



CONTRACT DOCUMENTS

FOR

COBBLESTONE ROAD IMPROVEMENTS AIKEN COUNTY, SOUTH CAROLINA



PREPARED BY:



**Civil Engineering
Consulting Services, Inc.**

2000 PARK STREET
COLUMBIA, SC 29201

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Cobblestone Road**

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**Aiken County Department of Engineering
Roadway Improvements for
Cobblestone Road**

Invitation to Bid

Project Description: Aiken County is requesting Sealed Bids for the Roadway Improvements for the paving of approximately one (1) mile of existing dirt road located in Aiken County. The road to be paved is as follows:

- *Cobblestone Road – located in Ridge Spring approximately one (1) mile west of Whispering Pine Road and US 1.*

as outlined in the attached Plans and Specifications. The Bids must be submitted as stated on the attached Aiken County Sealed Bid Document. Any question concerning the bid should be directed to procurement@aikencountysc.gov.

"The Bids must be received by mail or hand delivered to the Aiken County Procurement Department, Attn. Ms. Becky Dawes – Procurement Director, 1930 University Parkway, Room 3201, Aiken, SC 29801, at the specified time on the advertisement."

Plans, Specifications, and Contract Documents: Plans, Specifications, and Contract Documents may be obtained from *Civil Engineering Consulting Services, Inc., Mr. Lee Drummond, 2000 Park Street, Columbia, South Carolina, (803) 799-0311, between 8:00 a.m. to 5:00 p.m., Monday through Friday.* There will be a non-refundable \$75.00 per set deposit required for the Bid Documents. Overnight delivery service is available for an extra charge.

Owner Contact: All Contractors are instructed to direct all inquiries regarding this Bid to procurement@aikencountysc.gov. Requests to schedule a site visit with the Office of the County Engineer, Attn. Mr. Joe Berry, County Engineer, 1930 University Parkway, Aiken, South Carolina, 29801, (803) 642-1535, between the hours of 8:00 a.m. to 5:00 p.m. Monday through Friday.

Special Conditions: Traffic Control shall conform to SCDOT “shoulder Work with Minor Encroachment” page 17 of the South Carolina Work Zone Safety Manual.

Conditions of Work: The Contractor must have informed himself fully of the conditions relating to the construction of this project and the employment of labor thereon, to have inspected the site, and to have read and become familiar with all the bid documents, contract documents, and plans/sketches. Failure or omission to do so will not relieve a successful bidder of his obligation to furnish all material, equipment, and labor necessary to carry out the provisions of his contract. Insofar as possible, the Contractor, in carrying out his work, must employ such methods and/or means as will not cause any interruption of or interference with the work of other contractors.

Restrictions: Contractor will need to work within the easements and right of way. Coordination shall be through the County Engineer’s Office.

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Safety Devices: Contractor shall provide all needed barricades and signs for safety and remove trash and debris from the work area daily.

Damage to Property: Contractor shall be responsible for, and immediately take action to, repair or replace any damage adjacent to existing owner property for any reason.

Utilities: Any needed utilities shall be at the expense of the Contractor.

References: References shall be provided upon request to confirm that the successful bidder is capable of performing and completing this project in a timely manner under specified conditions.

Warranty Period: The warranty period for this project is one (1) year on labor and materials against defects and workmanship. This warranty period shall commence upon owner's final approval of the entire work.

Licenses & Permits: The Contractor is to obtain any licenses or permits required to perform this work at no additional expense to the Owner.

Insurance: Proof of Liability Insurance and Workmen's Compensation Insurance must be provided prior to commencing work.

Sketches: Sketches are provided for the purpose of bidding and not necessarily for detailed construction. All materials to be used are to be approved by the County Engineer prior to installation. In the case of an inconsistency between the sketches and specifications or within either document, the better quality or greater quantity of work shall be provided in accordance with the interpretation of the County Engineer.

Time of Completion: The time of completion is (230) calendar days, and availability of all items must be confirmed prior to commencing work. Liquidated damages are **five hundred (\$500.00) dollars** per calendar day. Written requests for additional time caused by unforeseen delays will be considered only if submitted in writing within ten (10) calendar days of event causing the delay. The work must commence on or before a date to be specified in a written "Notice to Proceed" from the Owner, and the project fully complete within the consecutive days thereafter, excluding major holidays.

Waiver of Lien: At the completion of the project, a Waiver of Lien (form provided by the County Engineer) shall be submitted to the County Engineer with the final Pay Request.

Security for Faithful Performance: For those contracts more than \$50,000.00 in value, a Performance Bond of 100% of Bid and a Payment Bond for 100% of Bid shall be required. The Owner shall retain and hold ten (10) percent from each pay request until all work has been completed and approved by the County Engineer, and a Waiver of Lien

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submitted stating that all vendors have been paid for materials, labor, and supplies. See advertisement for Bid Bond Information.

ENGINEERS

Civil Engineering Consulting Services, Inc.
2000 Park Street Suite 201
Columbia, SC 29201
Telephone: (803) 779-0311
Facsimile: (803) 779-0528

OWNER

Aiken County
1930 University Parkway
Aiken, SC 29801
Telephone: (803) 642-1535
Facsimile: (803) 642-1538

Instructions to Bidders

(rev. July 2010)

1. **Intention:** It is intended that the Instructions to Bidders, Special Conditions, General Conditions, Detail Construction Specifications, and Drawings shall cover the complete work to which they relate.

2. **Definitions:** Where the following words or pronouns used in their stead occur herein, they shall have the following meaning:

"Owner" shall mean AIKEN COUNTY, SOUTH CAROLINA, party of first part to the following agreement, or its authorized and legal representatives.

"Engineer" shall mean THE COUNTY ENGINEER FOR AIKEN COUNTY, SC.

"Contractor" shall mean the party of the second part to the following agreement, or the legal authorized representatives of such party.

3. **Scope of Work:** The work to be done consists of furnishing all materials and equipment and performing all labor necessary for completion of the work as set forth in the Bid, as shown on the Drawings, and as specified.

4. **Materials and Work by Owner:** The Owner will furnish and perform no labor for construction of the work under this contract except what is noted in the Special Conditions under "Work by County Forces."

5. **Contractor's License and Taxes:** Bidders must satisfy the requirements of all applicable South Carolina statutes, regulations, and ordinances pertaining to bidders, contractors, licenses, permits, fees and taxes, including but not limited to Sections 40-11-10, et seq., Code of Laws of South Carolina, 1976, as amended. *The General Contractor's License number must be shown in the space provided on the Bid Invitation Cover and in the Bid.*

6. **Site Examination:** The Bidder is expected, and directed to, examine the location of the work and to inform himself fully as to the structural and mechanical conditions; the conformation of the ground; the soil conditions; the character, quality, and quantity of the materials to be encountered; the character of equipment and facilities needed prior to, and during, the execution of the work; the general and local conditions; and all other matters which can in any way affect the work to be done.

7. **Subsurface Conditions:** A subsurface investigation has not been made on any portion of the work, and the Owner and Engineer make no representation, or express any opinion on such conditions. Excavation for the project is unclassified for rock. The contractor shall include in his bid all cost of excavation, removal, and replacement of unsuitable materials. The contractor shall make his own analysis of the materials to be encountered, and include prices for removal and replacement of these materials in his unit prices for construction, unless allowances for removal and replacement are provided in the Bid. It is expected that quantities may be significantly less, or greater, than shown in the Bid, since Bid quantities are established without any knowledge of the underground conditions and it would be unusual for the quantities to be close to those

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actually encountered. The prospective bidder must form his own opinion of the character of the subsurface materials to be encountered in excavating for construction of the various facilities and completing the work, and include all costs and charges therefore in their bid.

8. **Bids:** All Bids must be made upon the Bid forms hereto annexed, and shall be for materials and work shown on the Drawings and/or specified. Bid forms shall not be detached from the bound documents. Bid prices must be stated for each item for which a Bid is made. Documents are to be enclosed in a sealed envelope, addressed to:

CENTRAL PROCUREMENT DIVISION
1930 UNIVERSITY PARKWAY
AIKEN, SOUTH CAROLINA 29801

If forwarded by mail or courier, the sealed envelope containing the Bid shall be enclosed in another envelope or courier container also addressed as specified.

(a) **Unit Price Items:** The itemized quantities given in the Bid for unit price work shall be considered by the Contractor as the quantities required to complete the work. When the actual quantities required in the construction of the work are greater than, or less than, the quantities shown in the items, the amount equal to the difference in quantities at the unit prices bid for amount shall be paid.

(b) **Lump Sum Prices:** Where itemized prices are not given in the Bid, the Contractor shall consider the lump sum prices bid for the work shown on the Drawings and/or specified to be sufficient for completion of the Contract.

(c) **Total Amount Bid:** The correct total amount bid is defined as the correct sum total of the amount bid for the items in the Bid. The correct amount bid for each unit price item is defined as the product of the quantity listed in the Bid for the item, multiplied by the unit price bid.

9. **Extra Work Items in the Bid:** The Bid may contain certain unit price items entitled "Extra Work, If Ordered by the Engineer". In each such item, the estimated quantity is based on the average amount of extra work encountered in a typical job. The stated quantities are not guaranteed, but are included in the Bid in order to determine, in advance of construction, the actual low Bidder. No work included in such items will be authorized for payment without advance authorization of the work by the Engineer.

10. **Bid Security and Bonds:** Each Bid must be accompanied by a certified check or by a Bid Bond in an amount equal to not less than five percent (5%) of the amount of the bid to guarantee that the successful bidder will, within ten (10) days from the date of the notice of awarded Contract, enter into a contract with the Owner, and execute to the Owner a Performance Bond and Payment Bond, the contract and bonds to be in the form set forth in this booklet. If, for any reason whatsoever, the Bidder withdraws from the competition after the bids have been opened, or refuses to execute the required contract and bonds, if his bid is accepted, the Owner may retain the amount of the certified check, or proceed against the bid bond. The surety on the Bid

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Bond and Performance and Payment Bonds shall be a surety company authorized to do business in the State where the project is located. Including Attorneys-in-Fact certified, proper, and effectively dated copy of their power of attorney. Performance and Payment Bonds shall be countersigned by an agent residing in the State, County, or City of the Owner, if required. Bonds and the surety thereon shall be subject to approval by the Attorney for the Owner.

11. **Bids Opened in Public:** Bidders are invited to be present at the opening of Bids, which will be in public.

12. **Right to Reject Bids:** The Owner reserves the right to reject any or all bids and to waive informalities. No bids will be received after the time set for opening Bids. Any Bidder may change or withdraw his bid, either personally or by telegraphic or written request, at any time prior to the scheduled closing time for receipt of bids, but no bid shall be changed or withdrawn by telegraph or mail received after the time set for opening Bids.

13. **Determination of Low Bid:** The contract will be awarded, if it is awarded, to the responsible and responsive Bidder submitting the lowest bid. The Owner, in sole discretion, will decide which is the lowest responsible, and responsive, Bidder. In determining a responsible Bidder, the following elements, among other things, may be considered: whether the Bidder involved (a) maintains a permanent place of business; (b) has adequate plant equipment to do the work properly and expeditiously; (c) has a suitable financial status to meet obligations incident to the work; and (d) has appropriate technical experience on projects of similar scope and types of work, and experienced, qualified personnel. In determining a responsive Bidder, the following elements will be considered: (a) the completeness and regularity of the Bid Form; (b) Bid Form without excisions or special conditions, and (c) a Bid Form having no alternative bids for any items unless requested in the technical specifications.

(a) The Bidder, if requested by the County Engineer, shall list prices of at least two manufacturers of each item of major equipment if listed on the Bid Form. Use lowest price for base bid. If the "make" of any item listed in the base bid column does not meet specifications, the next lowest priced "make" listed for that item which does meet specifications will be used in determining the lowest bid price. If all of the listed "makes" of the item fail to meet specifications, as determined above, the Bidder will be so notified and he may, within 48 hours of such notification, submit a make, or makes, of equipment which will meet the specification for the base price originally listed in the Bid. Otherwise, the Bid will be rejected on the grounds that it is non-responsive.

(b) The Owner has the right to apply any or all "Deductions or Additions", if any, listed in the Bid by the Engineer, for the purpose of making an award.

14. **Return of Bid Security:** Subject to the provisions of paragraph 10, the Owner will, within ten (10) days following the Bid opening date, return the certified check of all Bidders, except the certified checks posted by the three lowest Bidders. Upon final award and execution of the

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Contract, the remaining certified checks will be promptly returned. Bid Bonds will not be returned unless requested.

15. **Interpretation of Drawings and Specifications:** If any person contemplating submitting a bid for the project is in doubt as to the true meaning of any part of the Drawings, Specifications, or other Contract Document, or as to the scope of any part of the work, they shall submit to the Engineer a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt delivery in ample time for an interpretation to be issued before bid opening date. Interpretations of the documents will be made only by Addendum, and a copy of that Addendum will be mailed or delivered to each person receiving a set of the documents. The Owner and Engineer will not be responsible for other interpretations of the documents.

16. **Complete Work Required:** The Specifications, the Drawings, and all supplemental documents are essential parts of the Contract, and requirements occurring in one are as binding as though occurring in all. They are intended to be complementary and to describe and provide for the complete work. In case of omissions from the Specifications as to items of equipment and materials or quantities therefore, the Drawings shall govern. In case of discrepancy in the Drawings, figured dimensions shall govern. It shall be the responsibility of the Bidder to call to the attention of the Engineer those omissions having a magnitude, which would affect the strength, adequacy, function, completeness, and cost of any part of the work in ample time for amendment by Addendum prior to the Bid opening date.

17. **Drawings:** The character and location of the work, together with the essential details, are shown upon the Drawings.

18. **Working Drawings:** Working drawings shall consist of those detail drawings which may be required for prosecution of the work, but which are not included in the Contract Drawings. Six copies of all necessary working drawings shall be submitted by the Contractor to the Engineer unless additional copies are included in the submittal. Working drawings shall include shop details of manufactured equipment, products to be used, and all other drawings as may be required by the Specifications, and as may be necessary for the successful completion of the work. Review and approval by the County Engineer must be obtained before work involving working drawings may be performed.

(a) **Check by Contractor:** The Contractor shall check all working drawings for accuracy of dimensions and details, and for conformance with Contract Drawings and Specifications before submitting working drawings to the Engineer for review. The Contractor shall indicate that working drawings have been checked by affixing an appropriate stamp or notation on the face of the working drawings. Deviations from the Plans and Specifications shall be clearly and specifically called to the Engineer's attention in a written statement accompanying the drawings.

(b) **Responsibility for Accuracy:** Review by the Engineer of the Contractor's working drawings shall not relieve the Contractor of responsibility for accuracy of

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dimensions and details. The Contractor shall be responsible for agreement and conformity of working drawings with the Contract Drawings and Specifications.

(c) **Payment:** The contract price shall include the cost of furnishing all working drawings, and the Contractor shall be allowed no extra compensation for furnishing those drawings.

19. **Cooperation of Contractor:** The Contractor will be supplied with five (5) copies of the Drawings and Specifications. The Contractor shall have available on the work, at all times, one (1) copy of the Drawings and Specifications. He shall give the work the constant attention necessary to facilitate the progress thereof, and shall cooperate with the Engineer and other contractors in every way possible.

20. **Construction Stakes:** Subsidiary lines and grades shall be laid out by the Contractor from the controlling lines and bench marks established by the Engineer, or from measurements shown. All lines and grades shall be subject to checking by the Engineer, but that checking shall in no way relieve the Contractor from responsibility for their labor and assistance as the Engineer may require in laying out work, establishing bench marks, and checking and measuring the work.

21. **Authority and Duties of Inspector:** Inspectors shall be authorized to inspect all work done and all materials furnished, including preparation, fabrication, and manufacture of the materials to be used. The inspector shall not be authorized to alter or waive requirements of the Drawings and Specifications. Inspectors shall call the attention of the Contractor to failure of the work and/or materials to conform to the Drawings and Specifications. Inspectors may reject materials or suspend work until questions at issue can be referred to, and be decided by the Engineer. The presence of the inspector shall in no way lessen the responsibility of the Contractor.

22. **Inspection:** The Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether or not the work performed, and materials used, are in accordance with the requirements and intent of the Specifications and Drawings. No work shall be done, or materials used, without suitable supervision or inspection by the Engineer or Engineer's representative. Failure to reject defective work and materials shall neither, in any way, prevent later rejection when those defects are discovered, or obligate the Owner to any final acceptance.

23. **Rejection of Work and Materials:** All materials furnished and work done when not in accordance with the Specifications and Drawings will be rejected, shall be immediately removed, and other work shall be done and materials furnished in accordance therewith. If the Contractor fails to remove the work and materials within forty-eight (48) hours after having been ordered to do so, then the Owner shall have the right and authority to stop the Contractor and his work at once until the Contractor removes the work and materials.

24. **Defective Materials and Work:** The inspection of the work shall not relieve the Contractor of any obligations to fulfill the Contract. Defective work shall be made good by the Contractor, notwithstanding that such work and materials have been previously inspected by the Engineer and accepted or estimated for payment. Failure by the Engineer to condemn or reject improper materials and workmanship shall be considered neither as a waiver of defects, which may be

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discovered late, nor as preventing the Owner at any time subsequently from recovering damages for work actually defective. All work shall be guaranteed against defects in workmanship and materials for a minimum period of one year from date of Owner acceptance.

25. **Corrections:** Should any portion of the Drawings and Specifications be obscure or in dispute, they shall be referred to the Engineer, who shall decide as to the true meaning and intent. The Engineer shall also have the right to correct errors and omissions at any time when those corrections are necessary for the proper fulfillment of the Drawings and Specifications.

26. **Disagreement:** Should any disagreement or difference arise as to the estimate, quantities, or classifications, or as to the meaning of the Drawings and Specifications, on any point concerning the character, acceptability, and nature of the several kinds of work and materials and construction thereof, the decisions of the Engineer shall be final, conclusive, and binding upon all parties to the Contract.

27. **Weather:** During unseasonable weather, all work must stop when the Engineer so directs, and all work must be suitably protected.

28. **Land and Rights of Way:** The Owner will furnish all land and rights of way necessary for the carrying out of this contract and the completion of the work herein contemplated, and will use due diligence in acquiring said land and rights of way as speedily as possible. It is possible that all lands and rights of way may not be obtained as herein contemplated before construction begins, in which event the Contractor shall begin his work upon such land and rights of way as the Owner may have previously acquired. The Owner will provide no rights of way over other property. The Contractor shall take every precaution to inconvenience as little as possible the owners or tenants of adjacent property. Public highways shall not be obstructed. Expense shall be borne by the Contractor to repair or pay for any damage or injury to either private or public property during progress of the work.

29. **Competent Labor:** The Contractor shall employ only competent and skilled personnel on the work. The Contractor shall at all times have a Superintendent, satisfactory to the Engineer, capable of acting as the Contractor's agent of the work, and who shall receive instructions from the Engineer or his authorized representative. The Superintendent shall have full authority to execute the orders and directions of the Engineer without delay, and to promptly supply these materials, tools, plant equipment, and labor as may be required. The Contractor shall, upon demand by the Engineer, immediately remove that Superintendent, Foreman, or Workmen whom the Engineer may consider to be incompetent or undesirable, or both.

30. **Laws, Regulations, and Permits:** The Contractor shall comply with all applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the work specified herein. Permits and licenses necessary for construction of the work shall be secured and paid for by the Contractor.

31. **Sales Tax:** Bidders shall include in the Bid an allowance for payment of State Sales Tax on all taxable materials specified to be furnished by the Contractor and incorporated into the work under this Contract.

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32. **Sanitary Facilities:** Necessary sanitary facilities for the use of personnel on the project shall be erected and maintained by the Contractor in such manner and at such points as shall be approved by the Engineer. Facilities shall be maintained in sanitary conditions and in strict accordance with the applicable regulations. No unsanitary act shall be committed outside sanitary facilities.
33. **Storage Facilities:** Should the Contractor so desire, he/she may build storage facilities for housing tools, machinery and supplies, but those facilities will be permitted only at places approved by the Engineer, and their surroundings shall be maintained at all times in a sanitary and satisfactory manner. On or before completion of the work, those facilities shall be removed at the expense of the Contractor.
34. **Water, Sewer, and Electric Power Supply:** The Contractor shall make his/her own arrangements for water, sewer, and electric power supply for his/her construction operations.
35. **Access Roads:** Streets, roads, and drives used by the Contractor for access to and from the job site shall be protected from damage in excess of that caused by the normal traffic of vehicles used for, or in connection with, construction work. Project related damages shall be repaired immediately, and the area shall be left in good condition at the end of the construction period.
36. **Order of Work:** The prosecution, order, and sequence of the work shall be as provided herein, or as approved by the Engineer, but that approval shall in no way affect the responsibility of the Contractor.
37. **Protective Works:** The Contractor shall furnish and install all necessary temporary signage for the protection of the work, including lights at night, barricades, and warning signs.
38. **Safety Regulations:** The performance of work under this Contract shall comply with safety regulations prescribed by the Owner, those of the National Occupational Safety and Health Act of 1970, and the requirements of the State where project is located. Each Bidder shall examine and satisfy him/herself as to the character and extent of these regulations.
39. **Allowable Time for Completion:** The time allowed for completion of all work as stated in the Bid and Construction Agreement shall be as specified in consecutive calendar days after notifications by written order from the Engineer to proceed with the work. Such notifications will be issued upon completion of execution of the contract documents.
40. **Liquidated Damages:** The Contractor shall pay to the Owner as liquidated damages the sum of **five hundred dollars (\$500.00)** for each calendar day that the Contractor shall be in default of completing the work within the time limit stated within the Bid.

General Conditions

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1. **Contract Security:** The Contractor shall furnish two Security Bonds (forms attached) each in an amount at least equal to one hundred percent (100%) of the contract price, one as a security for the faithful performance of this Contract, and one for the payment of all persons performing labor and furnishing materials in connection with this Contract. The Surety on each Bond shall be a surety company satisfactory to the Owner, duly authorized to do business in the State of South Carolina. The Bonds shall be countersigned by an agent who is a resident of the State, County, or City of the Owner, if required. The person executing the Bond on behalf of the surety shall file with the Bond a general power of attorney unlimited as to amount and type Bond covered by such power of attorney, and certified to by an official of said surety.

2. **Contractor's and Subcontractor's Insurance:** The Contractor shall not commence work under this Contract until obtaining all the insurance required under this paragraph, and until such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been so obtained and approved. All certifications of insurance and policies shall contain the following clause: "The insurance covered by this Certificate will not be cancelled or materially altered unless at least thirty (30) days prior written notice has been given to the Owner".

(a) **Compensation Insurance:** The Contractor shall procure and maintain during the life of this Contract, including the entire period of the Contractor's Warranty, Workmen's Compensation Insurance for all of the employees engaged, or to be engaged, in work on the project under this Contract; and in such case any such work is sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees engaged, or to be engaged, in such work, unless such employees are covered by the protection afforded by the Contractor's Workmen's Compensation Insurance. In case any class of employees engaged in hazardous work on the project under this Contract is not protected under the Workmen's Compensation Insurance Statute, the Contractor shall provide Workmen's Compensation coverage for, and hold harmless, the Owner for the protection of such of Owner's employees not otherwise protected.

(b) **Public Liability, Property Damage, and Automobile Liability Insurance:** The Contractor shall take out, and maintain during the life of this Contract, including the entire period of the Contractor's Warranty, Comprehensive General Liability Insurance, including products and completed operations, XC and U coverage; the ISO Broadform General Liability endorsement to its equivalent thereof; Automobile Liability Insurance; and such other insurance as the Owner shall direct and shall protect him and any subcontractor performing work covered by this contract from claims for damage 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 the insured or by anyone directly or indirectly employed by them. The Owner shall be listed as an additional Insured on all such policies and certificates of insurance. The amount of such insurance shall be as follows:

(1) **Bodily Injury Insurance:** in an amount of not less than \$500,000 for bodily injury, including accidental death to any one person, and subject to the same limit

General Conditions

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for each person, in an amount not less than \$1,000,000 on account of one accident.

- (2) **Property Damage Insurance:** in an amount not less than \$500,000 for any one damage claim, and in an aggregate amount up to \$1,000,000 during a period of twelve (12) months.
- (3) **Automobile Liability Insurance:**
 - a. For bodily injury, including accidental death, to any one person in an amount not less than \$500,000 and subject to the same limit for each person, in an amount not less than \$1,000,000 on account of one accident.
 - b. For property damage in an amount not less than \$500,000 for any one damage claim and in an aggregate amount up to \$1,000,000 during a period of twelve (12) months.
- (4) **Owner's Protective Liability Insurance:** The Contractor shall provide a policy issued in the name of the Owner for liability and property damage in the same amounts as required for the Contractor.
- (5) **Umbrella Policy:** Umbrella coverage shall be obtained, if required, to provide for an increase in basic policy coverage to an amount not less than \$1,000,000.
- (6) **Builder's Risk or Installation Floater Insurance (Fire and Extended Coverage):** The Contractor shall insure all work against loss or damage by fire and against loss or damage covered by the standard extended coverage insurance, and the amount of the insurance at all times, shall be at least equal to the amount paid on account of work and materials. The policies shall be in the names of the Owner and the Contractor as their interest may appear.
- (7) **Proof of Coverage of Insurance:** The Contractor shall furnish the Owner with certificates showing satisfactory proof of carriage of the insurance required before commencing work on this contract. Certificates of insurance for subcontractors are not required to be submitted to the Owner.
- (8) **Scope of Insurance:** The insurance required under subcontractors (b), (c) and (d) hereof shall provide protection for the Contractor and his subcontractors, respectively, as well as the Owner, against damage claims which may arise in any way from operations under this Contract, whether such operations be by the insured or by anyone directly or indirectly employed by the Contractor.
- (9) Nothing contained in this contract, or any document forming a part thereof or attached thereto, shall be construed to change or increase the limitations on the liability of the Owner set forth in the South Carolina Tort Claim Act.

General Conditions

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3. Accident Prevention: Precaution shall be exercised at all times by the Contractor for the protection of all persons, including employees and property. Hazardous conditions shall be guarded against or eliminated.

The Contractor shall be responsible for all injuries or damages to persons or property, and shall defend, indemnify, save and hold harmless the Owner, its officers, employees and agents, from all damages, attorneys' fees and costs by reason of injury to person or property resulting from performance of the work or in guarding the same, or from any improper materials, implements, or appliances used in its construction, or on account of any act or omission of the Contractor and subcontractor, their agents or employees. The whole, or as much of the monies due, under and by virtue of this Contract, as may be considered necessary by the Owner, shall or may be retained by the Owner until all suits or claims for damages have been settled, and evidence to that effect furnished to the satisfaction of the Owner.

(a) In emergencies affecting the safety of persons, the work, or property at the site, or adjacent thereto, the Contractor without special instruction or authorization from the Engineer or Owner, shall act to prevent threatened damage, injury or loss. The Contractor shall make prompt written notice to the Engineer and Owner of any changes in the work or deviations from the Contract Documents caused thereby.

(b) Safety and health facilities and procedures shall be in accordance with the requirements of the National Occupation Safety and Health Act of 1970, (OSHA), and subsequent amendments. The Contractor shall comply with the Department of Labor's Safety and Health Regulations for construction promulgated under the National Occupational Safety and Health Act of 1970 (P.L. 91-596), and under Section 107 of the Contract Work Hours and Safety Standard Act (P.L. 91-54), and subsequent amendments. The Contractor shall comply with OSHA Hazard Communication Standard, Title 29 Code of Federal Regulations 1910.1200, by compiling a master hazardous chemical list (including locations), expanding MSDS's, ensuring that containers are labeled, and providing employee training.

4. Laws of the Place: The Contractor shall conduct the construction as defined in the Bid in accordance with the applicable national, state, county, and municipal laws, ordinances and regulations. The Contractor shall keep fully informed of all orders and decrees of bodies and tribunals having jurisdiction and authority over the project, and fully informed of those laws, ordinances, and regulations which would, in any way, affect those engaged and employed in the project, the materials used in the project, and the conduct of the project. If discrepancies, or inconsistencies, or both, should be discovered in the Construction Agreement, Drawings, or Construction Specifications, or combination thereof, in relations to laws, ordinances, regulations, orders and decrees, the Contractor shall forthwith report the fact, in writing, to the Owner. The Contractor shall protect and indemnify the Owner, officers, agents and employees, against claims and all liabilities arising from, or based on, the violation of those laws, ordinances, regulations, orders, and decrees, whether by the Contractor or by his employees or agents.

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5. Payment of Contractor:

(a) Not later than the 30th day of each calendar month, provided estimates are promptly and properly submitted, the Owner will make a partial payment to the Contractor on the basis of a duly certified and approved estimate of the work performed during the preceding performance of this Contract. The Owner will retain ten percent (10%) of the amount of each estimate until such time that all work has been completed and approved by the County Engineer and a Waiver of Lien submitted stating that all vendors have been paid for materials, labor and supplies.

(b) In preparing estimates, the material not subject to deterioration delivered on the site, and preparatory work done, will be taken into consideration for inclusion on the partial payment request. The amount of eligible on-site material included in the partial payment shall be reduced by ten percent (10%) of the amount of the material cost as shown on the submitted material invoice.

(c) All material and work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made, or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all of the terms of the Contract.

(d) **Owner's Right to Withhold Certain Amounts and Make Application Thereof:** The Contractor agrees that to indemnify and save the Owner harmless from all claims growing out of the demands of subcontractors, laborers, workers, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies including commissary, used in the furtherance of the performance of this contract. The Contractor shall furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails so to do, then the Owner may, after having served written notice on the said Contractor, either pay unpaid bills, of which the Owner has written notice, directly, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such claims until satisfactory evidence is furnished that all liabilities have been fully discharged, whereupon payment to the Contractor shall be resumed, in accordance with the terms of this Contract; but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to either the Contractor or his Surety. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and the Owner shall not be liable to the Contractor for any such payments made in good faith.

6. Payment by Contractor: The Contractor shall pay for:

(a) All transportation and utility services no later than the 20th day of the calendar month following that in which services are rendered.

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(b) All materials, tools, and other expandable equipment not less than ninety percent (90%) of the cost thereof, no later than the 20th day of the calendar month following that in which such materials, tools, and equipment are delivered at the site of the project.

(c) Each subcontractor, no later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by subcontractors to the extent of such subcontractors' interest therein.

7. Subcontracting:

(a) The Contractor may utilize the services of specialty subcontractors on those parts of the work which, under normal contracting practices, are performed by specialty subcontractors.

(b) The Contractor shall not subcontract the complete work, or any major portion thereof, and shall not award any work to any subcontractor without prior written approval by the Owner, which approval will not be given until the Contractor submits to the Owner, a written statement concerning the proposed award to the subcontractor, which statement shall contain such information as the Owner may require.

(c) The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for the acts and omissions of persons directly employed by Contractor.

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

(e) The Contractor will indemnify and save the Owner or the Owner's agents harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the work.

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

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

9. Time for Completion and Liquidated Damages: It is hereby understood, and mutually agreed, by and between the Contractor and the Owner, that the date of beginning, rate of progress, and the time for completion of the work to be done hereunder are ESSENTIAL CONDITIONS of this contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on a date to be specified in the "Notice to Proceed" and completed within the time period specified herein above. The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for completion of the work described herein is a reasonable time for the completion of same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

IF THE SAID CONTRACTOR SHALL NEGLECT, FAIL OR REFUSE TO COMPLETE THE WORK WITHIN THE TIME HEREIN SPECIFIED, then the Contractor does hereby agree, as a part consideration for the awarding of this Contract, to pay to the Owner the amount specified in the Contract not as a penalty, but as liquidated damages for such breach of Contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the Contract for completing work. The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages which the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain, and said amounts shall be retained from time to time and the Owner from current periodical estimated.

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

- (a) To any preference, priority, or allocation order duly issued by the government.
- (b) To unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, or of the public enemy, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather.
- (c) To any delays of subcontractors occasioned by any of the causes specified in subsections (a) and (b) of this article.

Provided, further, that the Contractor shall, within forty-eight (48) hours from the beginning of such delay, notify the Owner in writing of the causes of the delay, who shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of its decision in the matter.

10. Construction Schedule and Periodic Estimates: Immediately after execution and delivery of the Contract, and before the first partial payment is made, the Contractor shall deliver to the Owner an estimated construction progress schedule in a form satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the Contract Documents and the anticipated amount of each monthly payment that will become due the Contractor in accordance with the progress schedule. The Contractor shall also furnish on forms acceptable to the Owner:

- (a) A detailed estimate giving a complete breakdown of the Contract price.
- (b) Periodic itemized estimates of work done for the purpose of making partial payments thereon.

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

11. Responsibility of Contractor: If, through acts of neglect on the part of the Contractor, any other Contractor, or any subcontractor shall suffer loss or damage on the work, the Contractor agrees to settle with such other contractor or subcontractor by agreement or arbitration if such other contractor or subcontractor will so settle. If such other contractor or subcontractor shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall defend and indemnify and save and hold harmless the Owner against any such claim.

12. Extras: Without invalidating the Contract, the Owner may order extra work or make changes by altering, adding to, or deducting from the work, the Contract sum being adjusted accordingly, and the consent of the Surety being first obtained where necessary or desirable. All work of the kind bid upon shall be paid for at the price stipulated in the Bid, and no claims for any extra work or materials shall be allowed unless the work is ordered in writing by the Owner or the Engineer, acting officially for the Owner, and the price is stated in such order.

13. Changes in Work: Should the Contractor encounter, or the Owner discover, during the progress of the work, subsurface or latent conditions at the site materially differing from those shown on the Drawings or indicated in the Specifications, or unknown conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Drawings and Specifications, the attention of the Owner shall be called immediately to such conditions before they are disturbed. The Owner shall thereupon promptly investigate the conditions, and if it finds that they do so materially differ, the Contract shall be modified, with the written approval by the Owner, to provide for any increase or decrease of costs or difference in time resulting from such conditions. No changes in work shall be made without prior written approval by the Owner.

The Contractor shall proceed with the performance of any changes in the work so ordered in the field by the Engineer and/or Owner unless the Contractor believes said change entitles Contractor to a change in Contract price and/or time, in which event the Contractor shall give the

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Engineer written notice thereof within seven (7) days after receipt of the field order and shall not execute the field change pending the execution of a change order unless the change is for accident prevention as cited herein.

The Contractor shall furnish to the Owner, when required, an itemized breakdown of the quantities and prices used in computing the value of any change that might be ordered. In figuring these changes, instructions for measurement of quantities set forth in the Specifications shall be followed.

Charges or credits for the work covered by the approved change shall be determined by the Owner using one or more or a combination of the following methods:

- (a) Unit bid prices stipulated in the Bid or as subsequently approved, which unit prices shall include allowances for overhead and profit.
- (b) An agreed lump sum.
- (c) The actual cost, by keeping a correct account including all vouchers, for:
 - (1) Labor, including foremen.
 - (2) Materials entering permanently into the work.
 - (3) Ownership or rental cost of power tools and construction equipment actually used.
 - (4) Power and consumable supplies for operation of power equipment.
 - (5) Prorate charges for insurance covering public liability, Workmen's Compensation, Old Age and Unemployment, and Social Security.

To the costs in (c) above shall be added a negotiated fixed fee for overhead and profit, not to exceed fifteen percent (15%) of the above items, except that actual cost only will be allowed for Social Security, Old Age and Unemployment Insurance. Among the items considered as overhead are costs for insurance other than above, bonds, superintendence, timekeeping, clerical work, watchman, use of small tools, general office expense and miscellaneous. The allowance for combined overhead and profit thus calculated shall be the only such allowance included in the total cost of the work performed by the Contractor or his subcontractor. If the work was performed by subcontract, the Contractor may add a negotiated fixed fee for overhead and profit not to exceed five percent (5%) of the subcontract cost.

If the Owner determines that the Contractor, pursuant to his obligations under paragraph 6 and 7 of the Instruction to Bidders and Special Provisions, should have discovered the conditions prior to the awarding of the bid for the project, it may require the Contractor to complete the project for the contract price and the condition shall be deemed to be materially different as provided herein.

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14. Claims for Extra Cost: No claim for extra work or cost shall be allowed, unless the same was done in pursuance of a written order by the Engineer, as aforesaid, and the claim presented with the first estimate after the changed or extra work is done. When work is performed under the terms of subsection 13(c) of these General Conditions, the Contractor shall furnish satisfactory bills, payrolls and vouchers covering all items of cost and when requested by the Owner, give the Owner access to accounts relating thereto.

15. Materials, Services and Facilities:

(a) It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, lights, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

(b) Materials and equipment shall be stored in a manner to insure the preservation of their quality and fitness for the work.

(c) Any work necessary to be performed after regular working hours, on Sundays or legal holidays, shall be performed without additional expense to the Owner.

16. Patents:

(a) The contractor shall defend, indemnify, hold and save the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including attorney's fees cost and expense, for or on account of any patented or unpatented inventions, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents.

(b) If the Contractor uses any design, device or materials covered by letter, patents or copyrights, Contractor shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood that, without exception, the Contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or the Contractor's sureties shall defend, indemnify, and save and hold harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or material or any trademark or copyright in connection with work performed under this Contract, and shall indemnify the Owner for any attorneys' fees, cost, expense, or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

17. Inspection and Testing of Material: Unless otherwise specifically provided for in the Specifications, the inspection and testing of material and finished articles to be incorporated in the work at the site shall be made by bureaus, laboratories or agencies arranged for by the

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Contractor and as approved by the Engineer. The Contractor shall furnish all such extra quantities of materials and items as may be required for testing, and shall deliver same to the laboratory. The cost of furnishing and delivering samples to the laboratory shall be paid for by the Contractor.

Where the detailed Specifications call for certified copies or mill or shop tests to establish conformance of certain materials with the Specifications, it shall be the responsibility of the Contractor to assure the delivery of such certifications to the Owner.

No materials or finished articles shall be incorporated into the work until such materials and finished articles have passed the required tests. The Contractor shall promptly segregate and remove rejected material and finished articles from the work site.

The testing and approval of materials by the laboratory or laboratories approved by the Engineer shall not relieve the Contractor of any of his obligations to fulfill this Contract and guarantee of workmanship and materials as called for in Paragraph 21 entitled "General Warranty for One Year After Completion of Contract", herein. The Contractor may, at Contractor's option and expense, cause such other tests to be conducted as Contractor may deem necessary to assure suitability, strength, and durability of any material or finished articles.

18. Right of the Owner to Terminate Contract: In the event that any of the provisions of this Contract are violated by the Contractor or by any subcontractors, the Owner may serve written notice upon the Contractor and Contractor's Surety of the intention to terminate the Contract. Such notices are to contain the reasons of such intention to terminate the Contract; and unless within ten (10) days after the serving of such notice upon the Contractor, such violation or delay shall cease and satisfactory arrangement of correction be made, the Contract shall, upon the expiration of said ten (10) days, terminate.

In the event of any such termination, the Owner shall immediately serve notice thereof upon the Surety and the Contractor, and the Surety shall have the right to take over and perform the Contract; provided, however, that if the Surety does not commence performance thereof within five (5) days from the date of the mailing to such Surety of notice of termination, the Owner may take over the work, prosecute the same to completion, by contract or by force, account at the expense of the Contractor, and the Contractor and his Surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event, the Owner may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the work site and necessary therefore.

19. Notices and Service Thereof:

(a) Any notice to the Contractor from the Owner, relative to any part of this Contract, shall be in writing and considered delivered and the service thereof completed, when said notice is posted by certified mail, to the said Contractor at the last given address, or delivered in person to said Contractor or authorized representative on the work, or is deposited in the regular United States mail in a sealed, postage prepaid envelope, and the receipt thereof is acknowledged by the Contractor.

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(b) All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to the County Engineer. Any notice to or demand upon the Owner shall be sufficiently given if delivered to the office of said County Engineer, or deposited in the United States mail in a sealed postage prepaid envelope or delivered with charges prepaid to any telegraph company for transmission, in each case properly addressed to the County Engineer, or to such other address as the Owner may subsequently specify in writing to the Contractor for such purposes, and received by the County Engineer.

20. Quantities of Estimate: The estimated quantities of work to be done and materials to be furnished under this Contract shown in any of the documents, including the Bid, are given for use in comparing bids, and to indicate approximately the total amount of the contract; and the right is especially reserved by the Owner, except as herein otherwise specifically limited, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the work contemplated by this Contract.

21. General Warranty for One Year After Completion of Contract: For a period of at least one year after completion of the Contract and final acceptance of the work by the Owner, the contractor warrants the fitness and soundness of all work done and materials and equipment put in place under the Contract. Neither the final certificate of payment nor any provision in the Contract Documents, nor partial or entire occupancy of the premises by the Owner, shall constitute an acceptance of work not done in accordance with the Contract Documents, or relieve the Contractor of liability for this warranty or for any other warranties or responsibility for faulty materials, equipment or workmanship. The Contractor shall remedy any defects in the work and pay for damage resulting therefrom discovered with a period of one year from the date of final acceptance of work unless a longer period is specified. The Owner will give notice of observed defects with reasonable promptness. This provision in no way affects the Contractor's responsibility to the Owner for latent defects.

22. Contractor's Obligations: The Contractor shall and will, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper and complete all work required by the Contract within the time herein specified, in accordance with the provisions of this Contract and said Specifications, the Plans and Drawings of the work covered by this Contract, and any and all supplemental plans and drawings of the work, and in accordance with the directions of the Engineer as given from time to time during the progress of the work. The Contractor shall furnish, erect, maintain, and remove such construction plant and such temporary works as may be required. The Contractor alone shall be responsible for the safety, efficiency and adequacy of the plan, appliance, and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation.

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

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23. Engineer's Authority: The Engineer shall give all orders and directions contemplated under this Contract and Specifications relative to the execution of the work. The Engineer shall determine the amount, quality, acceptability, and fitness of several kinds of work and materials which are to be paid for under the Contract and shall decide all questions which may arise in relation to said work and the construction thereof. The Engineer's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said Contract or Specifications, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this Contract affected in any manner or to any extent by such question.

The Engineer shall decide the meaning and intent of any portion of the Specifications and or any Plans or Drawings where the same may be found obscure or be in dispute.

Any difference or conflicts, in regard to their work, which may arise between the Contractor and other contractors performing work for the Owner, shall be adjusted and determined by the Engineer.

The Engineer and Owner will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

24. Owner's Prerogative: The Owner shall have the right to enter the site for the purpose of doing work and/or having work done which is not covered by the Contract Documents. This provision shall not relieve the Contractor of his obligations cited in Item 22 herein, excepting work done by the agents or employees of the Owner. Prior to completion and acceptance of the work set forth in the Contract, the Owner with the concurrence of Engineer and Contractor, may use any completed or substantially completed portion of the work, by such use shall not constitute an acceptance of that portion.

25. "Or Equal" Clause: With the exception of major items of mechanical and electrical equipment, whenever a material or article required is specified or shown on the Drawings by using the name of the proprietary product or of a particular manufacturer or vendor, any material or article which will meet the design criteria and is equal in function and durability, as determined by the Engineer prior to the bid, will be considered acceptable.

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

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27. Reports, Records and Data: The Contractor and each of his subcontractors shall submit to the Owner such schedules, payroll, reports, estimates, records and other data as the Owner may request, or as may be required herein, concerning the work performed or to be performed under this Contract.

28. Acceptance of Work and Final Payment: Before final acceptance of the work and payment to the Contractor of the percentage retained by the Owner, the following requirements shall be complied with:

(a) **Final Inspection:** Upon written notice from the Contractor that work is completed, the Engineer will make a final inspection of the work, and shall notify the Contractor of all instances where the work fails to comply with the Contract Drawings and/or Specifications, as well as any defects discovered. The Contractor shall immediately make such alterations necessary to make the work comply with the Contract Drawings and Specifications to the satisfaction of the Engineer.

(b) **Cleaning Up:** Before the work is considered as complete, all rubbish and unused material due to or connected with the construction must be removed and the premises left in a condition satisfactory to the Owner. Streets, curbs, crosswalks, fence, and other public and private property or rights of way disturbed or damaged shall be restored to their former condition. Final acceptance will be withheld until such work is finished.

(c) **Liens:** Final acceptance of the work will not be granted, and the retained percentage will not be due or payable until the Contractor has furnished the Owner proper and satisfactory evidence under oath that all claims for labor and material employed or used in the construction of the work under this contract have been settled, and that no legal claims will be filed against the Owner for such labor or materials.

(d) **Final Estimate:** Upon completion of all cleaning up, alterations and repairs required by the final inspection or operation test, the satisfactory completion of the operating test, and upon submitting proper and satisfactory evidence to the Owner that all claims have been settled, the Engineer will issue a certificate of final acceptance of the work. The Contractor shall then prepare a final estimate. After review of the final estimate by the Engineer, and approval by the Owner, the final payment shall then become due.

29. Minimizing Silting and Bank Erosion During Construction: During construction protective measures shall be taken and maintained to minimize bank erosion, and the silting of creeks and rivers adjacent to work being performed during construction. This shall be done as according to the Erosion Control Section of these Specifications and shall comply with the Plans.

30. Restoration of Disturbed Areas: All areas disturbed by or during construction shall be restored to their existing or better condition. This is not to be interpreted as to replacement of trees and undergrowth in undeveloped sections of rights of way.

31. Chemicals Used During Construction: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactor or

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of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal or residue shall be in strict conformity with manufacturer's instructions.

32. Acceptance of Final Estimate: The acceptance by the Contractor of the final payment shall operate as a release to the Owner from all claims and liabilities to the Contractor for all work done or materials furnished, or for any act of the Owner or its agents affecting the work.

33. Inspection by Agencies: The representatives of all local, state and federal regulatory agencies legally authorized to have access shall have access to the work wherever it is, in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection.

34. Litigation: In the event of litigation in which the Owner is or becomes a party, the Contractor agrees and consents that the litigation shall be filed in, or transferred to, the Court of Common Pleas of Aiken County, South Carolina or the Aiken Division of the United States District Court for the District of South Carolina and that the laws of the State of South Carolina shall apply to and govern such litigation. The Contractor further agrees to cooperate with the Owner in obtaining the transfer of such litigation to those courts by promptly signing all documents necessary thereto.

35. By signing the bid, offer, or proposal, Contractor certifies that Contractor will comply with the applicable requirements of Title 8, Chapter 14 of South Carolina Code of Laws and agrees to provide to the Owner, upon request, any documentation required to establish either:

- (a) That Title 8, Chapter 14 is inapplicable both to Contractor and its subcontractors or sub-subcontractors; or
- (b) That Contractor and its subcontractors or sub-subcontractors are in compliance with Title 8, Chapter 14.

36. Pursuant to Section 8-14-60, "A person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony, and, upon conviction, must be fined within the discretion of the court or imprisoned for not more than five (5) years, or both."

37. Contractor agrees to include in any contract with its subcontractors language requiring its subcontractors to:

- (a) Comply with the applicable requirements of Title 8, Chapter 14.
- (b) Include in their contracts with the sub-subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 8, Chapter 14.

Bid Proposal
Roadway Improvements for
Cobblestone Road

TO THE COUNTY AND COUNTY COUNCIL
OF AIKEN COUNTY, SOUTH CAROLINA

Submitted _____, 2015

The undersigned, as Bidder, hereby declares that the only person or persons interested in the Bid as principal or principals is (or are) named herein and that no other person than herein mentioned has any interest in this Bid or in the Contract to be entered into; that this Bid is made without connection with any other person, company or parties making a bid of Bid; and that is in all respects fair and in good faith without collusion or fraud. The Bidder further declares that he/she has examined the site of the work and informed him/herself fully in regard to all conditions pertaining to the place where the work is to be done; and that he/she has examined the Drawings and Specifications for the work and contractual documents relative thereto and has read all Special Provisions and General Conditions furnished prior to the opening of bids; and that he/she has satisfied him/herself relative to all work to be performed. The Bidder proposes and agrees, if this Bid is accepted, to contract with Aiken County, South Carolina, in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary, and to complete the construction of the work in full and complete accordance with the shown, noted, described, and reasonably intended requirements of the Drawings, Specifications, and Contract Documents to the full and entire satisfaction of Aiken County, South Carolina, with a definite understanding that no money will be allowed for extra work except as set forth in the attached General Conditions and Contract Documents, for the following prices:

**Bid Proposal
Roadway Improvements for
Cobblestone Road**

Cobblestone Road

Item	Description	Quantity	Units	Units Cost (\$)	Cost (\$)
1	Mobilization, Traffic Control Devices, Bonds and Construction Signage	1	LS	_____	_____
2	Construction Stakes, Lines and Grades	1	LS	_____	_____
3	Clearing & Grubbing, Including tree removal inside of: R/W, Drainage Easements & Construction Limits	1	LS	_____	_____
4	Moving Items: Mailboxes; Street Signs, Etc. to R/W Line or Designated Area	1	LS	_____	_____
5	Saw Cut and Dispose of Existing Pavement	1	LS	_____	_____
6	Signing	1	LS	_____	_____
7	Clean and Grade Outfalls	1	LS	_____	_____
8	Unclassified Excavation (Excavation and Haul including sediment removal)	5179	CY	_____	_____
9	Asphalt Key	2	EA	_____	_____
10	Permanent raised yellow Pavement Bi directional markers(4"square) at 80' o.c. maximum spacing, 40' o.c. curves	125	EA	_____	_____
11	24" White Stop Bar (Thermoplastic)	28	LF	_____	_____
12	12" White Solid Line (Thermoplastic)	68	LF	_____	_____
13	4" White Solid Line (Thermoplastic)	110	LF	_____	_____
14	4" White Broken Line (Thermoplastic)	54	LF	_____	_____
15	12" Yellow Solid Line (Thermoplastic)	40	LF	_____	_____
16	4" Yellow Solid Line (Thermoplastic)	1060	LF	_____	_____

**Bid Proposal
Roadway Improvements for
Cobblestone Road**

17	Pavement in SCDOT ROW(2" Type C Surface, 4" Type C Binder, 6" Graded Aggregate Base per SCDOT Encroachment Permit)	371	SY	_____	_____
18	1.5" minimum compacted Hot Laid Asphalt Concrete Surface Course, SCDOT Type C (Includes cost of coring every 1,000 LF) MAINLINE	12,000	SY	_____	_____
19	Bituminous Prime Coat (0.25 gal/s.y.) MAINLINE	12,000	SY	_____	_____
20	Shape Subgrade and Place 6" Compacted Sand Clay Base (Includes cost of testing subgrade and base every 1,000 LF) MAINLINE	13,100	SY	_____	_____
21	Driveways To ROW (To include Items 8, 13, 14, 15)	20	EA	_____	_____
22	Grassing, Fertilizer & Mulch on Shoulders and Disturbed Areas	3.4	AC	_____	_____
23	Turf Reinforced Matting (TRM) Type 1	2900	SY	_____	_____
24	Temporary Erosion Control Blanket (See SCDOT SC-M-815-9)	770	SY	_____	_____
25	18" Reinforced Concrete Pipe (RCP)	408	LF	_____	_____
26	24" Reinforced Concrete Pipe (RCP)	60	LF	_____	_____
27	Removal of Existing 4.5' X 4.5' Cattle Crossing at Sta. 18+18	1	LS	_____	_____
28	Woven Wire Fence (incl. removal of exist. fence and replacing exist. gates)	3,130	LF	_____	_____
29	9" Rip Rap (18" Deep))	33	SY	_____	_____
30	Geotextile Fabric, Class 2, Type B	33	SY	_____	_____
31	Sediment Tubes in Ditches (Installed and Maintained)	104	EA	_____	_____
32	Silt Fence (Installed and Maintained)	1,390	LF	_____	_____

**Bid Proposal
Roadway Improvements for
Cobblestone Road**

33	Install & Maintain Temporary Construction Entrance	2	EA	_____	_____
34	Crusher Run Fill At Driveways and Dirt Roads(where directed)	1,600	SY	_____	_____
35	Select Backfill At Driveways and Dirt Roads (where directed)	100	SY	_____	_____
36	Bedding Stone For Pipes	50	TN	_____	_____
			Subtotal	_____	_____

GRAND TOTAL

(Including all Allowances and Applicable Sales Tax)

_____ Dollars _____ Cents (\$ _____)

The Bidder further proposes and agrees hereby to commence work under this Contract, with adequate force and equipment, on a date to be specified in a written order of the Engineer, and shall fully complete all work thereunder within the following number of consecutive calendar days from and including that date:

230 Consecutive Calendar Days

In submitting this Bid, BIDDER represents that the BIDDER has examined copies of all bidding Documents and the following Addenda receipt of all which is hereby acknowledged:

- 1) Addendum _____ Date _____ Number _____
- 2) Addendum _____ Date _____ Number _____
- 3) Addendum _____ Date _____ Number _____

**Bid Proposal
Roadway Improvements for
Cobblestone Road**

The Bidder declares that he/she understands that the unit price quantities shown in the Bid 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 proposes to do the additional work at the unit prices stated herein; and should the quantities be decreased, he/she also understands that payment will be made on actual quantities used at the unit price bid and will make no claim for anticipated profits for any decrease in the quantities, and that 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. However, when the actual quantities required are more or less than fifteen percent (15%) of the itemized quantities, then a fair and equitable adjustment in the unit price shall be made between the Owner and the Contractor.

Submitted: _____

By: _____ **(L.S)**

Title: _____

General Contractor's License No. _____

(Note: If the Bidder is a Corporation, the Bid shall be signed by a duly authorized Officer of the Corporation; if a Partnership, it shall be signed by a Partner. If signed by other, authority for signature shall be attached. The name of the person signing must be typed in under his/her signature.)

Time is of the essence of this contract, and the Contractor shall pay to the Owner, not as a penalty, but as liquidated damages, the sum of **Five Hundred Dollars (\$500.00)** for each calendar day that the Contractor shall be in default of completing the work within the time limit named herein. Because of the difficulty of fixing damages suffered by the Owner on account of such default, damages are herein agreed upon as stated.

3. The Owner hereby agrees to pay the Contractor for the faithful performance of this Agreement, subject to additions and deductions as provided in the Drawings and Specifications, together with the Bid, Advertisements for Bids, Instructions to the Bidders, Special Provisions, General Conditions, and all Addenda hereto annexed, in lawful money of the United States, the sum of:

(Dollars and Cents)

which sum shall also pay for all loss or damages arising out of the nature of the work aforesaid, or from the action of the elements, or from unforeseen obstructions or difficulties encountered in the prosecuting of the work, and for all expenses incurred by or in consequence of the work, its suspension or discontinuance, and for well and faithfully completing the work and the whole thereof, as herein provided, and for replacing defective work, material or equipment provided for a period of **one year** after completion of all work.

4. No later than the 30th day of each calendar month, as work progresses, the Owner shall make partial payments to the Contractor on the value of labor and materials incorporated into the work and of materials on hand at the site of the work, except cement and materials subject to deterioration, during the preceding calendar month, less payments already made, and less deductions for any unaccepted or defective work, in accordance with terms set forth in the specifications.

5. Upon submission by the Contractor of evidence satisfactory to the Owner that all payrolls, material bills and other costs of any kind incurred by the Contractor in connection with the construction of the work have been paid in full, final payment on account of this Agreement shall be made within thirty (30) days after the completion by the Contractor of all work covered by this Agreement and the acceptance of such work by the Owner.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorized officers as the day first above written in four (4) counterparts, each of which shall, without proof or accounting for the other counterparts, be deemed an original agreement.

Signed, Sealed and Delivered
in the presence of:

AIKEN COUNTY, SOUTH CAROLINA

By: _____

ATTEST:

(As to County)

County Clerk (Official Seal) (SEAL)

Signed, Sealed and Delivered
in the presence of:

CONTRACTOR NAME

By: _____

(As to the Contractor)

(Name Printed or Typed)

(Name Printed or Typed)

Its: _____

(As to the Contractor)

ATTEST:

(SEAL)

(Name Printed or Typed)

(Name Printed or Typed)

APPROVED AS TO FORM BEFORE EXECUTION

Its: _____
(Official Seal)

Attorney for the Owner

***NOTE: If the contractor is a Corporation, the Construction Agreement shall be signed by the President or Vice President, attested by the Secretary, and the Corporate Seal affixed. If the contractor is a Partnership, the Construction Agreement shall be signed in the Partnership name by one of the Partners, with indication that he/she is a general partner. Signatures must be legible or typed in under the appropriate lines. THESE INSTRUCTIONS MUST BE FOLLOWED.**

For value received, it is hereby stipulated and agreed that no changes, alteration, extension of time, or addition to the terms of the said Agreement or Contract or in the work to be performed thereunder or the Specifications accompanying the same, shall in any wise affect the obligation under said obligation or bond, and notice is hereby waived of any such changes, extension of time, alteration or addition to the terms of the Agreement or Contract, or to the work or the Specifications.

IN WITNESS WHEREOF, the said Contractor has hereunder affixed his/her signature and said Surety has hereunto caused to be affixed its corporate signature and seal, by its attorney-in-fact, on this the _____ day of _____ 2015. Executed in four (4) counterparts.

Signed, Sealed and Delivered
in the presence of:

(Contractor)

1. _____
(As to Contractor)

By: _____ L.S.

(Name Printed or Typed)

(Name Printed or Typed)

2. _____

Title: _____ L.S.

(Name Printed or Typed)

ATTEST:

By: _____

(Name Printed or Typed)

1. _____
(As to Surety)

Its: _____
(OFFICIAL SEAL)

(Name Printed or Typed)

(Surety)

By: _____ L.S.

2. _____

(Name Printed or Typed)

(Name Printed or Typed)

Title: _____

APPROVED AS TO FORM:

By: _____ L.S.
Attorney for the Owner

proceeding instituted in the name of the claimant or claimants for his or their use and benefit against said Contractor or Surety or either of them (but no later than one year after the final settlement of said Agreement or Contract) in which action such claim or claims shall be adjudicated and judgment rendered thereon.

(b) The Contractor and Surety hereby designate and appoint the County Administrator of Aiken, South Carolina, as the agent for each of them to receive and accept service of process or other pleading issue or filed in any proceeding instituted on this bond and hereby consent that such service shall be the same as personal service on the Contractor and/or Surety.

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

IN WITNESS WHEREOF, the said Contractor has hereunder affixed his/her signature and said Surety has hereunto caused to be affixed its corporate signature, and seal, by its attorney-in-fact, on this the _____ day of _____, 2015. Executed in four (4) counterparts.

Signed, Sealed and Delivered
in the presence of:

1. _____
(As to Contractor)

(Name Printed or Typed)

2. _____

(Name Printed or Typed)

1. _____
(As to Surety)

(Name Printed or Typed)

2. _____
(Name Printed or Typed)

(Contractor)

By: _____ L.S.

(Name Printed or Typed)

Title: _____ L.S.

ATTEST:

By: _____

(Name Printed or Typed)

Its: _____
(OFFICIAL SEAL)

(Surety)

By: _____ L.S.

(Name Printed or Typed)

Title: _____

APPROVED AS TO FORM:

By: _____ L.S.
Attorney for the Owner

NOTE * If the Principal is a Corporation, the Bond shall be signed by the President or a Vice President, attested by the Secretary and the Corporate Seal affixed. If the Principal is a Partnership, the Bond shall be signed in the Partnership Name by one of the Partners, with the indication that he/she is a general partner. Signatures must be legible or typed in under the appropriate line. THESE INSTRUCTIONS MUST BE FOLLOWED.

1.1 Description

To help clarify construction contract administration procedures, the County (Owner) will conduct a Preconstruction Conference prior to start of the work. Contractor(s) will designate personnel for attendance.

1.2 Submittals

- A. To the maximum extent practicable, advise the County Engineer at least four (4) hours in advance of the Conference as to items to be added to the agenda.
- B. The Engineer will compile minutes of the Conference, and will furnish copies of the minutes to the Contractor. The Contractor may make and distribute such other copies as he wishes.

1.3 Preconstruction Conference

- A. The Conference will be held after the Owner has issued the “Notice of Award”, but prior to actual start of the work.
- B. Attendance:
 - 1. Provide attendance by authorized representatives of the Contractor and major subcontractors. For those persons designated by the Contractor, his subcontractors, and suppliers to attend the Preconstruction Conference, provide required authority to commit the entities they represent to solutions agreed upon in the Conference.
 - 2. The Engineer will advise other interested parties, including but not limited to, utilities and SCDOT, and request their attendance.
- C. Minimum agenda: Data will be distributed and discussed on:
 - 1. Organizational arrangement of Contractor’s forces and personnel, and those of subcontractors, materials suppliers and the Engineer;
 - 2. Establish channels and procedures for communication;
 - 3. Construction schedule, including sequence of critical work;
 - 4. Contract documents, including distribution of required copies of drawings and revisions;
 - 5. Processing of Shop Drawings and other data submitted to the Engineer for review;
 - 6. Processing of field decisions and Change Orders;
 - 7. Rules and regulations governing performance of the Work; and
 - 8. Procedures for safety, security, quality control, traffic control, etc.

Also during the Conference, the project start date will be determined. After the end of the Conference, a “Notice to Proceed” will be issued to the Contractor.

SECTION 1.0 - GENERAL

1.01 Applicability:

1.011 All County Contract Construction:

It is the intention of these specifications that all work done under contract to Aiken County, as owner, be done in strict accordance with the plans, contract drawings, standard drawings and these specifications.

1.012 Construction of Public Works by Private Parties to be dedicated to Aiken County:

It is the intention of these specifications that all work done by the contractor for private parties which is intended to be dedicated to Aiken County shall be done in strict accordance with the approved plans, contract drawings, standard drawings, and these specifications with exception to Items referring to measurement and payment.

1.013 Special Conditions:

Items in the special conditions of any project shall take precedent over these specifications.

1.014 License:

Any Contractor doing work for Aiken County or doing work intended to be dedicated to Aiken County must obtain General Contractor's License and a Bidder's License from the South Carolina Licensing Board for contractors before work will be allowed to begin.

1.015 Inspection and Testing by the County Engineer:

The Aiken County Engineer or his/her representative shall have access to the construction site at all times for inspection and/or quality control testing. Any quality control testing ordered by the Aiken County Engineer that shows nonconformance to these specifications will be paid for by the contractor, and the contractor will correct the items of nonconformance and order and pay for the testing required to show conformance.

1.02 Responsibility:

- 1.021 The presence or absence of the County representative on the site does not abrogate the responsibility of the contractor to ensure the strict adherence to the plans, contract drawings, standard drawings and these specifications by

his employees and subcontractors and their employees.

1.022 Permits, Fees, and Legal Requirements: The contractor is responsible for obtaining all permits, paying all fees, and complying with all local, state and federal requirements.

1.03 Conflicting Specifications:

In cases where conflicts arise within these specifications, they will be revised to resolve such conflicts; however, until the conflict is resolved, the adherence to the application of the stricter of the specifications shall control the situations. In situations where the conflicting specifications cannot be resolved, then the appropriate specification from the South Carolina Department of Transportation Standard Specifications for Highway Construction, latest revision, shall govern.

1.04 Ambiguities:

In the case of ambiguous specifications or various interpretations of these specifications, the County Engineer shall provide the final interpretation or application of the specification in question.

1.05 References:

Mention of any referenced specification or other publication refers to the current edition of that document or its replacement.

1.06 Damages:

Any existing materials, property, structure or other item damaged by the contractor shall be repaired to the satisfaction of the County Representative and in accordance with the applicable section of these specifications. The cost for such repairs shall be borne by the contractor.

1.07 Testing:

Unless specified otherwise, the cost of testing will be borne by the contractor. In any case, work that fails to meet these specifications shall be retested at the contractor's expense.

1.08 Notification:

For all steps requiring approval, the contractor must notify the County Representative at least 24 hours in advance prior to the inspection.

SECTION 2.0 - CLEARING

2.01 Description:

2.011 The work covered by this section of the specifications consists of furnishing all labor, equipment, materials and appurtenances, and performing the removal and disposal of all trees, brush, stumps, logs, grass, weeds, roots, decayed vegetable matter, rock debris, posts, fences, shrubs, rubbish, and all other objectionable matter resting on or protruding through the original ground surface and occurring within the construction limits, easement or right of way. The work shall be in accordance with this section of the specifications and the applicable drawings.

2.012 This work shall also include the preservation from injury or defacement of all vegetation and objects outside the limits of clearing as shown on the plans or designated to remain.

2.02 Construction:

2.021 Clearing:

- A. Clearing shall consist of the felling, cutting up, or the trimming of trees and the satisfactory disposal of the trees and other vegetation from the site as indicated on the drawings or as directed by the County Engineer, together with the down timber, snags, brush and rubbish occurring within the areas to be cleared. Timber shall not be considered waste and shall be disposed of as instructed in the special provisions.
- B. Clearing operations shall be conducted so as to prevent damage by falling trees, to trees left standing, to existing structures and installations, and to those under construction so as to provide for the safety of employees and others.

2.022 Grubbing:

- A. Grubbing shall consist of the removal from the construction limits, easement, or right of way, and proper disposal of all objectionable material defined below which is embedded in the underlying soil.
- B. Objectionable roots are matted trees and brush roots regardless of the size of the roots; roots more than 1" in diameter or more than 36" long; large quantities of lesser roots present in the top 16" of the finished subgrade.

- C. In foundation areas or roadbed fill areas, stumps, roots, logs or other timber, matted roots and other objectionable material shall be completely removed to a minimum depth of 18" or as directed by the County. Burning shall be done only with the approval of State Forestry Commission and at such time and such manner as to prevent fire from spreading and to prevent any damage to adjacent property, public or private, and shall be further subject to all requirements of local, state or federal governments pertaining to burning. Disposal by burning shall be kept under constant attendance with appropriate fire fighting equipment until all fires have burned out or have been extinguished.

- D. All depressions excavated below the original ground surface for or by the removal of stumps and roots, shall be refilled with suitable clean material as indicated on the plans or as directed by the County and compacted to make the surface conform to the surrounding ground surface.

2.023 Disposal:

Contractor shall dispose of all waste materials at his/her expense and in accordance with all County, State and Federal requirements.

SECTION 3.0 - ROADWAY EXCAVATION AND EMBANKMENT

3.01 General:

3.011 Roadway excavation and embankment shall consist of the excavation, hauling and satisfactory placement or disposal of all materials from within the limits of construction, easement or right of way as shown on the drawings.

3.012 All excavation shall be in conformity with the lines, grades and cross sections shown on the plans.

3.02 Excavation:

3.021 Unclassified Excavation:

A. The term excavation used hereinafter is defined as "unclassified excavation". Excavation of every description regardless of material encounter within the grading limits of the projects, shall be performed to the lines and grades indicated on the plans.

B. Rock is considered unclassified excavation and will be excavated to a depth of 18" minimum below subgrade.

3.022 Unsuitable Material:

When the existing materials are determined as unsuitable by the County Representative, the contractor may be required to remove the unsuitable material and backfill with suitable material, properly compacted. Such suitable material shall conform to Section 206.02 South Carolina Department of Transportation's Standard Specifications for Highway Construction (latest edition).

3.03 Compaction:

3.031 Under Roadways:

A. Fill material will be placed in layers no more than 8" loose and compacted by mechanical means.

B. Each layer below subgrade will be uniformly compacted to at least 100% of maximum dry density based on standard proctor test to within 6" of the finish subgrade. See section 4.0 of this specification for compaction requirements on the top 6" of the subgrade.

3.032 Other Areas - Outside Roadway

Compact each layer to at least 95% maximum dry density.

3.04 Testing:

The County will require standard field density/moisture tests of each layer of fill, and copies shall be provided to the County from an approved testing laboratory at locations determined by the County Representative. The contractor will bear the cost of all testing.

3.05 Final Finishing of Roadbed:

3.051 Roadway Surface:

After excavation is complete, the entire surface of the roadbed and slopes shall be shaped to reasonably true grade and alignment and cross section shown on the plans.

3.052 Drainage:

- A. During construction, roadway excavation and embankment shall be performed in a manner and sequence so as to provide suitable drainage at all times.
- B. All ditches, drains, and culverts on the right of way, construction limits, or easement shall be opened and effective.

SECTION 4.0 - CONSTRUCTION OF SUBGRADE

4.01 Definition:

This work shall consist of placing, mixing, compacting, and shaping the top 6" of the roadbed in both excavation and fill areas.

4.02 Construction:

4.021 Subgrade Construction:

The entire surface of the in place subgrade shall be plowed, harrowed and thoroughly mixed to a depth of at least 6". After the material has been thoroughly mixed, the subgrade shall be brought to line and grade and compacted to 100% of the maximum laboratory dry density in accordance with ASTM D-698, Method A.

4.022 Finishing Subgrade:

- A. The surface of the completed subgrade shall be bladed to a smooth and uniform texture. The center line profile shall conform to the established elevations with an acceptable tolerance of + 1/2 inch. The acceptable tolerance under a template conforming to the designated across section shall be + 1/4 inch.
- B. The full width between the raised edge and the right of way (top of curb and right of way in areas with curb and gutter) shall be finish graded to a uniformly smooth surface free from any abrupt irregularities sloping at a ratio not to exceed 1/2" per foot nor less than 1/4" per foot.

4.03 Testing:

4.031 Extent:

Laboratory, testing shall be done on all portions of subgrade, prior to dumping base material. Density testing shall be conducted by a certified materials testing firm (licensed in the State of South Carolina) in the presence of a County Representative. All laboratory results must be submitted to Aiken County Department of Public Works and Engineering for approval (prior to dumping base material). Contractor must notify the Engineering Division of the Aiken County Department of Public Works and Engineering at least 24 hours in advance of any laboratory density testing.

4.032 Means:

- A. Density test locations will be determined by the County Representative and, in no case, will be less than one test per 800 linear feet of road bed, and shall not exceed a distance of 1,000 linear feet, Subgrade must achieve a desired optimum of 100% compaction. All density testing shall be paid by the contractor.
- B. In the event, subgrade is rained upon prior to the contractor dumping base material the County Engineer may require the contractor to test roll the subgrade in the presence of a County Representative.
- C. If deemed necessary by the County Engineer, the contractor will provide the proof rolling equipment such as a fully loaded water truck or tandem truck. Test rolling shall be done by making passes with equipment on each side of vehicle lane. During proof rolling, County Representative shall observe subgrade to ensure that subgrade does not move or contain excess moisture.

C-1 Test rolling shall be done parallel to the centerline, with the forward speed of the roller between two (2) and five (5) miles per hour. The rolling shall be done over the quarter points of the road, with additional passes at the discretion of the County Representative.

C-2 The contractor will provide the roller, in serviceable condition with a minimum axle load of 15,000 lbs. per rear axle, of a type approved, generally a fully loaded water truck, asphalt distributor, or loaded 15-yard truck, or similar equipment.

C-3 All test rolling shall be done in the presence of the County Representative.

4.033 Repairs to Subgrade:

- A. All substandard density test must be retested to assure that subgrade has obtained 100% compaction.
- B. All depressions and weak spots shall be satisfactorily repaired.
- C. The repairs may consist of additional compactive effort,

the removal of unsatisfactory material and replacement with satisfactory material, or by the strengthening or stabilizing of the material in place or both as approved by the County Representative.

4.04 Grassing:

Grassing shall be completed in accordance with Section 18 of these specifications.

4.05 Protection of Existing Service Lines and Utilities:

The contractor shall be responsible for locating all services and utilities of any description before beginning work and for notifying and coordinating with the appropriate utility companies of work to be performed within the limits of the right of way, easement, or construction limits. If damaged, the contractor shall bear the cost of repair. This shall include all lines and/or structures.

4.06 Restoration of Property:

The contractor shall carefully restore all property defaced or damaged by operations or acts of any of contractor's agents, employees, or subcontractors. Such restoration shall include seeding, sodding, and transplanting of lawns, hedges, ornamental plantings, and repair or replacement of driveways, walks, fences, steps or other facilities which are not shown as a unit price item and shall be in like quality to the original undisturbed work.

4.07 Reconstruction or Adjustment to Grade of Miscellaneous Structures:

Contractor shall reconstruct or adjust to grade all manholes, water valve boxes, catch basins, traps or the like within the right of way or as directed by County Representative.

SECTION 5.0 - CONSTRUCTION OF BASE COURSE

5.01 Definition:

This work shall consist of, but not be limited to, the premixing, hauling, placing, compaction and shaping of the base course.

5.02 Material:

5.021 Sand Clay Base:

- A. Base course for residential streets shall consists of 6" minimum compacted thickness of sand clay material and shall conform to current South Carolina Department of Transportation Specifications Section 303.
- B. Material shall be free of any weeds, roots, and foreign matter of any description. On site or in place mixing will be permitted if the material meets specifications and is approved by the County and mixed to depth of 8".
- C. Before any base material is brought on site or on site mixing begins, the contractor shall provide the County with certification by an approved testing laboratory that base material conforms to the above referenced specifications.

5.022 Alternate Base Material:

Upon written approval by the County Representative, the contractor may substitute, on residential streets, crushed stone or full depth asphalt, the thickness and job mix of which shall be approved by the County Representative to meet existing field conditions.

5.03 Construction:

5.031 Preparation of Subgrade:

- A. If the subgrade is not in the condition of stability, surface, and compaction described in Section 4.02, all defective portions of it shall be repaired until it meets the requirements of that section. Unsuitable material shall be removed, as required by the County Representative, and it shall be replaced with suitable material as approved by the County Representative and compacted in accordance with Section 4.021.

- B. If subgrade finish conditions indicate, the County Representative may require the contractor to scarify the top two inches (2") of subgrade to allow for proper bonding of the subgrade material and the base material, before any base material is placed.

5.032 Compaction:

After the base material has been placed, mixed, and brought to line, grade, and cross section, then it shall be rolled until the course has been uniformly compacted to 100% of the maximum dry density (ASTM D-698).

5.04 Finish Grading:

5.041 Roadway Surface

- A. The contractor shall finish off the surface to a smooth and uniform surface, free from abrupt changes and sloping to the edges at a rate of 1/4" per foot. The surface shall vary from profile and cross section at any given point by no more than 1/4". The edges of the road at the gutter in areas with concrete curb and gutter shall be uniformly clipped to a depth of at least 1 1/2 inches. There shall be no roots, pine straw, other organic matter, trash, or any other matter projecting through or visible on the surface.

5.042 Finished Shoulders:

The contractor shall ensure the area from the edge of road or back of curb to the right of way in areas without ditch section is finished to a uniformly smooth surface, free from abrupt surface changes, in areas disturbed by the contractor's operations. They shall meet requirements of Section 4.022, Par. B.

5.05 Testing:

Contractor shall be responsible for meeting the requirements of Section 4.03 as they apply to the subgrade and base course before applying a prime coat. Base testing requirements are the same as the subgrade.

5.06 Protection of Surface:

- A. The contractor shall be responsible for the protection of all graded areas (roadway, shoulders, ditches, swales,

etc.) within the right of way easement or limits of construction.

- B. The graded areas shall be protected from traffic and erosion or damage in any form or manner; and any settlement, washing, silting, or sanding or damage that may occur from any cause shall be repaired and grades re-established according to the required grades or elevations,

5.07 Protection of Existing Service Lines and Utilities:

Contractor shall be responsible for compliance with Section 4.05.

5.08 Restoration of Property:

Contractor shall be responsible for compliance with section 4.06.

SECTION 6.0 - BITUMINOUS PRIME

6.01 Description:

6.011

This work shall consist of preparing and treating an existing surface with bituminous material and blotter material, if required, in accordance with these specifications.

6.012

Bases to be primed shall be with the exception of sand asphalt or asphaltic concrete base materials. Preparation of asphaltic bases shall be as approved by the County Engineer.

6.013

Prime shall not be applied until all conditions of the previous section have been met, and the base shall have been approved and accepted by the County.

6.02 Material:

6.021 RC 70, MC 30, MC 70

6.022

Material shall meet South Carolina Department of Transportation's Specifications.

6.03 Construction:

6.031 Weather:

Bituminous prime shall not be applied on a wet surface nor when the ambient temperature is below 40°F in the shade. Prime shall not be applied when weather conditions would prevent proper curing of the prime coat.

6.032 Condition of Surface:

- A. The surface to which the prime is to be applied shall have been finished to the line, grade and cross sections specified.
- B. The surface shall be uniformly compacted and bonded. All irregularities occurring in the surface shall be corrected in accordance with the specifications for the area being primed.

C. All loose material, dust, caked clay, and all other material likely to prevent penetration or bonding of the prime with the surface shall be swept or blown from the road.

6.033 Heating and Applying Bituminous Prime:

A prime coat of 0.15 gallon to 0.25 gallon per square yard shall be applied with a pressure distributor at a temperature between 80 degrees and 180 degrees. The prime shall be applied to the full width of paving plus six inches in areas without curb and gutter. Caution will be exercised to avoid the placement of prime coat on concrete curb and gutters.

6.04 Protection, Curing and Maintenance:

6.041 Closing to Traffic:

The prime surface shall be closed to all traffic and left undisturbed for so long as necessary for the prime to cure and until it does not pick up under traffic.

SECTION 7.0 - ASPHALT SURFACE COURSE

7.01 General

7.011

- A. This specification covers the general requirements that are applicable to all types of bituminous plant mixtures irrespective of gradation of aggregate, kind and amount of bituminous material, or pavement use.
- B. This work shall consist of the construction of bituminous plant mix on the prepared foundation surface in the required compacted thickness, and in reasonably close conformity with the lines, grades and cross section shown on the plans and drawings.
- C. Except where otherwise indicated herein below, all work and materials shall conform to the requirements of Section 400 of the South Carolina Department of Transportation's "Standard Specifications for Highway Construction".

7.02 Material:

7.021 Type:

The asphalt concrete mixture shall be SC Type 3 conforming to the South Carolina Department of Transportation Standard Specifications for Highway Construction, except that the percentage passing the No. 8 sieve shall be limited to 55%, and natural sand in the mix shall be limited to 20%. An anti-stripping additive, or lime, shall be included in all asphalt mixes.

7.022 Job Mix Formula:

The contractor shall submit samples of material and the proposed job mix formula including aggregate size, percent asphalt, recommended placing and rolling temperatures, and maximum density.

7.03 Construction:

7.031 Weather:

The mixture and placing of asphaltic concrete shall not be performed when the existing surface is wet or frozen or when the temperature is below 40°F in the shade. If the surface has been rained on, the surface will be test rolled again prior to any paving operations to ascertain any damage to the primed surface or base course. Repairs will be made as specified or as approved by

the County Representative.

7.032 Preparation of Existing Surface:

The existing surface shall have been prepared as specified for the particular course.

- A. Cleaning of Surface - before beginning paving operations, the existing surface shall be cleaned to the satisfaction of the County Engineer. The cleaning operations shall include the removal of dust, foreign matter such as pine straw, leaves, sand, etc., or any objectionable material.
- B. Patching and Repair of Minor Defects - All broken or loose areas, areas of loose sand shifting under load in the surface to be paved, and wet areas which require patching or repair as directed, shall be corrected prior to any mix being placed. Areas to be patched shall be cut out, and all loose material removed. At the discretion of the County Representative, defects which are not excessive in depth, width or length may be dug out ahead of the spreader, filled from the spreader and overlaid. If the extent of the defect is excessive, the defect shall be dug out, filled and compacted before overlaying.
- C. Tack Coat - The surface of existing abutting roadways shall be thoroughly swept either by hand or by power broom, so as to be completely free of dust, sand, excess asphalt, or other objectionable matter and tack coat of RS-1 shall be applied at a rate of 0.05 - 0.10 gallon per square yard on the area abutting or to be overlaid.

7.033 Transportation and Delivery:

The mixture shall be transported from the mixing plant to the point of use in approved vehicles. Any releasing agent used in the bed of the truck shall not be detrimental to the mixture such as diesel fuel. Vehicles shall have an access in the sides for the measurement of the mix temperature.

The mixture shall be delivered within 20°F of the temperature set for the job mix formula. Loads shall not be sent out so late in the day so as to prevent the completion of spreading and compaction of the mixture during daylight hours, unless sufficient artificial light is provided.

7.034 Spreading:

- A. Upon arrival at the point of dumping, the mixture shall be dumped into the hopper and spread by mechanical pavers, true to line, grade and cross section within the limits of previous specifications, with a crown of 1/4" per foot and to the loose depth that will secure a minimum compacted thickness of 1 1/2 inches, thickness as shown on plans or as directed by the County. The hot mixture shall be free from lumps and shall be spread while in workable condition. After the mixture has been spread and before roller compaction is started, the surface shall be checked and fat spots and irregular areas removed and replaced with satisfactory material.
- B. All irregularities, irregularities in alignment and grade along the outside edge shall be corrected by the addition or removal of mixture before the edge is rolled.

7.035 Compaction:

While the mixture is hot, it shall be compacted thoroughly and uniformly by rolling. The surface of the compacted mixture shall be smooth and true to crown and grade. Any mixture that becomes loose or broken, mixed with dirt or is in anyway defective, shall be removed and replaced with fresh hot mixture which shall immediately be compacted to conform with the surrounding mix. The edges shall be parallel to the centerline of the roadway. The density after compaction shall be at least 95% of the laboratory determined density for that job mix formula. Several types, and sizes of rollers are available for compacting base and asphaltic concrete mixes. Steel Rollers should range from 6 to 12 tons. Pneumatic tire rollers shall displace at least 5 lbs. per square inch. Ultimately, mix designs shall determine the appropriate size for the particular asphalt application.

7.04 Adjoining Roads:

7.041 Damaged Roadway:

The adjoining road at its point of connection to the new construction shall have all excessively damaged pavement removed by the contractor as required by the County Representative. The surface shall be broomed and tacked as specified in Section 7.032 Par. C.

7.042 Extent of Overlay:

The adjoining pavement to new construction shall be overlaid a distance of five (5) feet from the edge of the new construction or if the existing pavement is damaged but not excessively as determined by the County Representative, the distance of five (5) feet shall extend from the edge of the damaged area. Feathering of the edge shall not be permitted. Areas that are damaged shall be cut to provide a minimum of 3/4" overlay thickness at the joining with existing pavement.

7.05 Protection of Paving:

Sections of new pavement shall be protected from traffic until the traffic will not mar the surface or alter the surface texture.

7.06 Testing:

The contractor will be required by the County Representative to have the thickness, composition, and density of the asphaltic concrete in place tested by an approved testing laboratory. The number and location of tests shall be determined by the County.

7.07 Tolerances/Surface Requirements:

The surface of the asphalt mixture after compaction shall be smooth, of uniform texture, and shall be true to the specified compacted depth, crown, and grade. When an unsatisfactory riding surface is detected, as determined by the engineer, the contractor shall correct the areas causing the unsatisfactory riding surface. Any defective areas including unsatisfactory depths or riding surfaces shall be corrected without additional compensation by removing and replacing with suitable material, or addition of suitable material. on the irregularities. The suitable material shall be properly laid, compacted, and made to conform with the required grade, cross section, and the required smoothness.

When checked with a ten (10) foot straight edge applied parallel to the centerline of the pavement, the finished surface of the binder course shall not vary more than 1/4 inch, and the finished surface course shall not vary more than 1/8 inch as measured from the bottom of the straight edge to the top of the finished mixture. Binder or surface courses not meeting these finished requirements shall be corrected by repairing, or if necessary, by removing and replacing. In addition to meeting any specified requirements for surface tolerances, the base, binder, and surface courses shall meet the satisfactory riding qualities for the mixture being placed as determined by the engineer.

7.08 Finish Grading - Shoulders and Right of Way:

7.081. Grading - Shoulders and Right of Way:

In areas disturbed by the contractor's operations, or if Section 4.022 Par. B has previously waived until paving operation were completed, the area between the edge of road and the right of way shall be finish graded in accordance with Section 4.022 Par. B.

7.082 Finishing:

All trash, debris, construction material and equipment, excess dirt or asphalt, and all objectionable or unsightly material shall be removed by the construction from the right of way easement or limits of construction.

7.09 Restoration of Property:

The contractor shall carefully restore all property defaced or damaged by operations or acts of any of his agents, employees or subcontractor. Such restoration shall include seeding, sodding, and transplanting of lawns, hedges, ornamental plantings, and repair or replacement of driveways, walks, fences, steps or other facilities which are not shown as a unit price item and shall be in like quality to the original undisturbed work.

7.10 Reconstructing or adjustment to Grade of Miscellaneous Structures:

Contractor shall reconstruct or adjust to grade all manholes, water valve boxes, catch basins, traps, or the like within the right of way or as, directed by the County Representative.

SECTION 8.0 - CONCRETE CONSTRUCTION

8.01 General:

This section covers concrete construction, including reinforcement.

8.02 Forms:

8.021 Design:

- A. Forms, including their bracing and supports, shall be of sufficient strength to support the wet concrete and other loads and forces incidental to construction operations, without bulging between supports or bracing and without other deviation from the lines and contours shown on the plans.
- B. When form work is, or appears to be, inadequately supported, tied, or braced, either before or during concrete placement operations, the County Representative may require that the operation be stopped until the apparent defects have been corrected.

8.022 Material:

- A. Except as specifically noted otherwise, forms shall be of lumber, plywood, metal, plastic or a combination of the above, which will produce the required surface finish. All material shall be free of defects which materially affect form strength or impair the accuracy or appearance of the concrete surface.
- B. Forms placed for successive pours for continuous surfaces shall be fitted to accurate alignment to assure smooth, completed surface, free from irregularities, and shall be sufficiently tight to prevent loss of mortar. No forms shall be left permanently in place without prior approval of the County Representative. Holes resulting from removal of form ties shall be filled solid within 12 hours after removal of forms with cement mortar.

8.03 Materials:

8.031 Cement:

Only one type of cement shall be used for exposed concrete in any

individual structure. (Air entrainment shall be considered admixtures).

- A. Type 1A air entraining portland cement conforming to ASTM C-175.
- B. Type 1 portland cement conforming to ASTM C-150 used with an approved entraining additive.

8.032 Fine Aggregate:

Fine aggregate shall consist of clean, hard natural sand, manufactured sand, or a combination thereof, conforming to ASTM C-33, concrete aggregates, and shall be graded from 3/8 inch to No. 100 sieve.

8.033 Course Aggregate:

Coarse aggregate shall consists of crushed stone, angular gravel or a combination thereof, conform to the requirements of ASTM C-33, concrete aggregates, and shall be graded to meet the requirements for size No. 57 as appropriate.

8.034 Water:

Water shall be clean, free from oils, acids, salt, or other injurious substances.

8.035 Admixtures:

Admixtures shall be used only with prior written approval of the County Representative.

8.036 Curing Materials:

Curing paper shall conform to specifications for waterproof paper for curing concrete, ASTM C-171. Other curing materials must be approved by the County Representative.

8.037 Reinforcing Steel:

Reinforcing steel for concrete shall conform to ASTM A-165, Grade 40. Mesh reinforcement shall conform to ASTM A-185. All splices shall be lapped 30 diameters unless otherwise specified. Reinforcement shall be placed in accordance with CRS 1 Manual "Placing Reinforcement Bars".

8.038 Preformed Expansion Joint Filter Strips:

These shall conform to ASTM D-1751, and be approved by the County Engineer prior to installation.

8.039 Vapor Barriers:

Vapor barriers of 6 mil polyethylene shall be provided under all building floor slabs.

8.04 Concrete Quality:

8.041 All concrete quality shall be classified by strength. The strength classification shall be 28 day compressive strength F' C. All concrete quality shall be classified by strength and mix designs are based on obtaining the desired strength within 28 day time period.

8.042 Slump and Air Content:

The design slump shall not exceed 4", and the air content shall be 4.5% +/- 1-1/2%.

8.043 Water Ratio:

The water cement ratio shall not exceed .40 for 4000 psi concrete. The concrete mixture shall have a workability, free from segregation and bleeding.

8.044 Ready Mix:

Ready mix concrete shall conform to ASTM C-94.

8.045 Strength:

- A. All concrete not otherwise specified shall be 4000 psi.
- B. Sidewalks, sewer piers, cradles, collars, manhole slabs, curbs, gutters, and ditch paving shall be 3000 psi.
- C. All fill concrete shall be 2,500 psi.

8.05 Construction:

8.051 Placing:

- A. The length of time that the concrete may be held in the truck shall conform to the following:
 - 40° F - 80° F - 90 min.
 - Over 80° F - 90 min. with retardant.
 - Over 80° F - 60 min. without retardant.
- B. In accordance with the recommendations of ACI614, concrete shall be placed in the forms and mechanically

vibrated to produce concrete without segregation or honeycomb. Slabs and beams stems shall be placed in one operation. Concrete shall be placed continuously between construction joints. Each batch shall be placed into the edge of previously placed concrete to avoid stone pockets and segregation. If there is a delay in casting, the concrete place after the delay shall be thoroughly spaded and consolidated by mechanical vibration. During the casting of wall sections, not less than two (2) mechanical vibrators shall be operated continuously for each casting section. The concrete shall not be freely dropped more than six (6) feet, nor be moved horizontally after being deposited, more than five (5) feet. Care shall be taken to avoid excessive vibration. Do not allow the vibration equipment to come in contact with the reinforcing.

8.052 Floating:

The concrete shall be brought to correct level with a straight edge and struck off. Bull floats shall be used to smooth the surface of the slabs. Power floating of the slabs shall begin when the water sheen has disappeared and/or the mix has stiffened sufficiently that the weight of a man standing on it leaves only a slight imprint on the surface.

8.053 Rebar:

Reinforcing bars shall be free from scale, oil and structural defects. The retaining system for the rebar must insure that all steel in the top surface will support the weight of a workman without displacement and be placed in accordance with ACI Codes 318 and 315. All reinforcing steel within the limits of a day's pour shall be in place and firmly wired before concrete placing begins. Pulling up reinforcing to proper location during placement of concrete shall not be allowed.

8.054 Construction Joints:

Construction joints shall be formed at the location shown on the plans, unless specifically approved by the County Representative. Joints which must be formed in other locations shall be water stopped where appropriate, shall be adequately keyed and doweled, and shall form either a horizontal or vertical line.

8.055 Curing and Protection:

All freshly cast concrete shall be protected from the

detrimental effects of the elements: freezing, rapid temperature loss, loss of moisture, and from future construction operations. The contractor shall maintain the concrete temperature above 50 for the first 10 days after placing. All concrete shall be cured by flooding with clean water or by keeping forms and other protecting material wet with clean water for a minimum of 10 days. All surfaces not protected by forms nor covered with water for the entire curing period shall be kept wet and covered with curing paper meeting requirements of Section 8.036. If a floor is left uncovered during the curing period, a film of water shall be clearly visible at all times on the entire surface of the slab. When pozzolans are used in the concrete, the wet curing period shall be extended 10 days. Other curing methods must be approved by the County Engineer in writing prior to placing the concrete.

8.056 Removal of Forms:

The forms shall not be removed until the concrete has attained sufficient strength to prevent cracking or other injury. When forms are removed, the contractor shall place adequate reshores to prevent injury to the concrete by construction loads. The responsibility for safe practice in this regard shall be the contractor's.

8.057 Backfilling:

- A. The County shall be notified before backfilling in order that work may be inspected before it is covered.
- B. Backfilling shall not begin until all forms are removed and trash and debris removed from the excavation.
- C. Symmetrical backfill loading shall be maintained. Special care should be taken to prevent any wedging action or eccentric loading upon or against the structure.
- D. Compaction shall be in accordance to Section 3.03 of these Specifications.

8.06 Concrete Finishes:

8.061 Rough Finish:

- A. All concrete surfaces which are not exposed to view may be given this finish. This finish has a prerequisite, a thoroughly vibrated concrete which will give a surface smooth, free from air pockets, water pockets, sand streaks or

honeycombs.

- B. After the removal of forms, all fins shall be cut off; all holes, depressions and rough spots shall be carefully pointed up with mortar having the same proportions of cement and sand as used in the concrete being treated. The surface film of all pointed surfaces shall be carefully removed before setting occurs, otherwise, surfaces shall be left with the texture imparted by the forms.

8.062 Rubbed Finish:

- A. Wall, beam, sill and under slab surfaces which are exposed to view shall have a rubbed finish. As soon as the rough surface finish has set sufficiently, the entire surface shall be wet with a brush and rubbed with a No. 16 carborundum stone, to bring the surface to paste. The rubbing shall continue until all, form marks and projections are removed, and to produce a smooth dense surface without pits or irregularities. The material which is ground to a paste in the above process will be carefully spread or brushed uniformly over the entire surface and allowed to "reset".
- B. The final finish shall be obtained by a thorough rubbing with a No. 30 carborundum stone. This rubbing shall continue until the entire surface is of a smooth texture and uniform in color. The surfaces shall be stripped evenly with a brush so as to remove excess paste, and the surface left smooth with only enough paste remaining to obtain a uniform color.

8.063 Float Finish:

The surface of all concrete slabs, shall, unless otherwise hereinafter specified, be given a float finish. The structural slab shall be brought to the established grade by screeding. Irregularities shall be eliminated, and the entire surface finished with a wooden hand float or finishing machine.

8.064 Broom Finish:

Surfaces of exterior walkways or platforms shall be given a broom finish. A smooth, true and uniform surface is required for this finish. When the progress of the set provides the proper consistency, the surface shall be raked with a broom to give parallel transverse lines in the surface, and to give a uniform texture.

8.065 Trowel Finish:

All interior finish shall be power trowelled and hand trowelled. Power trowelling shall begin as soon as little or no cement paste clings to the blade. Trowelling shall be required to remove slight imperfections left by the trowelling machine and to bring the surface to a dense smooth finish. Sprinkling of dry cement and sand mixture or dry cement on the surface of the fresh concrete shall not be permitted.

8.066 Polished Finish:

Prior to polishing (or hard trowel finishing), the surface must be finished in accordance with Section 8.065. The additional hand trowelling required for this finish shall bring the surface to a smooth polished finish. Final hand trowelling shall continue until a clear ringing sound is heard as the trowel passes over the surface.

8.07 Samples and Tests:

8.071 Description:

The contractor shall be responsible for the concrete mix, designs, test cylinders for proving the mix design, tests for the aggregate gradation and quality, for molding test cylinders during the progress of the job, delivering the cylinders for testing to a laboratory, approved by the County Representative, testing for slump and air content, and for conducting load tests, as required.

8.072 Cylinders:

During the course of the job, one set of four cylinders per 50 yards of each class of concrete, but not less than two (2) for each day's pour shall be made. Cylinders shall be cured in accordance with ASTM C-31. Cylinders shall be marked, and a log maintained indicating the mark number, date and location of pour. The cylinders shall be tested at 7 and 28 days, by an approved testing laboratory.

8.073 Slump:

Test for slump shall be performed at the job site immediately prior to placing in accordance with ASTM C-143. If the slump varies from that of the design mix by more than permissible under ASTM C-94, the concrete shall be rejected. In no case will the maximum specified water cement ratio of the approved mix design be exceeded.

8.074 Air Content:

No less than one (1) test for air content shall be made for each day's pour and shall be made on a concrete sample that has been

removed when consolidation of the concrete in the forms has been completed. Method of testing shall be in accordance with ASTM C-231.

8.075 Load Test:

If there exists any evidence of faulty workmanship, violations of specifications, or likelihood of concrete having frozen, load test may be required as directed by the County Representative.

8.073 Slump:

The contractor is responsible for correction of concrete work which does not conform to specifications, but not limited to, strength, honeycomb, spells, cracks, chips, holes, fins, tolerances and finishes. The County Representative shall determine the acceptability of the proposed method of repair.

SECTION 9.0 - CONSTRUCTION OF CURB, GUTTER AND RAISED EDGE:

9.01 Description:

This section covers the construction of portland cement curb and gutter, asphalt concrete curb and raised edge section, including furnishing all labor, equipment, materials, and appliances whatsoever required to complete the work in accordance with these specifications.

9.02 Portland Cement Curb and Gutter: (Hand Placed)

9.021 Dimensions:

Size and dimensions of curb and gutter shall meet Standard 9.02, unless approved in writing prior to construction.

9.022 Concrete:

- A. Concrete shall have a compressive strength at 28 days of 3000 psi.
- B. All concrete, equipment, workmanship and materials shall conform to the applicable requirements of Section 8 of these specifications, except as hereinafter specified. The maximum size of coarse aggregate shall be 1 1/2 inches.

9.023 Subgrade Preparation Reference Standard 9.01

- A. The subgrade shall be constructed true to line, grade, and cross section. The subgrade shall be of materials meeting applicable specifications of Section 4 of these specifications in regard to material quality, compaction, testing, etc. The subgrade shall extend in all cases at least 6" behind the back of the curb.
- B. The subgrade shall be maintained in a smooth, compacted condition, in conformity with the required section, and establish grade until the concrete is placed.

9.024 Forms:

- A. Forms shall be of wood or metal, straight and true. They shall be free from warp, and of sufficient strength, when staked, to hold the alignment during the concrete placing and finishing operations. Ensure that forms are oiled before reusing again.
- B. The outside forms shall have a height equal to the full depth as indicated, and shall be securely fastened to, and

supported by, the outside form.

- C. Rigid forms shall be provided for curb returns except that benders or thin plank forms may be used for curb or curb returns with a radius of 10' or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90° cannot be used.
- D. Back forms for curb returns may be made of 1/2 inch benders, for the full height for the curb, cleated together.
- E. Forms shall be held rigidly in place by the use of stakes placed no more than four (4) feet apart. Clamps, spreaders and braces shall be used where required to insure rigidity in the forms.
- F. The forms on the face of the curb shall be removed not less than two (2) hours nor more than six (6) hours after the concrete has been placed. Forms for the back of curb shall remain in place until the face and top of curb have been finished. Gutter forms shall not be removed for 12 hours after the concrete has been placed. In no case shall forms be removed while the concrete is sufficiently plastic to slump in any direction.
- G. All forms shall be thoroughly clean and well oiled prior to use.

9.025 Mechanical Curb Formers:

- A. Powered mechanical curb formers shall be in good acceptable condition to turn out acceptable quality curb.
- B. String line guidance pins shall be placed no more than 25' apart on tangents and close enough together to produce a smooth, uniform curve on radii.
- C. Variation in concrete mix shall be allowed to meet job and curb requirements provided strength requirements are met.

9.026 Joints:

- A. Expansion joints and contraction joints shall be constructed at right angles to the line of curb and gutter.

- B. Contraction (construction) joints shall be constructed by means of 1/8 inch thick separators of a section conforming to the cross section of the curb and gutter. Contraction joints shall be placed so that monolithic sections between curb returns will be not less than five (5) feet nor more than 12 feet in length and shall be uniformly placed.
- C. The depth of the contraction joint shall be between 1/5 and 1/4 the full depth of the concrete. Separators shall be removed as soon as practicable after the concrete has set sufficiently to preserve the width and shape of the joint.
- D. Expansion joints shall be formed by means of preformed expansion joint filler material, cut and shaped to the cross section of the curb and gutter.
- E. Expansion joint filler, unless otherwise specified, shall conform to ASIM Standard D-1751 or D-1752 or shall be resin impregnated fiber board conforming to the physical requirements of ASIM D-175.
- F. Expansion joint at least 1/2 inch in width shall be provided in curb and gutter at the ends of all returns, at traps, cold joints, and at intervals not to exceed 50'.

9.027 Construction:

- A. No concrete shall be placed when the ambient air temperature is below 40° F (4° C) or is expected to go below 40° F within 12 hours of placing concrete.
- B. All new construction of concrete curb and gutter which adjoins existing curb and gutter shall begin at the joint of the first section of existing curb and gutter in good condition, or as determined by the County Representative. The contractor shall bear all costs occurring from the removal of existing unsuitable curb and gutter.
- C. Concrete shall be placed in forms to the required depth and thoroughly consolidated by tamping and spading so that there are no rock or air pockets at forms and mortar entirely covers the surfaces. Concrete may be compacted by means of mechanical vibrators. Concrete shall not be free dropped from a height so as to cause segregation.
- D. The curb and gutter shall be brought to meet Standard 9.02 with an edging tool to 1/4" radius on exposed edges, and the surfaces floated and finished with a smooth wood float

until true to grade and section and uniform in texture. The floated surfaces shall than be brushed with a fine hair brush with longitudinal strokes.

- E. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed.
- F. Visible surfaces and edges of the finished curb and gutter shall be free of blemishes form and tool marks, and shall be uniform in color, shape and appearance.

9.03 Asphalt Concrete Curb and Raised Edge Section:

9.031 Dimensions:

Size and dimensions of asphalt raised edge sections shall be in accordance with typical section as shown on the plans. Size and dimensions of asphalt concrete curb shall be approved by the Aiken County Engineer.

9.032 Materials and Construction:

The materials and construction methods shall conform to the requirements set forth in Section 7 and 9.02.

9.04 Testing:

9.041 Testing Sampling:

Testing and sampling shall be done in accordance with Section 7.06 of these specifications, or directed by the County Representative. The contractor will provide and pay for all required testing.

9.042 Notification:

Prior to placing any asphalt, the contractor will notify the County Representative. No asphalt shall be placed prior to inspection of the subgrade by the County Representative.

9.043 Tolerances:

The finished surfaces, except plan grade changes or curves, shall not vary from plan grade and line by more than 1/8 inch per 10 feet in the gutter or 1/4 inch per 10, feet for the top and face of the curb.

9.05 Finishing and Protection:

9.051 Backfill:

After the concrete has cured for at least seven (7) days, area to be backfilled shall be cleaned of debris and the backfill shall be placed in accordance to Section 8.057.

9.052 Protection:

The contractor shall protect the completed curb and gutter from all damage until accepted. Curb and gutter which has settled due to subgrade settlement or eroding under cut, or has been cracked or broken, shall be removed and repoured in accordance with above specifications.

9.053 Repair:

The contractor shall either replace or repair by chipping and scarifying the defective area and treating it with an approved bonding agent, tending that all such voids are patched, not plastered, with grout consisting of one part portland cement and one part washed sand. Any proposed repair method must be approved by the County Representative.

9.054

Curb and gutter that are damaged and where the County Representative requires their removal, shall be removed and reconstructed for the entire length between regularly scheduled joints.

9.06 Protection of Existing Service Lines and Utilities:

Protection of existing service lines shall be in accordance with Section 4.05.

9.07 Restoration of Property:

Restoration of property shall be in accordance with Section 4.06.

9.08 Grassing:

Contractor shall be responsible for grassing in accordance with Section 18.

SECTION 11.0 - EXCAVATION, TRENCHING AND BACKFILL FOR PIPELINES

11.01 General:

The work covered by this specification consists of furnishing all labor, equipment, appliances, materials, layout staking, grade staking and supervision, and performance of all operations in connection with excavation, trenching and backfilling, for pipelines in strictest accordance with this section of the specifications, plans, applicable drawings, and standards.

11.02 Classification of Excavation:

The term "excavation" used hereinafter is defined as "unclassified excavation". Excavation of every type and description regardless of material encountered shall be performed to the lines and grade as indicated on the plans or as directed by the County Representative.

11.03 Excavation for Walls and Footings:

Excavation for walls and footings shall extend a sufficient distance to allow for the placing and removal of forms, installation of services and for inspection, except where the wall or footing may be authorized to be placed directly against excavated surfaces.

11.04 Trench Excavation:

11.041 General:

Trenches shall be excavated true to line and grade regardless of substances or material encountered and after the right of way, easement, or limits of construction have been cleared, grubbed and graded to subgrade or plan line and grade.

11.042 Trench Width:

- A. Trenches to receive pipe having a diameter of 24 inches or less shall not be less than 12 inches wider, nor more than 16 inches wider than the outside diameter of the pipe to be laid therein, so that a clear space not less than six (6) inches nor more than eight (8) inches in width is provided on each side of the pipe.
- B. Trenches to receive pipe with a diameter greater than 24 inches shall not be less than 18 inches wider nor more than 24 inches wider than the outside diameter of the pipe to be laid therein so that a clear space not less than 9 inches nor more than 12 inches in width is provided on each side of the pipe.

- C. The maximum width specified refers to the width in the pipe zone. Any additional excavation in trench width at the pipe zone must be approved by the County Representative and may require upgrading of pipe bedding classification. It is the contractor's responsibility to ensure compliance with OSHA safety requirements.

11.05 Trench Foundation:

11.051 Preparation:

- A. Trenches shall be excavated accurately to plan grade to provide a uniform and stable foundation. Any overcut shall be replaced with approved material which is suitable from the overcut or select refill placed and compacted by hand or mechanical means to the satisfaction of the County Representative.
- B. All Material shall be from the excavation, if suitable, or borrow approved by the County Representative, and shall be free of trash, lumber or other debris, clods of dirt greater than 2" in diameter, frozen or wet material, roots or other organic, perishable or detrimental matter.

11.052 Bell Holes:

Bell holes shall be dug at each bell or coupling so that load is supported entirely by the pipe barrel, uniformly throughout its entire length, on the prepared bottom of the trench. Bell holes shall be excavated only to an extent sufficient to permit accurate work in the making of the joints.

11.053 Rejection:

Any and all pipe which is not uniformly supported throughout its length shall be removed, and the trench bottom reshaped and compacted to plan line and grade so as to support the pipe uniformly. There shall be no voids visible anywhere below the pipe.

11.06 Unsuitable Foundation - Select Refill:

- A. Where the natural trench bottom is incapable of satisfactorily supporting the pipe, such unsuitable soil shall be removed to a minimum depth of 6" or as directed by the County Representative and shall be refilled with well to poorly graded sands and friable sand clay suitably compacted and reshaped to plan line and grade so as to

support the pipe uniformly through out its length.

- B. Where rock excavation is required, the rock shall be excavated to a minimum overdepth of six (6) inches below the plan grade of the pipe. Select refill shall than be placed and compacted in accordance with Section 11.051-53 inclusive, of the specifications.

11.061 Grading:

- A. All grading in the vicinity of trench excavations shall be controlled to prevent surface ground water from flowing into the trenches.
- B. During excavation, material suitable for backfilling shall be stored in an orderly manner a minimum distance of 1 1/2 times the depth of the excavation back from the edge of the trenches to prevent slides or cave-ins.

11.062 Dewatering:

- A. Where water is encountered, it shall be prevented from accumulating in excavated areas by pumping, well pointing or other means approved by the County Representative. Water so removed shall be discharged in a manner and location so as not to cause injury or damage to public or private property, work in progress, or completed work.
- B. Under no circumstances will pipe be laid in accumulated water. Where the ground water table is such that it makes well pointing unpractical, the contractor shall bed the pipe in crushed stone to the extent necessary to provide a dry trench bottom at the expense of the Contractor.

11.07 Shoring and Sheeting:

11.071 Description:

All shoring, sheeting and bracing required to perform and protect the excavation and to safeguard employees and the public shall be performed.

11.072 Responsibility:

The contractor shall be responsible for the placing of such protection as necessary and shall be responsible for any damages resulting from its omission.

11.073 Removal:

Whenever sheeting is driven to a depth below the elevation of the top of the pipe, that portion of the sheeting below the elevation of the top of the pipe shall not be disturbed or removed. Sheeting left in place shall be cut off not less than one (1) foot below finished grade. No sheeting shall be removed until the excavation is substantially backfilled. Excluded from this requirement are specially constructed reusable shoring devices.

11.08 Blasting:

11.081 Requirements:

All explosives used within the right of way, easement, or limits of construction shall be used in strict accordance with the state requirements. All blasting operations shall be done by blasters licensed under the provisions of the current state laws.

11.082 Responsibility:

It is the contractor's responsibility to ensure the compliance with Section 11.081 of these specifications and is solely responsible for any kind and all damage resulting from blasting operations. A full plan for blasting, warning signs, and safety precautions shall be submitted and approved by the County Representative before blasting can begin.

11.083 Limit:

No blast shall be set of within 100' of pipe under construction in the trench. The County Representative shall be notified prior to any blasting.

11.09 Backfilling and Compaction:

11.091 Pipe Zone and Initial Backfill:

The backfilling shall not begin until necessary inspections and tests have been performed and permission given by the County Representative.

- A. After pipe is laid the prepared trench bottom suitable excavated material or borrow, approved by the County Representative, shall be placed and compacted under the pipe haunches to the spring line and carefully compacted by hand to the satisfaction of the County Representative. Only enough material to backfill to the spring line shall be placed in the trench, and compacted until satisfactory compaction of the haunches and been attained. Extreme care will be exercised by the contractor to attain the desired compaction without laterally displacing the pipe.
- B. When satisfactory compaction has been attained at the pipe haunches, the contractor shall begin the initial backfill to the top of the pipe zone, placing material symmetrically so as to prevent eccentric loading or wedge action against the pipe. The material shall be properly tamped by hand to the satisfaction of the County Representative.
- C. When satisfactory compaction has been attained in the pipe zone, the remaining initial backfill shall be placed in layers and properly compacted by hand to the satisfaction of the County Representative.

11.092 Trench Zone:

- A. The remainder of the trench zone will be carefully placed and compacted in 3" to 8" layers by hand, or 12" layers by mechanical tampers. Mechanical tampers shall not be operated any closer to the pipe zone than will ensure the integrity of the pipe and will not cause it to crack, shift or flatten (e.g.), and in no case closer than 18" from the top of the pipe.
- B. Trenches in the right of way or under existing or proposed paving shall be compacted in layers as specified to 100% maximum theoretical dry density (Standard Proctor).
- C. Trenches outside of the right of way shall be compacted in layers as specified to 90% maximum theoretical dry density (Standard Proctor) or to the density of surrounding soil which ever is greater.
- D. Trenches shall be carefully backfilled as specified with excavated materials, approved for backfilling consisting or earth, loam, sand-clay, sand, and gravel soils capable of being readily shaped and compacted to the required densities. If excavated material is unsuitable for backfill, select backfill material shall be used.

- E. No material which has previously been disapproved or found unsuitable by the County, or is wet or frozen, or contains mulch or other organic perishable material of any description, stones, blasted rock, broken concrete or pavement, or other hard materials having any dimension more than four (4) inches, debris or earth with an exceptionally high void or clay content shall be placed as backfill in any trench.
- F. Compactive efforts shall be continued as specified above until reaching the subgrade unless a mechanical surface tamp such as a hydrohammer is used, in which case the last three (3) feet below the subgrade may be tamped from the surface. No hydrohammer or surface tamper may be used within three (3) feet of the pipe.
- G. The following methods of compaction are prohibited and shall not be used in the trench zone on any trench within the right of way.
 - 1. The introduction of water under pressure within the pipe or trench zone (jetting).
 - 2. Excavation of trenches before the overburden is removed and allowing weather and heavy equipment to attempt compaction.
 - 3. Backfilling with heavy equipment in layers greater than 18" with *the* application of heavy equipment on the trench to gain compaction.
 - 4. Any method not meeting these specifications without prior written approval of the County Representative.
- H. If at any time, methods of compaction are observed which are not in accordance with the above specifications, it is assumed that such methods were employed prior to observation, and no work or pipe previously placed shall be accepted for payment or service by the County Engineer. The burden of proof to the contrary shall be on the contractor.

11.10 Testing:

- A. Before acceptance, the trench shall be tested to determine the compaction achieved on backfilled trenches

within the right of way.

B. The method, locations, and type of testing shall be determined by the County Representative. The contractor shall provide the County Representative with equipment and personnel necessary to perform the testing.

C. Testing will be at the cost of the contractor.

11.11 Protection of Existing Service Lines:

The contractor shall be responsible for the protection of existing service lines and utilities in accordance with Section 4.05 of these specifications.

11.12 Restoration of Property:

The contractor shall be responsible for the restoration of property in accordance to Section 4.06 of these specifications.

11.13 Grassing:

The contractor shall be responsible for grassing according to Section 18.

11.14 Removal and Replacement of Existing Pipes and Equipment:

Where shown on the plans or drawings or where required to properly construct the work under the contract, the contractor shall remove and replace such pipelines and equipment or structures was directed by the County Representative and will be considered a no pay item incidental to the work.

11.15 Pavement Removal and Replacement:

11.151 Open Cuts:

- A. No open cuts of pavement on any county road shall be made without prior written approval from the County.
- B. Work performed on state roads will require a permit from the South Carolina Department of Transportation before work begins.

11.152 Repair:

- A. The contractor shall be responsible for the repair of pavement in streets and driveways.

- B. Concrete driveways and sidewalks shall be saw cut either side of the limit of excavation, or the concrete shall be removed to the nearest joint. The trench shall be backfilled and compacted in accordance with the above referenced specifications and concrete of 3000 PSI compressive strength shall be poured not less than 6" thick over the trench and 9" either side, and monolithically, or 4" thick outside of the driveway for sidewalks to the grade of the existing driveway in areas the driveway is damaged or removed.

11.16 Finish Grading:

11.161 Drainage:

- A. The contractor shall be responsible for maintaining all ditches, drains, and culverts on the right of way easement, or limits of construction, and for ensuring the effective functioning of all existing drainage characteristics.
- B. The contractor shall be responsible for all damage to property, public or private, resulting from the work.

11.162 Finishing:

Before acceptance, the contractor shall remove from the right of way easement or limits of construction all construction material or equipment, excess material of every description, trash, roots, stumps, and all material deemed detrimental or unsightly by the County Representative. All trenches shall be brought to finished plan line and grade as close as possible with powered equipment.

SECTION 14.0 - CONSTRUCTION OF STORM SEWER (CLOSED)

14.01 Description:

The work covered by this section of the specifications consists of the furnishing and performance of all operations necessary and incidental to the construction and installation of storm drain pipe. This shall include, but not be limited to, all excavation, trenching, removal and replacement of unsuitable materials, grading, and all pipe and fittings, as shown on the plans or drawings, or as directed by the County Representative.

14.02 Plans, Permits and Codes:

14.021 Permits and Codes:

It is the intent of this section of the specifications that the contractor's bid on this work be based upon the plan, drawings, and these specifications, and with all applicable codes, permits and regulations as amended by any waivers.

14.022 Plans:

- A. The contract drawings, standard drawings, and plans indicate the extent and specific arrangement of the work.
- B. If any departure from the indicated line grade or location as shown by the plans are deemed necessary by the contractor, detail of such departures and the reasons therefore shall be submitted as soon as practicable for approval.
- C. No work on such departures or deviations shall begin without written approval by the County Representative. No work shall be accepted by the County Representative for any unapproved departures or deviation from the contract drawings, standard drawings, or plans.

14.03 Materials:

14.031 General:

- A. All materials furnished by the contractor shall meet the requirements of these specifications.

- B. All materials shall be new, first quality, and free from any and all defects and blemishes such as cracking, splitting, spilling, spalling, damages to coatings, bending, dents, and deformations of any type. Material shall be protected from damage at all times. The County Representative shall inspect the material at his/her discretion and all material deemed unsuitable or damaged by the County Representative shall either be repaired to the satisfaction of the County Representative or be removed from the right of way, easement, or limits of construction.
- C. Extreme care shall be exercised in handling the material during unloading and stringing and at all times during construction. All unloading or placing of pipe in the trench shall be done carefully by hand or machine. At no time will materials be allowed to free fall or be dropped from any height.

14.032 Pipe:

- A. Pipe for storm drains shall be reinforced for all applications within the public right of way. Reinforced concrete, or corrugated metal pipe may be used for all other applications. Should velocities exceed 10 feet per second, metal pipes must have a paved invert.
- B. Specifications:
 - 1. Reinforced Concrete Pipe
 - a. Reinforced concrete pipe shall meet the requirements of AASHTO M-170, Class III pipe will be used when a strength class is not specified.
 - b. Minimum pipe size shall be 18".
 - 2. Bituminous Coated Corrugated Metal Pipe
 - a. Bituminous coated corrugated metal pipe shall meet the requirements of AASHTO M-36 and N-190 of latest edition.
 - b. Pipe shall be helically corrugated, continuous lock or welded seam with 2 2/3" x 1/2" minimum corrugations.
 - c. Ends of pipe will have annular type Corrugations and annular type corrugated bands.
 - d. Two lifting lugs shall be provided for each

section of pipe 24" or larger.

- e. Bands shall be corrugated to fully enlarge the annular corrugations on pipe for full 360°.
- f. Minimum gauge of 16 for pipe size under 24". All others to be approved by the County Engineer.

3. Aluminum Coated Corrugated Metal Pipe

- a. Aluminum coated corrugated metal pipe shall meet the latest requirements, AASHTO M-274 - 791, and all requirements of 14.032 except asphalt coating.

4. Aluminum Pipe

- a. Minimum gauge of 12 for pipe 24" and all requirements of 14.032 - B.2 except asphalt coating. All others to be sized by the County Engineer.

5. Corrugated High Density Polyethylene Culvert Pipe (12" diameter or greater)

- a. This pipe shall conform to the requirements of AASHTO M-294, Type S as required.
- b. Type S pipe shall have an outer corrugated high density pipe wall and a smooth inner liner.

14.033 Affidavit of Compliance:

The contractor shall furnish an affidavit from the manufacturer that all material conforms to the above referenced ASTM or AASHTO Specifications to the County Representative.

14.04 Excavation, Trenching and Backfill:

14.041 Excavation and trenching shall be in accordance with Section 11.01 - 11.042C inclusive.

14.042 Bedding:

- A. Trenches shall have been excavated accurately to plan grade to provide a uniform and stable foundation.
- B. A maximum overcut of 6" shall be allowed.

- C. Materials of poor or non-uniform bearing capacity shall be removed and replaced with suitable material as directed by the County Representative.
- D. Rock shall be excavated to a depth of six inches (6") below the plan grade and suitable bedding placed.
 - 1. For B.C.C.M.P., a uniform blanket of loose material shall cover the bedding to a depth sufficient to allow the corrugations to become filled with the material.
 - 2. Bedding or shaping shall be wide enough to permit efficient compaction of the remaining backfill under the haunches of the structure, but not so wide as to interfere with bolting procedures.

14.043 Backfill:

- A. After pipe is laid in the prepared trench bottom, bedding as previously specified shall be placed and compacted under the pipe haunches to the center of the pipe and carefully compacted by hand to the satisfaction of the County Representative.
- B. Only sufficient material to backfill to the centerline of the pipe shall be placed in the ditch and compacted until satisfactory compaction has been attained.
- C. When haunch compaction is attained, the contractor shall begin backfill of the trench, placing material symmetrically so as to prevent eccentric loading or wedge action against the pipe. Minimum pipe cover shall be 18".
 - 1. On pipe placed within the right of way, suitable backfill shall be placed in lifts of no more than 8" and compacted by mechanical tampers to 100% maximum dry density (Standard Proctor).
 - 2. On B.C.C.M. pipe placed outside of the right of way, the contractor shall backfill with suitable material in such a manner as to secure the integrity of the pipe structure and to achieve compaction of 90% maximum dry density or to the density (Standard Proctor) of the surrounding soil.

- D. No material which has previously been disapproved or found unsuitable by the County Representative, is wet or frozen, or contains mulch or other organic perishable material of any description, large stone, blasted rock, broken concrete or pavement, or other hard material having any dimension greater than four inches, clods of earth or dirt larger in any dimension than four inches, debris or earth with an exceptionally high void or clay content shall be placed as backfill in any trench.

14.05 Construction:

14.051 Pipe Laying:

- A. Only such pipe as has been previously inspected and approved and is free of dents, damage to coating, spalls, cracks, and is free from any damage which may, in the opinion of the County Representative, be detrimental to the proper functioning of the storm drain system shall be laid in the trench.
- B. The contractor shall remove from the site all damaged material.
- C. Pipe shall be carefully lowered into the trench; no pipe shall be free dropped into the trench.
- D. The pipe laying shall proceed upgrade with the spigot end of bell and spigot pipe pointing in the direction of the flow.
- E. Each pipe shall be laid true to line and grade in such manner as to form a close concentric joint with the adjacent pipe and to prevent offsets in the flow line.
- F. The pipe shall be kept clean and free of debris at all times.

14.052 Jointing:

- A. Reinforced concrete pipe sections may be joined by mortar joint, bituminous plastic cement joint, rubber type gasket joint, o-ringed gasket joint or preformed plastic gasket joint. In mortar and bituminous plastic cement joints, the annular space shall be filled with the joint material and the inside of the joint wiped smooth. Mortar joints shall be made in the same manner except that the

annular space shall be thoroughly wetted before filling with joint material. After the initial set, the mortar on the outside shall be protected from the air and sun with thoroughly wet earth or burlap cover. Rubber type, o-ring, and preformed plastic gasket joints shall be installed in accordance with the manufacturer's recommendations.

- B. Bituminous coated corrugated metal pipe shall be joined with coupling bands having two or more fastening bolts. The space between adjoining sections shall not be more than the width of one corrugation.

14.053 Dewatering:

- A. All grading in the vicinity of trench excavations shall be controlled to prevent surface ground water from flowing into the trenches.
- B. When, in the judgement of the County Representative, water seepage within the trench or ground water level creates unstable foundation conditions or prevents the proper makeup of joints, the water shall be removed by well pointing, pumping or other suitable means.
- C. Water so removed shall be discharged in a manner and location so as not to cause injury or damage to public or private property, work in progress, or completed work.

14.054 Blasting:

Blasting shall be in accordance with Section 11.08 of these specifications.

14.055 Repair of Coatings:

- A. Where damage to the bituminous coating exposes the metal, repair by patching shall be made before backfilling begins. Repair shall be in accordance with the manufacturer's requirement.
- B. Suitable repair materials include asphalt mastic with fiberglass fibers in lieu of asbestos fibers and cut back coal tar.

14.06 Tie-in to Existing Storm Drains:

14.061 Authorization:

- A. At no time shall the contractor make any unauthorized tie-ins of storm drains of any type under construction to existing storm drains of any type.
- B. The contractor shall not make any authorized tie-ins (e.g., called for on plans or previously approved changes) unless the County Representative is present.

14.062 Construction:

- A. The contractor shall make any such tie-ins in close accordance with the plans or as directed by the County Representative.
- B. The contractor shall take whatever measures are necessary to prevent the introduction of mud, silt, debris, or excess surface water runoff into the existing storm drain system. Such measures must meet the approval of the County Representative.

14.07 Field Tests:

14.071 Pipe and Fittings:

Each piece of pipe and fitting shall be visually inspected immediately before being placed in the trench, and all pieces which are damaged and cannot, in the judgement of the County Representative, be repaired after installation shall be rejected.

14.072 Joints Alignment and Grade:

- A. After the pipe has been installed in the trench, and prior to backfill, the joint alignment and grade shall be carefully checked for conformance with the plans.
- B. Any deposit or protruding joint material shall be removed and the joint remade.

14.073 Visual Inspection:

- A. All storm drains shall be visually checked for alignment between structures and any deviations from the plan line and grade or offsets of any type shall cause that portion of the storm drain system to be rejected if, in the opinion of the County Representative, said defects will adversely affect the designed performance of the system and shall be relayed correctly by the contractor at the contractor's expense.

14.08 Protection of Service Lines and Utilities:

Protection of service lines and utilities shall be in accordance with Section 4.05 of these specifications.

14.081 Restoration of Property:

- A. Restoration of property shall be in accordance with Section 4.06 of these specifications.
- B. Removal and replacement of existing pipes and equipment shall be in accordance with Section 11.14 of these specifications.

14.082 Pavement Removal and Replacement:

Pavement removal and replacement shall be in accordance with Section 11.15 of these specifications.

14.083 Clean Up and Finishing:

- A. All pipe shall be clean and free from silt, mud, debris or anything which may block the free flow of water prior to acceptance.
- B. Finishing shall be in accordance with Section 11 and Section 16 of these specifications.

14.084 Safety:

Safety shall comply with OSHA.

SECTION 15.0 - STORM SEWERS (OPEN)

15.01 Description:

The work covered by this section of the specifications consists of furnishing all labor, equipment, materials and appliances and performance of all operations necessary to, and incidental to, the construction and installation of open storm drain systems. This shall include, but not be limited to, all excavation, trenching, and removal as shown on drawings, or as directed by the County Representative.

15.02 Plans, Permits, and Codes:

15.021 Permits and Codes:

It is the intent of this section of the specifications that the contractor's bid on this work be based upon the plans, drawings, and these specifications, and with all applicable codes, permits and regulations as amended by any waivers.

15.022 The Contract Drawings:

- A. Standard drawings and plans indicate the extent and specific arrangement of the work.
- B. If any departure from the indicated line, grade or location, as shown by the contractor, detailed of such departures and the reasons therefore shall be submitted as soon as practicable for approval.
- C. No work on such departures or deviations shall begin without written approval by the County Representative for such unapproved departures or deviations from the contract drawing, standard drawings, or plans.

15.03 Material:

15.031 General:

All materials shall be new, first quality, undamaged material meeting these specifications.

15.032 Concrete:

- A. All concrete shall be in accordance with Section 8 of these specifications except as herein specified.
- B. Concrete shall have a compressive strength at 28 days of 3000 psi.
- C. The maximum size of coarse aggregate shall be 1 1/2 inches and not less than one (1) inch. Concrete shall have a slump of not more than four (4) inches.

15.033 Reinforcing Wire:

Reinforcing wire shall be 6" x 6" #10 wire.

15.034 Expansion Joint Material:

Expansion joint material shall conform to ASTM Standard D-1751 or D-1752 of latest edition or shall be resin impregnated fiber board conforming to the physical requirements of D-1752.

15.04 Construction of Ditches and Swales:

15.041 Line and Grade:

All ditches and swales shall be constructed true to plan line and grade.

15.042 Cross Section:

The ditch or swale shall be constructed as indicated on the plan drawings or as directed by the County Representative.

15.043 Ditch Checks:

- A. Ditch checks shall be constructed at every three (3) foot drop in elevation.
- B. Ditch checks shall be constructed of stone rip-rap or sand cement bags placed by hand.

15.05 Construction of Concrete Ditches:

15.051 Excavation:

- A. The subgrade shall be excavated true to line and grade by appropriate equipment.

15.052 Preparation of Subgrade:

- A. Prior to forming or pouring concrete, the subgrade shall be of a smooth uniform texture and compacted to 100% maximum dry density (Standard Proctor).
- B. The centerline shall conform to the established elevations with an acceptable tolerance of 1/4".

15.053 Forms:

- A. Forms shall be of wood or steel, straight and true without any defects which, in the judgement of the County Representative, may adversely affect the work.
- B. Forms shall be held rigidly in place by the use of stakes placed no more than four (4) feet apart.
- C. Rigid forms shall be used in all circumstances except that benders and thin wall planks may be used with the prior approval of the County Representative.
- D. Forms shall not be removed for six (6) hours, nor in any case while the concrete is sufficiently plastic to slump in any direction.
- E. Forms shall be thoroughly cleaned and oiled prior to each use.

15.054 Joints:

- A. Premolded expansion joint filler strips shall be resilient, compressive bituminous and fiber material saturated with at least 35%, but not over 50%, by weight of asphalt.
- B. Expansion joints shall be cut to the full depth of the cross section of the ditch and shall extend no further than 1/4 inch below the level surface of the ditch.
- C. Expansion joints at least 1/4 inch in width shall be provided in the ditch at intervals not to exceed 50 feet and an expansion joint of at least 1/2 inch in width where ditches abut structures.
- D. Contraction joints of 1/8" width shall be spaced at 10' intervals.
- E. The depth of the construction joint shall be no less than 1/5 nor more than 1/4 the depth of the concrete and joints shall have rounded edges.
- F. Separators shall be removed as soon as possible after concrete has set sufficiently to preserve the width and shape of the joint.

15.055 Concrete:

- A. No concrete shall be placed until the subgrade has been approved by the County Representative.
- B. No concrete shall be placed when the ambient air temperature is below 40° F. (Refer to Section 8.051 B).
- C. Concrete shall be placed in forms to the required depth and thoroughly consolidated by tamping and spading so that there are no rock and air pockets at forms and mortar entirely covers the surfaces. Concrete may be compacted by means of mechanical vibrators. Concrete shall not be free dropped from a height so as to cause segregation.
- D. The concrete ditches shall be constructed in accordance with Standard 17.02.
- E. Visible surfaces and edges of the finished ditch shall be free of blemishes, form, and tool marks.
- F. Concrete ditches shall be finished in accordance with Section 8.064 of these specifications.

15.056 Unsuitable Subgrade:

- A. In areas where the subgrade has been disturbed, replaced and compacted, or where in the judgement of the County Representative, the subgrade is otherwise unsuitable, the contractor shall place reinforcing wire and additional thickness of concrete as required and/or replace the unsuitable material in accordance with Section 11.06 of these specifications, at the discretion of the County Representative.

15.06 Finishing and Protection:

15.061 Backfill:

After the concrete has cured for at least seven (7) days, all debris shall be removed, and backfill shall be placed in accordance with Section 8.057 of these specifications. The contractor shall secure compaction of backfill so as to ensure the prevention of surface water infiltration beneath the ditch.

15.062 Protection of Structure:

- A. The contractor shall protect the completed concrete ditch from all damage until accepted. Ditch sections which have settled or been displaced due to subgrade settlement or surface water infiltration or any other reason, shall be removed and repoured in accordance with these specifications.
- B. Any ditch section which has settled or been displaced will not be accepted by the County Representative until the ditch sections which have settled or been displaced have been returned to its original position.

15.063 Repair:

- A. The contractor shall either replace or repair by chipping and scarifying any defective areas and treating it with an approved bonding agent, tending that all such areas are patched, not plastered, with grout consisting of one part portland cement and one part washed sand.
- B. Concrete ditch sections damaged whereby the County Representative requires their removal, shall be removed and reconstructed for the entire length between regularly scheduled joints.

15.07 Clean Up and Finish Grading:

15.071 Clean Up:

The contractor shall remove all debris, trash or objectionable material from the easement, right of way, or limits of construction.

15.072 Grading:

The contractor shall ensure the area of the easement or any areas disturbed by his operations are finished uniformly smooth and free from abrupt changes in grade and are in conformity with the plans or as directed by the County Representative, and shall be in accordance with Section 11.16 of these specifications.

15.08 Field Tests:

15.081 Testing and Sampling:

- A. Testing and sampling shall be done in accordance with Section 8.07 of these specifications or as directed by

the County Representative.

- B. The contractor will provide and pay for all required testing.

15.082 Tolerances:

- A. The finished surfaces, except plan grade changes or curves, shall not vary from plan line and grade by more than 1/8" per 10'.
- B. The cross section shall vary no more than 1/4" from the specified cross section.

15.09 Protection of Service Lines and Utilities:

Protection of service lines and utilities shall be in accordance with Section 4.05 of the specifications.

15.10 Restoration of Property:

- A. Restoration of property shall be in accordance with Section 4.06 of these specifications.
- B. Removal and replacement of existing pipes and equipment shall be in accordance with Section 11.14 of these specifications.

15.11 Grassing:

Grassing shall in accordance with Section 18 of these specifications.

SECTION 16.0 - CONSTRUCTION OF STORM SEWER STRUCTURES

16.01 Description:

The work covered by this section of the specifications consists of furnishing all labor, equipment, materials and appliances and performance of all operations necessary, and incidental to, the construction of storm sewer structures. This shall include, but not be limited to, all excavation, trenching, removal and replacement of unsuitable materials and grading as shown on the plans or drawings or as directed by the County Representative.

16.02 Plans Permits, and Codes:

16.021 Permits and Codes:

It is the intent of this section of the specifications that the contractor's bid on this work be based upon the plan, drawings, and these specifications, and with all applicable codes, permits and regulations as amended by any waivers.

16.022

- A. The contract drawings, standard drawings, and plans indicate the extent and specific arrangement of the work.
- B. If any departure from the indicated line, grade, or location as shown by the plans are deemed necessary by the contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable for approval.
- C. No work on such departures or deviations shall begin without written approval by the County Representative. No work shall be accepted by the County Representative with any unapproved departures or deviations from the contract drawings, standard drawings or plans.

16.03 Excavation and Backfill:

16.031

- A. All excavation shall be in strict accordance with Section 11 of these specifications.
- B. The contractor shall especially note Section 11.05, 11.06, 11.09, and 8.057

- C. Excavation of any sort is a no pay item incidental to the construction of the various items in this section of the specifications.

16.032

Backfill shall be in strict accordance with Section 8 and 11 of these specifications.

16.04 Construction of Brick Boxes and Traps:

16.041 Brick:

Prefabricated boxes may be used with prior approval of the County Engineer. Any request to use a concrete box must be submitted in writing with shop drawings of the product to be used.

- A. Brick for the construction of storm sewer boxes shall conform to Federal Specifications SS-B-656, Type H.
- B. All brick shall be thoroughly cleaned and saturated with water immediately prior to being laid up.
- C. The brick shall be laid perpendicular in header courses with the joint broken by staggering each successive course.
- D. Brick junction boxes shall conform to Standard 18.01.
- E. Brick weir traps shall conform to standard 18.01.
- F. Brick single and double wing traps shall conform to Standard 18.03.
- G. Brick shall be laid up with cement mortar made of one part portland cement and two parts of approved washed sand to which may be added lime not to exceed 25% by volume of the cement.
- H. The inside of the box may be rubbed with a cloth in lieu of striking the joints.
- I. No box shall be constructed when the air temperature is 32° F (0° C) and falling.
- J. The base of the box shall be constructed of 3000 psi concrete with #4 rebar placed 12" O.C. both ways. Minimum slab size shall be 4'6" x 4'6".
- K. The completed box shall be rigid and true to dimensions.

16.042 Tops:

- A. Junction boxes, weir traps and winged traps shall conform to the specifications shown in the standard drawings.
- B. Tops shall be finished in accordance with Section 8.064.

16.043 Inverts:

- A. Pipe shall be set so that the invert is flush with the slab.
- B. No pipe shall protrude past the inner wall of the box and shall be free from ragged edges.
- C. Brick shall be laid up around the pipe and all voids shall be mortared inside and out with mortar mix as previously specified.

16.044 Steps:

All boxes, traps, and manholes over 5' deep shall have steps installed.

16.045 Frame and Covers:

Box and trap covers will be in accordance with Standard 18.04 A.

16.05 Construction of Headwalls:

16.051 Brick Headwall:

Headwalls of brick construction are acceptable.

16.052 Flared End Sections:

- A. Where flared end sections are specified, they shall conform to Standards 18.05A and 18.06A of these specifications for the type of pipe specified.
- B. Outfall flared end sections shall have a minimum of 10 S.Y. (1.5 Tons) of grouted rip-rap as specified in Section 17.
- C. All excavation shall be in accordance with Section 14.04 of these specifications.

16.053 Reinforced Concrete Headwalls:

- A. Where specified on the plans or drawings or where required by the County Representative, the contractor shall construct a reinforced concrete headwall in accordance with Section 8 of these specifications and Standard 18.06.
- B. Exposed concrete shall have a trowelled finish.

16.06 Field Tests:

16.061 Concrete:

- A. No concrete for headwalls, trap bottoms or tops shall be poured unless a representative of the County is present.
- B. Any concrete poured without approval of the County Representative will be rejected.
- C. Test cylinders for compressive strength testing shall be made as specified in Section 8.07.

16.062 Structures:

All structures shall be visually inspected prior to acceptance for conformity with these specifications.

16.07 Finishing, Protection and Repair:

Finishing, protection and repair shall be in accordance with Section 15.06 of these specifications.

16.08 Clean Up and Finish Grading:

Clean up and finish grading shall be in accordance with Section 15.07 of these specifications.

16.09 Protection of Service Lines and Utilities:

Protection of service lines and utilities shall be in accordance with Section 4.05 of these specifications.

16.10 Restoration of Property:

Restoration of property shall be in accordance with Section 4.06 of these specifications.

16.11 Removal and Replacement of Existing Pipes and Equipment:

Removal and replacement of existing pipes and equipment shall be in

accordance with Section 11.14 of these specifications.

16.12 Grassing:

Grassing shall be in accordance with Section 18 of these specifications.

16.13 Safety:

Safety shall comply with OSHA.

SECTION 17.0 - SOIL EROSION CONTROL

17.01 Scope:

17.011 General:

It is the intention of this section to ensure the implementation of The South Carolina Department of Health and Environmental Sediment, Erosion and Stormwater Management Regulations and to specify certain practices under this section.

17.012 Permits:

- A. No land disturbing activities shall be performed by the contractor until a grading permit has been obtained.
- B. Any work performed prior to obtaining said permit shall be rejected by the County Representative.

17.02 Temporary Site Erosion Control:

17.021 General:

- A. All soil erosion control measures shall be implemented with the commencement of clearing and grading or as required by the County Representative.
- B. All soil erosion control measures on the plans, or as directed by the South Carolina Department of Health and Environmental Control Agent, or the County Representative, shall be properly constructed, maintained or replaced as required by these specifications to prevent on site erosion damage, downstream siltation damage, or to conserve and protect land, water and air resources. Structural and vegetative practices are shown in Standard Detail numbers 16.01, 16.02; 16.03.
- C. Clearing operations shall be confined to the limits shown on the plans.
- D. Vegetation outside of the limits of construction shall be protected from any damage resulting from construction operations public right of way by construction traffic.

- E. Sediment shall not be transported from the site and shall be protected from any damage resulting from construction operations public right of way by construction traffic.
- F. Grassing in accordance with Section 18 of these specifications shall be established on areas disturbed by construction operation as soon as possible or as directed by the County Representative.

17.022 Hay Bales:

- A. Hay bales shall be placed around all storm drain inlets, inlets and outlets of pipes, at all points of discharge into streams or ponds or where shown on the plans or as directed by the County Representative.
 - 1. Bales will be placed in a single row, lengthwise, on the contour, and embedded in the soil to a depth of three (3) inches.
 - 2. Bales will be securely anchored in place by stakes or bars driven through the bales.
 - 3. Bales will be placed to the height required to effectively filter runoff and prevent sediment disposition within the storm drain system or offsite.
- B. Bales shall be replaced when they are no longer effective sediment barriers or as directed by the County Representative.

17.023 Brush Barriers:

- A. Brush barriers shall be placed along the limits of clearing, easements or where shown on the plans or as directed by the County Representative.
- B. Brush barriers shall be windrowed on the contour as nearly as possible and shall be compacted using construction equipment.

17.024 Other Structures:

- A. At all discharge points of ditches or swales, pipe outlets and inlets, where required by the plans or contract drawings, or as directed by the County Representative, the contractor shall place loose rock rip-rap to the extent shown on the plans or

a minimum of 10 square yards.

- B. Rip-rap shall be well graded from 25 to 150 pounds with the majority of the rock weighing more than 60 pounds.
- C. If not otherwise specified in the plans or contract drawings, rip-rap shall be placed by equipment on the surfaces and to the depths specified.
 - 1. The rip-rap shall be constructed to the full course thickness in one operation and in such a manner as to avoid the displacement of subgrade or foundation material.
 - 2. The rip-rap shall be placed in such a manner as to ensure the uniformly distributed and firmly in contact with one another with the smaller rock filling the voids between larger rocks.
 - 3. Rip-rap shall be placed in such a manner as to avoid damage to structures.
- D. Within 10 feet of all structures, the rock shall be placed by hand.
 - 1. The rock shall be placed securely, with the larger rocks firmly in contact with one another.
 - 2. Space between larger rocks shall be filled with smaller rock. Small rock shall not be piled together as a substitute for larger rock.
 - 3. Slab rock shall be laid on edge.
- E. Rip-rap shall extend up the bank to the level where vegetation will provide adequate protection.
- F. Rip-rap shall not be placed on banks steeper than 1.5:1. Banks steeper than this shall be cut to at least 1:5 to 1 prior to placing rip-rap.

17.025 Grouted Rip-Rap:

- A. Where indicated on the plans or contract documents or

as required by the County Representative, the contractor shall grout the loose rock rip-rap.

- B. Rip-rap shall have been placed in accordance with Section 17.024 prior to grouting.
 - 1. Grout shall consist of one part portland cement to three parts sand.
 - 2. Grout shall be placed in such a manner that will cause all remaining voids in the rip-rap to be filled and tend to seal the foundation material from surface water runoff.

17.026 Cement Sand Bag Rip-Rap:

- A. Cement sand bag rip-rap may be used in lieu of loose rock rip-rap, by or as indicated on the plans or contract drawings, or as directed by the County Representative.
- B. Mix for cement sand bag rip-rap shall be a minimum of one part Portland cement to five parts sand placed in approved burlap or synthetic fiber bags of approximately one (1) cubic foot capacity.
- C. Sand bags shall be placed by hand parallel to the contour on slopes of not greater than 1.5:1.
- D. Sand bags shall be carefully placed by hand in staggered courses abutting one another.
- E. In the flow zone of ditches sand bags shall be carefully placed abutting one another in staggered courses perpendicular to the line of flow and true to finished grade of the ditch line 4 - 1 inch.
- F. The extent and location of cement sand bag rip-rap shall be the same as for loose rock rip-rap.

17.03 Grassing:

Grassing shall be in accordance with Section 18 of these specifications.

17.04 Field Tests:

17.041 Temporary Structures:

- A. At various times during construction, the County

Representative shall visually inspect all temporary erosion control measures for adherence to these specifications. Note: It is the contractor's responsibility to maintain all such devices required by the plans, contract drawings, or as directed by the County Representative, in proper functioning order at all times, to prevent on site erosion and off site sedimentation damage.

- B. Should such devices be found in poorly maintained condition, damaged or no longer in place when they are still properly required, the County Representative may reject or refuse to accept all work being done in the right of way, easement or limits of construction until the soil erosion and sediment control measures are brought up to specifications.
- C. Should the contractor repeatedly ignore or neglect such measures or requirements of the plans, contract drawings, or direction of the County Representative, the County Representative may stop work within the right of way easement or limits of construction and turn the matter over to the department.

17.042 Permanent Structures:

Prior to acceptance of the work the County Representative shall visually inspect all loose rock rip-rap, grouted rip-rap, and cement sand bag rip-rap to ensure that it is in place correctly, undamaged and according to these specifications.

17.05 Restoration of Property:

Restoration of property shall be in accordance with Section 4.06 of these specifications.

17.06 Clean Up and Finishing:

Clean up and finishing shall be in accordance with Section 16.08 of these specifications.

17.07 Work:

All work shall conform to SCDHEC standards. All inspections shall conform to SCDHEC requirements.

SECTION 18.0 - GRASSING

18.01 Description:

This section covers the furnishing of all labor, equipment and materials and the performance of all work required to establish a dense, permanent cover of the specified grass on all areas of the site, within the construction limits, easements of right of way and any areas disturbed by construction operations in accordance with this section of the specifications.

18.02 Materials:

18.021 Fertilizer:

- A. Fertilizer shall be commercial 10.10.10 analysis fertilizer.
- B. Lime shall meet specifications set by the South Carolina Department of Transportation.

18.022 Seed:

- A. Common Bermuda (hulled).
- B. Common Bermuda (unhulled).
- C. Tallfescue (may be used only in rural areas with prior written approval by the County Representative).
- D. Abruzzi Rye.

18.023 Water:

- A. Water used to produce grass may be obtained from any approved source.
- B. The water shall be free of excess chlorine, and any chemicals or substances harmful to plant growth.

18.024 Asphalt:

- A. Asphalt used to secure mulch shall be a homogeneous emulsification of a refined petroleum asphalt suitable for spray application with or without dilution with water.

- B. Asphalt shall be suitable for this use and shall contain no petroleum solvents or diluting agents which would be harmful or toxic to plant growth.
- C. The type used shall meet the requirements of South Carolina Department of Transportation Standard Specifications for Highway Construction, latest edition subsection 810.

18.025 Mulch:

- A. Straw mulch material shall be stalks of wheat, rye, barley, oats, or other approved straw as per section 810.08 of South Carolina Department of Transportation Standard Specifications for Highway Construction, latest edition.
- B. Cellulose mulch may be used in hydro seeding operations and shall meet South Carolina State Highway Department Standard Specifications for Highway Construction, latest edition.
- C. Mulch shall be dry to the touch and free of seeds of competing species or weeds.

18.03 Construction:

18.031 Preparation of Ground:

- A. Final grades shall be established as shown on the plans or as directed by the County Representative prior to any seed bed preparation. Grading shall be in accordance with Section 4.022(B).
- B. For slopes of less than three percent (3%), the ground shall be prepared by plowing to a depth of 6".
- C. After plowing, the areas shall be thoroughly disked until pulverized to the depth specified. All large clods, boulders, stumps, roots or other matter which will interfere with the work shall be removed.
- D. Graded surfaces shall be maintained in a smooth and even condition by the contractor until the required cover is established.
- E. Slopes of greater than three percent (3%) shall be prepared as approved by the County Representative.

18.032 Application of Fertilizer:

- A. Fertilizer shall be applied uniformly at a rate of 1500 lbs. per acre and shall be incorporated with the soil to depth of approximately three (3) inches by disking, harrowing, or by other approved methods before anymore work is done on the area.
- B. Immediately following or simultaneously with the application of fertilizer, lime shall be distributed at the rate of 1500 lbs. per acre to a depth of three (3) inches by the previously specified method.
- C. Not less than 30 days after completion of seeding, the contractor shall furnish and apply nitrate of soda or ammonium sulphate to the planted areas at a rate which will give not less than 60 lbs. of available nitrogen per acre. Nitrogen shall only be applied between March 15 and October 15.
- D. No fertilizer or nitrogenous material shall be spread on windy days or when plant growth is damp.

18.033 Seeding:

- A. Weather permitting, seed shall be sown within 24 hours following the application of fertilizer and lime and preparation of the seed bed.
- B. Seed shall be sown at the rate specified according to the following schedule.

<u>Date</u>	<u>Type</u>	<u>Rate</u>
Apr. 15 to Sept. 1	Hulled Common Bermuda	40 lb/acre
Sept. 15 to Apr. 1	Unhulled Common Bermuda and Abruzzi Rye Grass	200 lb/acre

Tallifescue may be used in rural areas only with prior written approval of the County Representative. In areas adjacent to private residential property, the contractor shall match any type of grass which may be growing on, or planted in, the adjacent area.

- C. Seed shall be uniformly sown or planted using seed drills or any other type of approved equipment that will produce a uniform application of seed.
- D. Distribution by hand will be permitted.

- E. No sowing will be done during windy weather which prevents even distribution of seed, when the prepared surface is crusted, or when ground is frozen, wet or in an otherwise unsuitable condition.

18.034 Compaction:

- A. Immediately after seeding operations have been completed, the areas shall be compacted by means of a cultipacker, roller wood float, or other approved equipment to reduce air pockets to a minimum.
- B. The completed planted area shall be left with a firm, even surface, free from abrupt humps and hollows and to the established grade.

18.035 Mulching:

- A. All seeded areas shall be mulched.
- B. The contractor may use bituminous treated mulch or mixed in place mulch.
- C. The quantity of mulch to be applied shall be that required to evenly cover the seeded area to a depth of at least three quarters of an inch (3/4") and not more than one and one half inches (1 1/2"). It is intended that mulch shall allow some sunlight to penetrate and air to circulate at the same time shading the ground, reducing erosion, and conserving soil moisture.
- D. Mulch may be applied by either hand or machine in the amount previously specified.
- E. Mulch shall be applied immediately after seeding and compaction.
- F. Where mixed in place mulch is used, mulch shall be applied uniformly at a rate of 1 1/2 tons per acre and shall then be immediately mixed into the soil with specified equipment so as to produce a loose soil and mulch mixture 3 to 4 inches deep. As soon as the mixing is completed and disturbed areas have been restored to line and grade, seeding shall be done as previously specified.

18.036 Hydro Seeding:

- A. Hydro seeding is an acceptable alternative form of seeding.

- B. Seed beds shall be prepared as previously specified.
- C. Wood fiber mulch shall be applied at a rate of approximately 500 lbs. per acre. Seeds of all size may be mixed together.
- D. Equipment for mixing and applying the mulch/seed slurry shall be specially designed for this purpose. It shall be capable of applying a uniform mixture over the entire area to be seeded. The slurry mix shall be agitated during application to keep the ingredients thoroughly mixed.
- E. All materials shall be discharged within one (1) hour after being combined in the spreader.
- F. Hydro seeding shall not be performed when winds prevent an even, thorough distribution.
- G. Bituminous treated mulch or mixed in place mulch shall be applied over the entire hydro seeded area in accordance with Section 18.035 of these specifications.

18.04 Grass Establishment:

18.041 Requirements:

- A. The contractor shall provide the establishment of grass on all areas seeded for the purpose of establishing permanent vegetation.
- B. Grass establishment shall consist of preserving, protecting, watering, and reseeding, and other such work, and at such times as may be necessary to keep the grassed areas in a satisfactory condition during the warranty period.

18.042 Growth and Coverage:

- A. It is the contractor's responsibility to provide satisfactory growth and coverage.
- B. Growth and coverage shall be considered satisfactory when the grass has reached a point of maturity such that each area shows a satisfactory visible growth with no bare spots larger than one (1) square foot. Bare spots shall be scattered and the total bare areas should not

comprise more than 1/100 of any area.

18.05 Schedule of Seeding and Mulching:

18.051 Within Right of Way:

A. All areas within the right of way shall be seeded and mulched as soon as possible, or within 30 days after paving operations are completed, or as directed by the County Representative, when construction of public utilities within the right of way make such seeding and mulching operations infeasible until said construction is complete.

18.052 Easements:

Easements, including all areas disturbed by construction within the easement, shall be grassed and mulched immediately upon completion of construction within the easement.

18.053 Limits of Construction:

All areas disturbed by construction not previously specified, e.g. upon completion of construction operations in those areas.

18.054 Exceptions:

It is the intent of this section of the specifications to provide for rapid and adequate development of ground cover to prevent soil erosion and siltation damage. Therefore, the County Representative may require grassing and mulching of certain area, in accordance with these specifications, at any time, when in his/her opinion, grassing and mulching is necessary to prevent soil erosion or siltation damage.

18.06 Final Acceptance:

18.061 Protection and Repair of Sown Areas:

The contractor shall be responsible for the protection and repair of grassed areas from damages including, but not limited to, damage from vehicular traffic, erosion, additional construction or other sources, until the work is finally accepted.

18.062 Final Acceptance:

Final acceptance of the work shall not be given until grass is established in accordance with Section 18.04 of these specifications.

SECTION 20.0 - GROUNDWATER CONTROL

20.01 Scope:

This work consists of construction and procedures required to remove excessive groundwater that may be encountered in subgrades and soils. This work shall include furnishing pipe of the kind, size, and length specified; excavation and backfilling; course aggregate; filter cloth; the finishing of proper joints and connections to other drains, pipes, catch basins, etc.; and the removal and disposal of surplus materials required to complete the work.

20.02 Groundwater Control Classifications:

20.021 Temporary:

Temporary groundwater control consists of trenching, pumping, well pointing, dewatering, and draining of groundwater as required to advance the work.

20.022 Permanent:

Permanent groundwater control consists of installing a permanent system of underdrains and filters as shown on the plans or as directed by the Engineer.

20.03 Underdrain Materials:

20.031 Perforated Corrugated Aluminum Alloy Pipe:

Corrugated aluminum alloy pipe underdrain shall conform to the requirements of AASHTO M 196 for Type III corrugated aluminum alloy underdrains.

20.032 Polyvinyl Chloride (PVC) Pipe Underdrain:

PVC pipe shall conform to the requirements of AASHTO M 278 for Class PS 46 Polyvinyl Chloride underdrain pipe with cell classification of 12454-B.

20.033 Corrugated Polyethylene Underdrain:

Corrugated polyethylene drainage tubing used as underdrain shall conform to the requirements of AASHTO M 252.

20.034 Course Aggregate No. 789:

The aggregate shall consist of crushed stone or gravel conforming with the requirements of Aggregate No. 789.

Aggregate shall be free of clay lumps, humus, or other objectionable material.

20.035 Filter Cloth:

Filter cloth for underdrains shall be a previous sheet of synthetic polymer filaments nonwoven for continuous filaments. Filter cloth shall be of the type recommended by its manufacturer for the intended application. The filter cloth shall meet the following requirements:

- A. Minimum average thickness: 30 mils (ASTM D1777)
- B. Air permeability: 250-550 C.F.M. sq. ft.
- C. Minimum grab strength: 100 lbs. (ASTM D. 1682)

20.04 Construction Requirements:

20.041 Temporary Groundwater Control:

Temporary groundwater control shall be employed wherever wet soils are encountered in subgrades and in soils to be excavated. In paving areas, ditches shall be excavated below subgrade as shown on the plans or as directed by the Engineer. Groundwater in trenches shall be handled in accordance with generally accepted practice as approved by the Engineer.

20.042 Permanent Groundwater Control:

- A. Trenches for underdrain shall be excavated to a width equal to the outside diameter of the pipe, plus 12 inches on either side of the pipe, and to a depth as required to lay the pipe at the desired grade.
- B. Filter fabric, where indicated, or as directed by the Engineer, shall be laid in the trench and folded back to allow No. 789 aggregate fill and pipe, if specified, to be installed.
- C. A layer of No. 789 aggregate shall be tamped in the bottom of the trench to a depth of six (6) inches after tamping. The pipe, if specified, shall be placed into the center of the trench and bedded firmly on the bottom course of aggregate. If bell and spigot type is used, the bell end shall be laid upgrade. Perforated pipe shall be laid with the perforations on the underside

of the pipe. The joints of butt end drain tile shall be covered with filter fabric, burlap, roofing paper or other material designated by the Engineer not less than six (6) inches in width and of sufficient length to cover the joints and turn outward and lay flat on the bottom course of stone a distance of three (3) inches on each side of the pipe. Bell and spigot or tongue and groove pipe shall be laid without mortar in joints and the lengths shall be pressed firmly together to prevent infiltration of the aggregate, Lateral connections shall be made with suitable tee, wye, bend, reducer, or increaser specials as required. The upgrade end not terminating in a structure shall be capped, plugged, or fitted as directed by the Engineer.

- D. The filter fabric shall be lapped across the top to the gravel a minimum of 12 inches. Any rips or tears in the fabric shall be repaired by lapping a separate fabric section 12 inches beyond the tear in all directions. Backfill shall be carefully placed and compacted to prevent damage or movement of filter cloth.
- E. The remainder of the trench shall be filled with suitable earth or, where directed by the Engineer, No. 789 aggregate shall be used instead of earth backfill. The backfill shall be carefully compacted in six (6) inch layers.
- F. Pipe outlets shall be constructed as directed by the Engineer. The outlet pipe may be of the same type as the underdrain or may require the use of bell and spigot type pipe.

20.05 Basis of Payment:

20.051 Temporary Groundwater Control:

Temporary groundwater control measures as required shall be considered incidental to construction involving land disturbing activities, and no payment shall be allowed thereof.

20.052 Permanent Groundwater Control:

The accepted footage, as measured by the Engineer, shall be paid for at the contract unit price per linear foot for pipe underdrain of the size and type specified, which price shall constitute full compensation for excavating, backfilling, and disposal of surplus materials, for finishing, hauling, and placing all the materials, including pipe, aggregate, filter

cloth, incidental concrete, wye, tee, bend joints, and other connections, and for all labor, tools, equipment and incidentals necessary to complete the work. Pipe outlets shall be paid for as pipe underdrain.

SECTION 22.0 - TRAFFIC CONTROL

22.01 General:

The contractor will be required to maintain through and local traffic within the limits of the project, including all existing roads and streets which cross or intersect the project and are within the project limits, unless otherwise provided on the plans or special provisions. Traffic shall be maintained from the time the contractor begins work on the project site until final acceptance of the project, including any periods during which the contractor's operations are suspended, unless otherwise provided for in the special provisions or permitted by the Engineer. The contractor shall conduct work in a manner which will create a minimum amount of inconvenience to traffic.

All roadway and structure facilities used by the contractor in maintaining traffic shall be maintained by the contractor in a safe, passable, and convenient condition under all weather conditions.

Signing, barricades, lighting, traffic control devices, and traffic control operations used in maintaining traffic shall be in accordance with the applicable provisions of the latest edition, as amended, in effect on the date of advertisement, of South Carolina Manual on Uniform Traffic Control Devices.

Failure of the contractor to comply with the requirements of this specification will be justification for suspending work on the project until all deficient items have been corrected to the satisfaction of the Engineer.

22.02 Traffic Control Supervision:

The contractor shall designate one individual who will have complete charge of the contractor's traffic control program on the project as his project traffic control supervisor. This individual shall be given full authority by the contractor to take such action as may be necessary to ensure that traffic is maintained in accordance with the requirements of the contract. He/she shall work with the County Engineering Department so that the coordinator is informed of all details concerning the contractor's traffic control program. The contractor's traffic control supervisor or designated representative shall be on call at all times and shall promptly make any changes in traffic control operations, as deemed necessary by County personnel. When on any project the County elects to let the roadway construction to one contractor and the structures within the project to another contractor, the project traffic control supervisor designated by the roadway contractor and shall cooperate in maintaining safe and adequate traffic conditions throughout the project at all times, including periods of work suspension by either contractor.

22.03 Traffic Control Through the Project:

The contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient warning lights, danger signals, and signs; shall provide sufficient number of flagmen to direct the traffic; and shall take all necessary precautions for the protection of the work and the safety of the public.

The contractor shall erect and maintain effective warning and directional signs along the construction detours clearly directing traffic around the closed portion, or portions, of the construction detour.

All barricades and obstructions or hazardous conditions shall be illuminated as necessary to provide for safe traffic conditions.

Warning and caution signs shall be posted throughout the length of any portion on the project where traffic flow is restricted.

Unless otherwise permitted by the Engineer, signs, markers, barricades, and other traffic control devices shall be temporarily removed or altered by the contractor at night, or at other times when construction operations are not underway, and the condition of the roadway being used by traffic does not present a hazard. Such traffic control devices shall be replaced by the contractor prior to the resumption of construction operations.

Advisory speed limit signs used by the contractor shall be posted only when and where reduced speeds are warranted and so approved by the Engineer, and such reduced speeds shall be the maximum speeds which are reasonable under the prevailing conditions.

The contractor shall provide continuous, safe access to all properties, both public and private, along the project in all cases where such access will be provided by the completed facility, and shall conduct his operations in such a manner that inconvenience to the property owner will be held to a minimum.

22.04 Through Traffic Detours:

When provided for by the special provisions or approved by the Engineer, through traffic will be detoured around the project using existing roads or streets. Such through detours will be signed and maintained by the contractor, and it shall remain the responsibility of the contractor to erect and maintain appropriate barricades, signs, lights, signals, or other traffic control devices at the ends of the project, and all roads and streets which cross or intersect the project as may be necessary to provide adequate protection of the work and safety for the public.

Where through traffic is detoured, the contractor shall be responsible for the maintenance of local traffic within the limits of the project to the extent that safe conditions are provided.

22.05 One-Way Traffic:

Two-way traffic is to be maintained at all times unless otherwise provided for on the plans or special provisions or unless permitted by the Engineer. Where one-way traffic is permitted, traffic shall be periodically altered in direction by flagmen or approved traffic control devices and all necessary precautions shall be taken to minimize excessive delay to traffic. The distance along the project through which one-way traffic will be permitted shall be subject to the approval of the Engineer.

22.06 Construction While Maintaining Traffic:

When the work is to be performed while maintaining traffic, the contractor shall schedule and perform the work so as to create the least safety hazard to traffic. At each location where work is started that creates a safety hazard, it shall be continued until completed to the extent that the safety hazard is eliminated. If the work is not pursued in a continuous manner, the Engineer will not allow any other work on the project to be performed until the existing safety hazard is eliminated.

22.07 Standards:

All traffic control devices and practices shall conform to the manual.

22.08 Payment:

No additional payment for traffic shall be considered incidental to the project and shall be included in mobilization.

SECTION 24.0 - GEOSYNTHETIC EROSION CONTROL FOR CHANNEL LININGS

24.01 Description:

This section covers the furnishing of all labor, equipment and materials and the performance of all work required to install geosynthetic erosion control material as a liner for newly constructed and rehabilitated stormwater channels to be seeded and vegetated.

24.02 Related Sections

24.021

Section 17 - Erosion Control

24.022

Section 18 - Grassing

24.03 Unit Prices

24.031

Method of measurement shall be by the square yard including seams, overlaps, anchor trenches, and wastage.

24.032

Basis of payment shall be by the square yard, installed.

24.04 Quality Assurance

24.041

Manufacturer qualifications shall be ISO 9002 certified.

24.05 Materials

Include the following for Type C-3 geosynthetic, Use Type C-3 when, unvegetated, the maximum velocity is equal to or less than 6.1 meters (20feet) per second and the maximum shear stress is 383.6 Newtons per square meter (8 lbs/ square foot) at a 0.5 hour duration while the maximum velocity is equal to or less than 3.0 meters (10 feet) per second and the maximum shear stress is 144.2 Newtons per square meter (3 lbs/ square foot) at a 50 hour duration. Then vegetated,, the maximum velocity is equal to or less than 7.6 meters (23 feet) per second and the maximum shear stress is 479.7 Newtons per square meter (10 lbs/ square foot) at a 0,5 hour duration while the maximum velocity is equal to or less than 4.3 meters (14 feet) per second and the maximum shear stress is 287,4 Newtons per square meter (6 lbs /square foot) at a 50 hour duration.

24.051 Type C-5 Geosynthetic Erosion Control Material

- A. Three-dimensional, lofty woven polypropoylene geosynthetic specially designed for erosion control applications on steep slopes and vegetated waterways.
- B. Matrix composed of monofilament yarns woven into uniform configuration of resilient pyramid like projections.
- C. Material to exhibit very high interlock and reinforcement capacity with both soil and root systems and demonstrate high tensile modulus.
- D. Minimum Average Roll Values:

Property	Test Method	Units	Results
Thickness	ASTM D-5199	<i>nun</i> (in)	12.7 (0.50)
Resiliency	ASTM D-5199	percent	80
Mass Per Unit Area	ASTM D-5261	G/sq. m (<i>ozlsy</i>)	475 (14.0)
Tensile Strength	ASTM D-4632	N (lbs.)	1555 x 1335 (350 x 300)
Tensile Strength	ASTM D-4595	kN/m (lbs./ft.)	44 x 3 (3,000 x 2,200)
Tensile Elongation	ASTM D-4595	percent	45 (max)
Tensile Strength @ 10% Elongation (typical value)	ASTM D-4595	kN/m (lb/ft)	27.0 x 23.0 (1,850 x 1,600)
Ground Cover Factor	Light Projection	percent	75
Moisture Absorption	ASTM D-570	percent	0.01 (max)
UV Resistance	ASTM D-4355	percent	80 at 1000

24.06 Accessories:

24.061 Ground Anchoring Devices:

- A. U-shaped wire staples, metal pins, or triangular wooden stakes.
- B. Wire staples shall be a minimum 8 gauge.
- C. Metal pins shall be steel, minimum 5 mm (0.20 in) in diameter with 40 mm (1.5 in) steel washer.
- D. Wooden stakes shall be 75 mm (3 in) long triangular wooden survey stakes with minimum 40 mm (1.6 in) head.
- E. Length shall be 200 to 450 mm (8 to 18 inches), sufficient ground penetration to resist pullout. Use longer anchors for loose soils.

24.07 Execution:

24.071 Preparation

- A. Grade and compact areas to be treated with geosynthetic erosion control material and compacted as indicated or as directed by Engineer.
- B. Remove large rocks, soil clods, vegetation, and other sharp objects that could keep geosynthetic erosion control material from intimate contact with subgrade.
- C. Prepare seedbed by loosening 50 to 75 mm (2 to 3 in) of soil above final grade.
- D. If directed, select and apply soil amendments, fertilizer, and seed to scarified surface prior to installation of geosynthetic erosion control material. Alternatively, seed may be applied after installation.
- E. Construct 150 x 300 mm (6 in x 12 in) anchor trench at upgrade end of installation to inhibit undermining from stray surface water. Excavate 150 x 150 mm (6 in x 6 in) check slots at 7.6 to 9.1 meter (25 to 30 foot) intervals along length of channel. Cut longitudinal anchor slots 100 x 100 mm (4 in x 4 in) at top of each side slope.

24.08 Installation:

- A. Install geosynthetic erosion control material at elevation and alignment indicated.
- B. Beginning at downstream end in center of channel, place initial end of first roll of geosynthetic erosion control material in anchor trench and secure with ground anchor devices at 300 mm (12 in) intervals.
- C. Position adjacent rolls in anchor trench in same manner, overlapping preceding roll minimum 75 mm (3 in).
- D. Secure geosynthetic erosion control material at 300 (12 in) intervals, backfill and compact with specified soil or as directed by Engineer.
- E. Unroll center strip of geosynthetic erosion control material upstream over compacted trench. Stop at next check slot or terminal anchor trench. Unroll adjacent rolls of geosynthetic erosion control materials upstream in similar fashion, maintaining 75 mm (3 in) overlap.
- F. Fold and secure rolls of geosynthetic erosion control material snugly into transverse check slots. Lay material in bottom of slot, then fold back against itself as indicated. Anchor through both layers of geosynthetic erosion control material at 300 mm (12 in) intervals. Backfill with soil and compact. Continue unrolling geosynthetic erosion control material widths upstream over compacted slot to next check slot or terminal anchor trench.
- G. Secure geosynthetic erosion control material to channel bottom with ground anchoring devices at a frequency of three (3) anchors per square meter (2 1/2 anchors per square yard), increased anchoring may be required depending upon site conditions.
- H. Alternate installation methods must be approved by Engineer prior to execution.
- I. If specified, seed or fill geosynthetic erosion control material after installation.
 - 1) Spread and lightly rake 12 to 20 mm (0.5 to

0.8 in) of fine topsoil into geosynthetic erosion control material to completely fill its thickness.

- 2) When using lightweight power equipment to fill geosynthetic erosion control material, avoid sharp turns. Do not drive tracked or heavy equipment over geosynthetic erosion control material.
- 3) Smooth out soil by barely exposing top portion of geosynthetic erosion control material. Do not place excessive soil above material.
- 4) If specified, broadcast additional seed or mulch above soil filled mat and water.
- 5) If seeding is done prior to installation of geosynthetic erosion control material, reseed the area.



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