights and barricades for protection of traffic.

b) Protection of Other Utilities and Structures: Any damage done to existing utility lines, services, poles and structures of every nature shall be repaired or replaced by the Contractor at his own expense. The approximate position of certain known underground is not shown. The Contractor shall locate these and other possible unknown utility lines by use of an electronic pipe finder, or other approved methods, and shall excavate and expose all existing underground line in advance of trenching operations.

2. Clearing

a) Perform all clearing necessary for installation of the complete work.

b) Clearing shall consist of removing all trees, stumps, roots, brush and debris in the rights-of-way obtained for the Work.

c) All timber of merchantable size shall remain the property of the Owner and shall be trimmed and cut in such lengths as directed and stacked along the edge of the right-of-way.

d) All other material, including trimmings from above, shall be completely disposed of in a satisfactory manner.

3. Restoration of Disturbed Areas

a) Restore all areas disturbed by, during or as a result of construction activities to their existing or better condition.

b) Do not interpret this as requiring replacement of trees and undergrowth in undeveloped sections of the rights-of-way.
4. Minimizing Silting and Bank Erosion During Construction

a) During construction, protective measures shall be taken and maintained to minimize silting and bank erosion of creeks and rivers adjacent to the work being performed during construction.

5. Excavation

The Contractor shall perform all excavation of every description and of whatever substances encountered, to the depths indicated on the drawings or as otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be removed and deposited where and as directed by the Owner.

a) Excavation for Appurtenances: Excavation for manholes and similar structures shall be sufficient to leave at least one foot in the clear between outer surfaces and the embankment or sheathing and bracing line. Care shall be taken not to excavate below the depth specified or indicated. Any excavation below the proper level shall be filled with Class “C” (2500 psi) concrete, at the expense of the Contractor.

b) Sanitary Sewer Excavations: Trench excavation shall not advance more than 200 feet ahead of pipe laying unless permitted by the owner. The top portion of sewer pipe trenches may be excavated with sloping or vertical sides to any width which will not cause damage to adjoining structures, roadways, pavements, utilities or private property.

6. Class “B” Bedding (Type 2 Modified)

Undercut four inches below the bottom of the pipe barrel, full width of the trench, and backfill with compacted crushed stone, conforming to South Carolina Department of Highways and Public Transportation's Aggregate Number Five. Stone or gravel shall be placed in layers of not more than six inches to the top of the pipe. Each layer shall be compacted by slicing with a shovel.

7. Pipe and Fittings

A. Polyvinyl Chloride (PVC) and Fittings

All PVC pipe and fittings shall conform to the requirements of ASTM D3034, Table I, minimum SDR-35, with integral wall bell and spigot joints. Pipe shall be in standard lengths of 13.0 or 20 feet. Joints shall be sealed with a rubber gasket provided by the pipe manufactory's, insuring a water tight seal.

B. Ductile Iron Pipe and Fittings (DIP):

a) Use class 50, complying with ANSI/AWWA C151/A21.51 and ASTM A377, latest revisions.
b) Use mechanical or push-on joints complying with ANSI/AWWA C111/A21.11 as modified by ANSI/AWWA C151/A21.51.

c) Use rubber gaskets and lubricants complying with ANSI/AWWA C111/A21.11.

d) Use fittings with pressure rating of 150 psi complying with ANSI/AWWA C110/A21.10.

e) Use lining complying to one of the following:

1) Polyethylene lining complying with ANSI/ASTM D-1248, 40 mils nominal thickness or:

2) Amine cured Novalac, Epoxy polymeric lining, 40 mils nominal thickness. The standards of quality are based on Protecto 401 by Vulcan Painters, Birmingham, Alabama or Corrosion-Clad Polymer Lining No. 210 by Seauereisen Cements, Pittsburgh, Pennsylvania.

8. Manholes

All manholes shall be constructed of precast concrete sections, with cast iron frames and covers. All invert channels shall be smooth and semi-circular in shape, conforming to the inside of the adjacent sewer section and shall be formed directly in the concrete of the manhole base. The floor of the manhole, outside the channel, shall be smooth and shall slope toward the channel not less than one inch per foot.

a) Precast concrete manholes shall conform to all requirements of ASTM C478, "Standard Specification for Precast Reinforced Concrete Manhole Sections".

b) Bottoms of precast concrete manholes shall be cast monolithic with the bottom wall section.

c) Wall section joints shall be tapered, tongue and groove cast to close tolerance and sealed with a vulcanized butyl rubber sealant.

d) Top sections shall be shaped as an eccentric cone or in shallow manholes provided with a flab slap top with entrance hole offset to one side.

e) Manholes frames and covers shall be of grey iron castings meeting the requirements of ASTM a 48, CLASS 30 iron. Cover shall be circular and have the words "Sanitary Sewer" cast on it, and shall not contain more than two pick holes. Frames and cover shall not weight less than 210 pounds with inside opening of not less than 21 inches nor more than 24 inches. Coat frames and covers with two (2) shop coats of water based bitumastic paint.

1) Cast owners name and standard logo (Ref logo no. 41384026) into the cover. "City of Orangeburg" and "Sanitary Sewer" on outer radius of cover. "DPU" and owner logo beneath "DPU" in center of cover.

2) The frames and cover shall be East Jordan Iron Works, Inc. Model V-1384 or approved equal.

f) Manhole steps shall be polypropylene plastic steps reinforced with 3/8" diameter steel rod, provide steps having non-skid top surfaces, safety slope
at each end, minimum width of 10-inches and not less than 5-inches projection from wall.

g) Coat manhole sections with coal tar epoxy, Tnemec “Tnemec – Tar” or equal.
   1) Interior 21 dry mils
   2) Exterior 7 dry mils

h) Provide epoxy coating for all manholes as shown on the drawings, specified herein, and needed for a complete and proper installation per manufactures specifications.
   1) Acceptable Product; Raven 405 manufactured by Raven Lining Systems, Inc., Tulsa, Oklahoma and is named to establish standards of quality.
   2) The product applicator must be qualified and certified by the manufacturer of the product.

9. **Installation of Pipe**

All sewer pipe shall be laid upgrade with the spigots pointing downhill. The pipe shall be so laid in the trench that after the sewer is completed, the interior surface shall conform on the bottom accurately to the grades and alignment fixed or given by the owner. No joint shall be made where surfaces of pipe and bell to be jointed have been soiled by earth in handling until such soiled surfaces are so thoroughly cleaned by brushing and wiping that all traces of earth are removed. The interior of the pipe shall be carefully freed of all dirt and superfluous material of every description as the work proceeds. All pipe shall be carefully examined for cracks or other defects and no pipe shall be laid which if found defective. If any pipe is found to be defective after being laid, it shall be removed and replaced with sound pipe without further charge. The surfaces of pipe to be joined, as well as the gaskets, shall be cleaned and lubricated with a vegetable soap or other lubricating agent as recommended by the manufacturer. Whatever lubricating agent is used, it shall not be injurious or detrimental to the gasket. After each joint is installed, the gasket shall be checked for proper position prior to installation of the succeeding length of pipe.

10. **Tie In to Existing Manhole**

   a) Tie into existing manhole with a synthetic rubber boot cored into the manhole wall creating a water tight seal with both manhole and pipe while allowing differential settlement.

   b) Minimum material thickness: 0.375 inch.

11. **Casing Pipes**

Provide and install casing pipe under surface structures as indicated and as needed for a complete and proper installation of grades and elevations as shown on plans.
a) Steel complying with ASTM A 139 Grade B with minimum yield strength of 35,000 psi. Provide ends suitable for field welding. Weld joints to provide a watertight job. Minimum wall thickness as follows:

<table>
<thead>
<tr>
<th>Diameter of Casing</th>
<th>Minimum Wall Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inches</td>
<td>Inches</td>
</tr>
<tr>
<td>6 thru 14</td>
<td>1/4</td>
</tr>
<tr>
<td>16 thru 18</td>
<td>5/16</td>
</tr>
<tr>
<td>20 thru 22</td>
<td>3/8</td>
</tr>
<tr>
<td>24 thru 26</td>
<td>7/16</td>
</tr>
<tr>
<td>28 thru 32</td>
<td>1/2</td>
</tr>
</tbody>
</table>

11.1 Casing Spacers

a) For piping installed in casing provide pipeline casing spacers using a minimum of 1 spacer per ten linear feet of pipe.

b) Provide pipeline casing spacers as manufactured by Cascade Manufacturing of Yorkville, Illinois, or approved equal.

11.2 Installation

a) Install casings by dry boring through the casing while simultaneously jacking the casing.

b) Any proposed alternate method shall be approved in writing by the Department of Public Utilities.

c) Install casing spacers on carrier pipe per the manufacturer’s instructions.

d) Provide spacer sizing and length necessary to obtain the pipe slope and elevations as shown on the plans.

e) Seal each casing end with brick and mortar to prevent entrance of foreign material.

12. Backfilling

All trenches and excavations shall be backfilled immediately after the pipes are laid therein, unless other protection of the pipe line is directed. Backfill materials shall be selected and deposited with special reference to the future safety of the pipes. Fine, loose earth, free from large clods or stones, shall be carefully deposited on both sides of the pipe and thoroughly rammed and tamped until enough fill has been placed to provide a cover of not less than two feet above the top of the pipe. The remainder of the backfill material shall be deposited in 6-inch layers and thoroughly tamped. Whenever trenches have not been properly filled or settlement occurs, they shall be refilled, smoothed off and finally made to conform to surface of the ground. Surplus material shall be disposed of as directed by the owner. The original surface shall be restored to the full satisfaction of the owner.

a) Under roads, streets and other paved areas, all backfilling of excavated portions requiring pavement replacement shall be mechanically tamped in 6-
inch layers, using heavy duty tampers, such as pneumatic jack hammers with tamping foot attachment. Each layer shall be thoroughly tamped to a density equivalent to at least 95% of an ASTM-D-698-78 Proctor Curve. Settlement in trenches shall be refilled with crushed stone, and such maintenance shall continue until replacement of pavement is authorized by the owner. If the excavated soil is not suitable for compacting, then the owner shall furnish proper soil to backfill. Backfill shall be accomplished immediately after pipe is installed.

b) Backfilling in undeveloped areas. Where the pipe line is located in wooded, swampy, or undeveloped areas, backfilling shall be accomplished as specified hereinbefore.

c) Settlement - Whenever the trenches have not been properly filled, or if settlement occurs, they shall be refilled, smoothed off and finally made to conform to the surface of the ground. Backfilling shall be carefully performed and the original surface restored to the full satisfaction of the owner.

d) Surplus material not required for the backfilling shall be removed and wasted at points designated by the owner.

13. Cutting, Removing and Replacing Existing Pavements

Existing pavements and base courses cut for the installation of utility lines and appurtenances shall be removed to neat lines and disposed of as directed. The replacement of pavements and base courses shall be made with pavements similar to the type removed and in accordance with the following:

a) Concrete pavements or base - Concrete shall be removed at a joint or the concrete shall be removed by cutting on a straight and true line, using an approved concrete saw, cutting to a depth of at least two inches, and the remaining depth may be sheared or broken with suitable pneumatic tools. Replacement of pavement shall be made with concrete designed for minimum compressive strength of 3000 pounds psi when broken at the age of 28 days. The concrete shall be replaced to a depth of 6 inches below the bottom of existing slab, and shall extend 6 inches under the existing slab on each side to form a shelf. Surface finishes of concrete pavement shall conform to the existing surface. The surface of concrete base courses shall be left rough and shall be depressed below the finished grade to accommodate 1 ½ inches of bituminous surface course as specified hereinafter.

b) Flexible pavement (ditch line) - Replacement shall be made with a base course, eight (8") inches of concrete overlay and with a bituminous surface course. Prior to placing the base course, the sub-grade shall be thoroughly compacted to the required density. The base course shall consist of a four (4") inches stabilized aggregate and eight (8") inches of concrete overlay conforming to applicable portions of South Carolina Department of Transportation's specifications, Section 305. The surface course shall consist of 1 ½ inches of Hot Laid Asphaltic Concrete, Type 1 or 2, conforming to the applicable portions of South Carolina Department of Transportation's Specifications, Section 403.
c) Flexible Pavements (Resurfacing) – Replace pavement in ditch line as specified above. Prime and resurface with 1% of 1 ½" of asphaltic concrete. Taper resurfacing to existing pavement evenly for a distance of 10 feet beyond repaired section. Payment will be made at the unit price per square yard as stated in the contract documents. Area will be determine by average width and length measured from end to end.

d) Cleanup - The disturbed area of construction shall be cleaned up daily. This cleanup shall include the opening of all drainage ditches, the backfill of all trenches and excavation, sweeping the pavement, and the disposing of all excavated material.

e) Backfilling and patching shall conform to “Typical Repair Section” drawing attached.

14. Grass

a) Provide grassing of the sanitary sewer easements, including highway and street shoulders and all areas disturbed by the construction operation.

b) Ground Preparation - Bring all areas to proper line, grade and cross section indicated on the plans. Repair erosion damage prior to commencing seeding operations. Loosen seed bed to minimum depth of 3”. Remove all roots, clods, stones larger than 1” in any dimension, and other debris.

c) Grass Seed - Provide grass seed which is free from noxious weed seeds, and re-cleaned. Grade ‘A’ recent crop seed treated with appropriate fungicide at time of mixing. Delivered to the site in sealed containers with dealer’s guaranteed analysis.

d) Sowing Methods - Do not conduct seeding work when ground is frozen or excessively wet. Produce satisfactory stand of grass regardless of period of the year the work is performed.

e) Straw Mulch - Provide straw or hay material. Straw to be stalks of wheat, rye, barley or oats. Hay to be timothy, peavine, alfalfa or coastal bermuda.

f) Payment for the work under this Section will be included in the lump sum price bid for the item to which it pertains.

15. Inspections and Testing

A. General:

1) All sewers will be visually inspected, tested and gauged for infiltration and/or exfiltration.

2) All visible leaks shall be repaired even if infiltration is within allowable limits.

B. Inspection:

1) Clean and prepare for inspection each block or section of sewer upon completion, or at such other times as the Owner may direct.
2) Each section between manholes shall show a full circle of light when viewed from either end.

C. **Deflection Tests:**

1) Perform deflection tests on PVC pipe in the presence of the Owner.
2) No pipe to exceed a deflection of 5%.
3) Conduct deflection testing after the final backfill, and compaction thereof, has been in place at least thirty (30) days and prior to placing the sewer lines into operation.
4) Conduct the deflection tests using a rigid ball or mandrel having a diameter equal to 95% of the inside diameter of the pipe.
5) Do not use mechanical pulling devices for the deflection tests.

D. **Infiltration Tests:**

1) Conduct tests using V-notch weir, or by direct measurement prior to allowing sewage flows in the line.
2) Close the end of the sewer at upstream structure sufficiently to prevent the entrance of water.
3) Discontinue use of well points or other groundwater pumping operations at least three (3) days prior to testing.
4) Infiltration into the entire system of new sewers or any one trunk, interceptor or outfall sewer, including connecting laterals, or any stretch of sewer shall not exceed 200 gallons per inch of diameter per mile per day.
5) Make tests in presence of the Owner, giving the Owner at least three (3) days advance notice.

E. **Air Testing**

Conduct air test on all newly constructed sewers in accordance with ASTM C828.

F. **Closed Circuit Television Inspection**

Prior to final inspection, Contractor, at his expense, shall clean and televise all sewer mains and service laterals for DPU's records. A copy of the inspection log and video must be submitted to the Wastewater Division.

G. **Measurement and Payment**

Payment for the work under the lump sum price bid for the item to which it pertains.