GENERAL PROVISIONS AND SPECIFICATIONS
For this contract, the definitions and terms contained in the "South Carolina State Highway Department Standard Specifications for Highway Construction, Edition of 2007", shall apply with the understanding County of Greenville reserves the right to any changes Additions/deletions. All quantities are estimated it is the contractor's responsibility to verify and measures all items. The County reserves the right to reject all bids for this project.

Licenses:
The Contractor must be a licensed general contractor in the State of South Carolina and must possess a valid South Carolina Bidder's License.

Permits:
All work shall be subject to the applicable permitting requirements of County, State, and Federal agencies. Clearing, grading, and erosion control measures shall comply with the Greenville County Storm water Management Ordinance.

Warranty:
All materials and workmanship must be free of defects for a period of one year from the date of completion of all contract work specified herein. By acceptance of the contract, the Contractor agrees promptly to repair, to the satisfaction of the County Engineer, any defects in materials or workmanship at the Contractor's expense.

Scheduling, Notification, & Coordination:
The Contractor shall develop and maintain a proposed schedule of work to submit to Greenville County. The schedule shall be provided in a bar-chart format listing the sequence of project activities within the contract time frame.

The schedule shall be updated monthly and submitted to Greenville County.
Prior to the beginning work, the County will notify the affected residents about the start date for construction. The contractor shall notify the County at least 7 days prior to beginning work.

The contractor shall be responsible for coordinating with all utilities which will be impacted by the project, or have easements in the work area. The contractor shall provide the County with copies of all correspondence and telephone transcripts with the utility providers. The contractor shall be responsible for coordinating with the Piedmont Utility Protection Service and/or the utility providers for locating underground utilities before digging. The contractor shall be responsible for all damage to existing utilities caused by the contractor's crews and machinery, or subcontractors' crews and machinery. The contractor shall be responsible for designating a staging area and provide the County with a copy of the agreement for the use of that area.

Contract Time:
All work phases specified herein must be completed as stated on the Project Description Sheet, from notice to proceed. If the contractor fails to satisfactorily complete the work within the specified time, liquidated damages of $250.00 per calendar day shall be assessed up to value of the contract (total bid). The penalty may be drawn from any payment due, or the performance bond, at the discretion of the County.

Working Days:
The Contractor may work any calendar day that weather permits, excluding Sundays.

Incorporation of Documents:
All documents, forms, specifications or other published items included by reference in these special provisions shall be considered incorporated herein and shall be a part of this document. All items incorporated herein are available for review in the Greenville County Purchasing Department.
Contact Agencies:
Greenville County Engineering & Maintenance – County Engineer, 864-467-7010
Greenville County Engineering & Maintenance – Project Manager, 864-467-7017
Greenville Water System – 864-241-6112
Metropolitan Sewer District – 864-277-4442
Western Carolina Sewer Authority – 864-299-4020
Duke Power Company –Engineering Department, 864-370-5011
AT & T Engineering Dept. - Engineering Department, 864-298-0700
Local Sewer Authority

Roadway Damage:
Any damage which occurs to existing pavement, curbs, or drainage structures (in areas not already designated as part of the construction project) from the contractor's or subcontractors' tracked equipment or other machinery shall be repaved and/or repaired by the contractor at his expense to the County's satisfaction.

Pre-Construction Conference:
A pre-construction conference will be scheduled for the chosen contractor to discuss any special concerns. The chosen contractor shall provide the proposed work schedule to the County at the pre-construction conference. The County and utility providers affected by the work will be part of the conference. A date and time for the conference shall be determined once the bids have been received and a contract awarded.

Engineer Authority:
The County 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 the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to said work and the construction thereof. The County Engineer's estimates and decisions shall be final and conclusive. The contractor agrees, if any questions arise between the parties hereto relative to said contract or specifications, the determination or decision of the County 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 County Engineer shall decide the meaning and intent of any portion of the specifications and of any part 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 under this contract and other contractors performing work for the County, shall be adjusted and determined by the County Engineer.

Method of Measurement and Basis of Payment:
The quantity of work completed for all items shall be measured in accordance with the units indicated in each section of the specifications. The quantities will be paid for at the contract unit price bid for the items listed on the itemized bid form. Said prices and payments shall be full compensation for furnishing all materials, labor, tools, equipment, supplies, taxes and incidentals necessary to complete the work. All work shall be performed in a neat and workmanlike manner. All quantities listed herein are estimated. The County reserves the right to increase or decrease all quantities as indicated herein without limit at no change in the unit bid price. Progress payments made to the contractor are not to be considered as a final acceptance.

Retainage
Retainage on monthly progress payments will be ten (10%) percent of approved monthly invoices until satisfactory completion of the contract.
SPECIFICATIONS
Specifications pertain to written standards and requirements for materials, construction procedures, testing, quality control, and workmanship to be provided for the project. The specifications to be used for the project shall include, but are not be limited to the following:

SCDOT Standard Specifications.
The 2007 edition of the South Carolina State Highway Department Standard Specifications for Highway Construction will apply, except where Greenville County Standard Specifications state otherwise (see below).

Greenville County Standard Specifications
Greenville County Standard Specifications shall take precedence over the 2007 edition of the South Carolina State Highway Department Standard Specifications for Highway Construction whenever there is a conflict between the two specifications. The County standard specifications are included herein for the following:
- Site Clearing (02110)
- Earthwork (02200)
- Erosion Control (02270)
- Paving (02510)
- Storm Drainage (02720)
- Lawns & Grassing (02930)
- Landscaping (02931)
RELATED DOCUMENTS: Attention is directed to related sections of the Specifications, as they pertain to the guidelines, materials, and methods described in this section. Also, the General Provisions and Special Provisions of the Contract shall apply to all Sections of the Work.

1.0 SCOPE

a. General: This section includes furnishing all labor, materials, equipment, and all services necessary for any clearing, and/or clearing and grubbing required within the areas of operation.

b. Traffic Control: The Contractor shall be responsible for conducting all work in streets, roads and highways in accordance with any and all Regulatory Authorities current requirements. As a minimum, for any work in State Highways, the Contractor shall meet the requirements of Traffic Controls for Street and Highway Construction Part V of the South Carolina Manual on Uniform Traffic Control Devices for Streets and Highways - 1982, or latest revision.

2.0 CLEARING AND GRUBBING

a. Clearing - On all areas where grading, excavating and filling are to be done, and on all border areas, clearing shall consist of cutting, removal and disposal of all trees, brush, debris and other objectionable material resting on or protruding above ground within the limits of grading.

b. Grubbing - Grubbing shall consist of the removal and disposal of stumps, roots, and other objectionable organic material within the limits of grading. Stumps shall be removed entirely. Roots and matted roots shall be grubbed out at least 18 inches below the existing surface.

c. Disposal of Materials - All materials removed as a result of clearing and grubbing operations shall be removed from and disposed of off-site.

d. Trees - Those trees that are indicated to be saved shall be carefully protected during grading operations. If the trees are damaged or destroyed due to the Contractor's negligence, they will be replaced at the fair market value determined by the County Engineer and paid for by the Contractor.

3.0 CERTIFICATION

The clearing and grubbing operations shall be certified by the County Engineer prior to rough grading, filling, or as required by Local Government Agencies.

END OF SECTION
RELATED DOCUMENTS: Attention is directed to related sections of the Specifications, as they pertain to the guidelines, materials, and methods described in this section. Also, the General Provisions and Special Provisions of the Contract shall apply to all Sections of the Work. For the purpose of these specifications, the "County Engineer" shall mean the County Engineer or the County Engineer's representative, which shall include the County project manager, project inspector, or private testing firm hired by the County to oversee the earthwork operations.

### 1.0 SCOPE

<table>
<thead>
<tr>
<th>a. General: This section includes furnishing all labor, material, equipment, and all services necessary to complete the earthwork within the project site including but not limited to road right-of-way, trenches, fill and/or cut slopes as shown on the drawings and as herein specified. The scope of the project shall include but not be limited to the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clearing and grubbing.</td>
</tr>
<tr>
<td>2. Backfilling and compaction.</td>
</tr>
<tr>
<td>3. Demolition of areas shown on drawings including but not limited to concrete, asphalt, walls, structures and pipe.</td>
</tr>
<tr>
<td>4. Provide and place any additional material if needed, to bring existing grades to new grades.</td>
</tr>
<tr>
<td>5. Temporary drainage of site.</td>
</tr>
<tr>
<td>7. Trenching for utilities and drainage.</td>
</tr>
</tbody>
</table>

| b. **Contractor Verification:** The Contractor shall visit the job site prior to the submission of the proposal to verify the actual conditions with those shown on the working drawings. |

| c. **Limitations & Tolerances:** Excavation and earthwork under this contract will be limited to rough grading the subgrade of roads in accordance with plans, details and specifications. Rough grading shall be within 0.1' (one-tenth of a foot) plus or minus making allowances for topsoil, road surfacing, etc. |

| d. **Notification of Project Start:** The Contractor shall notify the County Engineer seven (7) days prior to the beginning of grading operations. |

| e. **Stockpiling of Topsoil:** Topsoil shall be removed to its entire depth from all areas to be filled, excavated, or used for borrow and stockpiled at convenient locations approved by the County Engineer. |

| f. **Maintenance of Reference Points:** All reference points, property markers, right-of-way markers, etc., shall be carefully maintained. If disturbed or destroyed, the Contractor shall accurately replace same at his expense. |

| g. **Protection of Existing Utility Lines:** Existing utility lines shall be protected from damage during construction operations, and shall be repaired to the satisfaction of the Utility and County Engineer at the Contractor's expense, if damaged. |
h. Traffic Control: The Contractor shall be responsible for conducting his work in streets, roads, and highways in accordance with the requirements of the applicable Regulatory Authorities. As a minimum, for any work in State Highways, the Contractor shall meet the requirements of Traffic Controls for Street and Highway Construction and Maintenance Operations, Part V of the South Carolina Manual on Uniform Traffic Control Devices for Streets and Highways - 1982, latest revision.

2.0 TESTING

a. Scheduling and Coordination: The Contractor shall arrange for soil compaction testing to be performed by an independent Geotechnical testing firm at the contractor's expense for any areas which are deemed questionable by the County Engineer.

b. Proof-rolling: Prior to paving, the Contractor shall proof-roll the roadway in the presence of the County Engineer. A fully loaded tandem dump truck or water truck shall be used to identify any unstable areas of base material. The unstable base material shall be promptly removed, replaced with suitable material, and recompacted until the proof-roll is satisfactory.

c. Additional Testing: Additional tests will be paid for by the Contractor for materials which do not meet the specifications.

3.0 STRIPPING

a. General Requirements: The entire area within the limits of grading shall be excavated to a depth sufficient to remove all vegetable matter, sod, muck, rubbish and other unsuitable material. Topsoil material from stripping operations shall be placed separate from other excavated materials and piled free of roots, stones, and other undesirable material for use in fine grading operations.

4.0 STOCKPILING TOPSOIL

a. General Requirements: Topsoil shall be removed to its entire depth from all areas to be filled, excavated, or used for borrow and stockpiled at convenient locations approved by the County Engineer.

5.0 PLACING TOPSOIL

a. General Requirements: Topsoil shall be placed on all shoulders, slopes, ditches and other earth areas to be grassed after grading. Topsoil shall be placed uniformly to a compacted depth of not less than 4". Soil material shall be free from clods, rocks, roots and other objectionable materials which might hinder subsequent grassing and mowing operations.

6.0 PREPARATION OF GROUND SURFACE FOR FILL

a. General Requirements: Sloped ground surfaces steeper than 1 vertical to 4 horizontal on which fill is to be placed shall be plowed, stepped or benched, or broken up as directed, in such manner that the fill material will bond with the existing surface. Prepared surfaces on which compacted fill is to be placed shall be wetted or dried as may be required to obtain the compaction specified.
7.0 PROOF ROLLING PRIOR TO FILLING

a. General Requirements: After any required clearing, grubbing and stripping of topsoil has been accomplished, and before beginning any earthwork operations, all areas to receive compacted fill, shall be proof rolled to detect any soft areas that may exist. A 4-wheel pneumatic tired roller of not less than 25 tons, or its equivalent, shall be used for this operation. At least 4 passes shall be made, (2) in each of the two directions at right angles. Any soft areas thus disclosed that do not harden up after successive passes of the roller shall be called to the attention of the County Engineer. The County Engineer may require the areas to be under cut and replaced with properly compacted material.

8.0 FILLING

a. Embankments: Approved material removed from the excavation shall be used in forming the fill. Fill material shall be free from roots, other organic material and trash, and from stones having a maximum dimension greater than 6 inches. No frozen material will be permitted in the fill. Soil material for fill shall be placed in successive horizontal layers of not more than 6 inches in loose depth for the full width of the fill embankment cross section. Each layer of fill or embankment shall be compacted by rolling with an approved tamping roller, vibrating roller or other compaction equipment, whichever is best suited for the types of soil encountered.

b. Trenches: Place backfill in not more than 6" thick compacted lifts, except as specified otherwise, and each lift shall be compacted as specified hereinafter. Backfill adjacent to structural elements shall be placed, as far as practicable, as the adjacent structural elements have been completed and accepted. Backfilling against concrete walls shall be done only after the walls have been adequately shored or have cured to sufficient strength to withstand the soil pressure. Backfilling of trenches shall progress as rapidly as the construction, testing and acceptance of the work permits. In backfilling pipe trenches, compact fill in 6" thick compacted lifts to a depth of 12" over the top of the pipe; backfill and compact the remainder of the trench as specified hereinafter. For trenches excavated in paved areas, place the backfill in not more than 6" compacted lifts to the top of the trench. For trenches excavated in unpaved areas place and compact backfill in 12" compacted lifts to the top of the trench.

c. Compaction: Each layer of fill or embankment shall be compacted to not less than 95% of maximum density at optimum moisture content. The upper 18" of fill under roads shall be compacted to 100% of this Specification.

1. The method of test for maximum density shall be in accordance with ASTM D-698 (Standard Proctor Test). The material to be compacted shall be of the proper moisture content to obtain the prescribed density. Wetting or drying of the material and manipulation to secure a uniform moisture content throughout each layer will be required.

2. When compaction is suspended for several days, before resuming operations, the existing soil surface shall be plowed if deemed necessary by the County Engineer. No allowance in payment will be made for this plowing.

9.0 FIELD CONTROL OF FILLING OPERATIONS

a. Testing: The Contractor shall retain the services of an independent testing laboratory to perform all tests required under this section. In areas where the density of the fill or embankment is specified, field density tests shall be performed in sufficient number to insure that the specified density is being obtained. Areas of the site in which testing reveals compaction below the specified density as stated hereinbefore shall be reworked by the Contractor until satisfactory to the County Engineer. The cost of the initial test shall be paid for
by the Contractor unless other arrangements have been made; and subsequent tests required as a result of improper compaction shall be paid for by the Contractor.

10.0 EXCAVATION

a. General Requirements: Excavation of every description regardless of material encountered within the grading limits of the project shall be performed to the lines and grades indicated or necessary. Suitable excavated material shall be transported to and placed in fill areas within limits of the work. Surplus excavation material not required for fill shall become the responsibility of the Contractor and shall be removed from the site or disposed of as directed by the County Engineer. The construction, excavation and filling shall be performed in a manner and sequence that will provide drainage at all times. When required, the Contractor shall provide temporary drains, ditches, pumps, drainage lines, or other equipment to intercept, divert, or remove water which may affect the prosecution or condition of the work. Water shall be removed from the site to the satisfaction of the County Engineer.

b. Classification: Excavation shall pertain to cuts and fills, and shall be classified as one of the following: site excavation, muck excavation, borrow excavation, stripping, surplus excavation, water course and ditch excavation, and rock excavation. Site excavation, stripping, surplus excavation, and water and ditch excavation shall be included in the unit prices for various other pay items, but will not be considered as individual pay items. Borrow excavation, muck excavation, and rock excavation will be treated as individual pay items. Rock excavation shall be such material which cannot be removed by means other than by explosives or air hammers. Materials which can be removed by ripping shall not be considered rock excavation. Classification of excavation which is disputed shall be determined by the County Engineer. It shall be the Contractor's responsibility to notify the County Engineer when rock excavation or muck excavation is encountered.

c. Notification for Rock Excavation: It shall be the Contractor's responsibility to notify the County Engineer when rock excavation is encountered. The Contractor will not be credited for any rock quantities removed before such notice is given. The County inspector must measure rock quantities before the excavation is backfilled in order for credit to be given and payment to be made.

d. Insurance for Blasting: If conditions are such that blasting or any use of explosives is required, the Contractor, prior to blasting, shall submit to the County Engineer satisfactory evidence of blasting and explosive insurance in the amounts of bodily injury and property damage insurance required in the Special Conditions and shall provide to the satisfaction of the County Engineer the experience and capability of the Contractor's organization to safely handle and perform such operations.

e. Qualifications and Safety for Blasting: Handling and storing of blasting materials shall be performed only by qualified persons skilled in such work. Adequate precautions shall be taken to prevent accidents, injury to persons or damage to property. Qualifications of blasting operation personnel and safety precautions shall be in full compliance with all codes governing such operations and shall be approved by the County Engineer. Full responsibility for all blasting operations shall remain with the Contractor, and he shall make good any damage that may result.

f. Trenches: Excavate for trenches to depth indicated or required to establish indicated flow lines or invert elevations. Maintain uniform width required for particular item to be installed, including width to provide adequate working room and compaction or as directed by the Engineer. Rock shall be excavated to a depth of 6 inches below the invert and 18 inches on each side of all structures or utilities.
   1. Rock will be defined as follows:
a) General Excavation - any material which cannot be excavated with a single tooth ripper drawn by a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds.

b) Trench Excavation - any material which cannot be excavated with a track mounted backhoe with a bucket curling force of not less than 20,760 pounds. The contractor shall notify the County project manager in writing when rock is encountered to verify rock excavation prior to any rock removal.

2. Rock Quantity Measurement - All rock quantities must be observed, measured, and verified by the County project manager or representative prior to backfilling. In trenches, credit will be given for the rock excavated to a maximum depth of 6" below the pipe invert and a maximum of 18" on each side of the pipe. Rock excavated outside of this zone will not credit.

3. Blasting - If conditions are such that blasting or any use of explosives is required, the Contractor, prior to blasting, shall submit to the County Engineer satisfactory evidence of blasting and explosive insurance in the amounts of bodily injury and property damage insurance required in the Special Conditions and shall provide to the satisfaction of the County Engineer the experience and capability of the Contractor's organization to safely handle and perform such operations. Handling and storing of blasting materials shall be performed only by qualified persons skilled in such work. Adequate precautions shall be taken to prevent accidents, injury to persons or damage to property. Qualifications of blasting operation personnel and safety precautions shall be in full compliance with all codes governing such operations and shall be approved by the County Engineer. Full responsibility for all blasting operations shall remain with the Contractor, and he shall make good any damage that may result.

11.0 EXCESS MATERIAL AND BORROW

a. Disposal of Excess Material: Any excess material from excavation shall be disposed of by the Contractor at the Contractor's expense.

b. Dumped Material: The dump shall be uniformly piled, with top flattened and edge sloped to present a neat appearance and permit drainage. Silt fencing shall be installed around the stockpile as necessary for erosion and sedimentation control.

c. Approval of Fill Material: The Contractor shall furnish all material required for fill work. Fill material shall be approved by the County Engineer prior to filling operations.

d. Offsite Borrow: When necessary to borrow material for filling, the Contractor shall obtain fill material from offsite unless directed otherwise by the County Engineer.

12.0 GRADING

a. General Requirements: Grading of all areas within the project including excavated and fill sections and adjacent transition areas shall be reasonably smooth, compacted and free from irregular surface changes. The Contractor shall protect newly graded areas from action of the elements. Any settlement or washing which occurs prior to acceptance of the work shall be repaired and grades re-established to required elevations and slopes. Fill to grade levels any areas where settlement occurs. This fill material shall be placed in accordance with the articles as previously described.

b. Spreading of Topsoil: Topsoil shall be uniformly spread to a minimum depth of 4" over all earthen areas disturbed during construction.
13.0 DRAINAGE

a. General Requirements: Drainage, both temporary and permanent, shall be constructed and maintained during the performance of the work. Existing drains, culverts, and ditches not interfering with new work shall be kept clean and operating during construction operations. The surface of unfinished fills shall be bladed smooth to a crown or grade at the conclusion of the day's work or before shutdown for any cause to permit water runoff. Fill that has become saturated with water because of improper drainage shall be removed to a depth determined by the County Engineer. Such saturated fill shall be disposed of as directed by the County Engineer, or reconditioned to conform to these specifications. The Contractor shall control grading so that ground is pitched to prevent water from running into excavated areas and provide all pumping required to keep excavated areas free of water. Should springs or running water be encountered in excavation, the County Engineer shall be notified immediately. The Contractor shall provide free discharge of such water by providing trenching which shall drain to an appropriate point of disposal.

14.0 REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL

a. Definition: Unsuitable material shall be defined as any muck material or other objectionable excavated material which is deemed unsatisfactory for road construction purposes or pipe backfill, based on the judgment of the County Engineer. Unsuitable material does not include stripping from clearing and grubbing operations or other excavated materials not intended for roadway fill or pipe backfill.

b. Removal and Disposal: Removal of unsuitable material shall include complete removal and disposal. If directed by the Engineer, unsuitable materials may be blended with suitable soils and used for non-structural fill in approved areas. All organic and otherwise objectionable materials removed as a result of stripping and removal of unsuitable material not intended for road construction or pipe backfill as described in this section shall become the responsibility of the Contractor and shall be removed without charging as muck excavation.

16.0 SUBGRADE ELEVATIONS

a. Finished Elevations: The grading elevations shown on the drawings are finished elevations.

b. Roadway Subgrade Elevations: In roadway sections, the subgrade elevations will be below finished elevations by the thickness of the paving.

17.0 EROSION AND SEDIMENTATION CONTROL

a. General Requirements: Erosion and sedimentation control measures as shown on the drawings or as required by local ordinances shall be installed and operational prior to starting any work on the project site.

END OF SECTION
EROSSION CONTROL
SECTION 02270

RELATED DOCUMENTS: Attention is directed to related sections of the Specifications, as they pertain to the guidelines, materials, and methods described in this section. Also, the General Provisions and Special Provisions of the Contract shall apply to all Sections of the Work.

1.0 SCOPE

a. General: The work includes the provision of temporary erosion control measures to prevent the pollution of air, water, and land. Installation of temporary erosion control features shall be coordinated with the construction of permanent erosion control features to assure effective and continuous control of erosion.

2.0 CONSTRUCTION

a. Gravel Construction Entrance: Provide as indicated, a minimum of 6 inches thick, at points of vehicular entrance and exit on the construction site. Gravel shall be as specified in S.C. Highway Department, "Standard Specifications for Highway Construction", Section 305 for Composite Mixture Macadam Base Course.

b. Dust Suppression: ASTM D-98 calcium chloride, magnesium chloride, or other standard manufacturer's products designed for dust suppression. Apply dust suppressors in accordance with manufacturer's instruction. Protect treated surfaces from traffic for a minimum of 2 hours after treatment. Repeat application of dust suppressors as required to control dust emissions.

c. Sediment Fence: Install posts at the spacing indicated, and at an angle between 2 degrees and 20 degrees towards the potential silt load area. Do not attach filter fabric to existing trees. Secure filter fabric to the post and wire fabric using staples, wire, or hog rings. Imbed the filter fabric into the ground as indicated. Splice filter fabric into the ground as indicated. Splice filter fabric at the support pole using a 6 inch overlap and security seal. Top of the filter fabric shall have a 1 inch tuck or a reinforced top end section. Preassembled silt fences may be used as approved by the County Engineer.

1. Posts: 4 inch by 4 inch wood posts, minimum 3 inch diameter wood, or 1.33 pound per linear foot steel posts. Posts shall be minimum 5 feet long.

2. Wire Fabric: ASTM A-185, 6 by 6, minimum 14 gage.

3. Filter Fabric: A woven or nonwoven polypropylene, nylon, or polyester containing stabilizers and/or inhibitors to make the fabric resistant to deterioration from ultraviolet light. Filter cloth shall be of the type recommended by its manufacturer for the intended application.

4. Straw Bales: Constructed from grain straw or hay with each bale bound together with binding wire or twine. Posts shall be ASTM A-615, 1-1/2 inch diameter wood posts or 1.0 pound per linear foot steel posts. Imbed the bottom row of bales in a 4 inch deep trench and place straw bales tightly abutting each other. Bales shall be placed so the bindings are horizontally oriented around the bales, wire adjoining bales together. Anchor each bale with two stakes, driving the first stake towards the previously laid bale. Wedge straw in gaps between bales. After the bales are staked, the excavated soil from the trench shall be backfilled against the straw bales to ground level on the downhill side and to 4 inches above ground level on the uphill side.

d. Gravel Dam and Silt Trap: Provide as indicated, adjusting dimensions as directed by the County Engineer to fit grading and location.


e. Erosion Control Matting: Jute, excelsior, straw, or paper matting that has not been bleached or dyed. Provide matting in minimum 4 foot widths. Staples for anchoring the matting shall be minimum throat width of 1 inch minimum length of 6 inches after forming. Place matting in the direction of the flow of water. The up channel matting end shall be placed in a narrow trench a minimum of 5 inches deep. Where one roll of matting ends and a second roll begins, the end of the upper roll shall be brought over the buried end of the second roll to provide a 6 inch overlap. Where matting widths are laid side by side, the overlap between matting shall be 4 inches. Provide check slots every 50 feet longitudinally in the matting. Construct check slots by providing a narrow trench 5 inches deep and folding the matting down into the trench, across the bottom of the trench, and then back up the trench to the existing ground. Backfill and compact the trench using the excavated material from the trench. Staple matting ends, junctions, and check slots at 10 inches on center. Staple matting outer edges, overlaps and the center of each matting strip at 3 feet on center. Install excelsior matting with the woven fabric on top.

f. Temporary Seeding: Within 48 hours after attaining the grading increment specified herein, provide seed, fertilizer, and mulch on graded areas when any of the following conditions occur:

1. Grading operations stop for an anticipated duration of 30 days or more.

2. Provide on the slopes of cuts and fill slopes for every 5 foot increment of vertical height of the cut or fill.

3. When it is impossible or impractical to bring an area to finish grade so that permanent seeding operations can be performed without serious disturbance from additional grading.

4. When an immediate cover is required to minimize erosion, or when erosion has occurred.

5. Provide on erosion control devices constructed using soil materials.

g. Temporary Seeding Operations: Temporary seeding operations shall consist of the following:

1. Procedure: Loosen subgrade to a minimum depth of 4 inches. Uniformly apply the seed, fertilizer, and mulch at the specified rates. Roll the seeded area after applying seed and fertilizer. Do not seed or fertilize when the County Engineer determines conditions are unfavorable. Provide water to promote turf growth.

2. Seed: Provide certified seed type and quantity (pounds per acre) as follows:

<table>
<thead>
<tr>
<th>SEED TYPE</th>
<th>MAY 1 - SEPT. 1</th>
<th>SEPT. 1 - MAY 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Rye</td>
<td>100 lbs/Ac</td>
<td>150 lbs/Ac</td>
</tr>
<tr>
<td>Common Bermuda</td>
<td>50 lbs/Ac</td>
<td>---</td>
</tr>
</tbody>
</table>

3. Fertilizer: Apply 10-10-10 fertilizer at the rate of 1000 pounds per acre.

4. Mulch: Spread hay or straw mulch at the rate of 1.5 tons per acre and anchor by crimping mulch with a disc. Provide in an air dried condition for placement with commercial mulch blowing equipment.
5. Alternate Bid: Temporary seeding shall be bid as an alternate bid item to be provided only as required above.

h. Maintenance and Inspection: Inspect erosion control devices after each rainfall and daily during prolonged rainfall. Remove sediment deposits after each rainfall or when sediment reaches approximately one-half the barrier height or storage capacity. Immediately repair damaged erosion control devices and damaged areas around and underneath the devices. Maintain erosion control devices to assure continued performance for their intended function. Modify the erosion control plan as required to control problem areas noticed after each inspection.

i. Clean Up: At the completion of the job, or when directed by the County Engineer, erosion control devices shall be removed. Erosion control devices and areas immediately adjacent to the device shall be filled (where applicable), shaped to drain and to blend into the surrounding contours, and grassed or landscaped as specified.

END OF SECTION
ASPHALT PAVING
SECTION 02510

RELATED DOCUMENTS: Attention is directed to related sections of the Specifications, as they
pertain to the guidelines, materials, and methods described in this section. Also, the General
Provisions and Special Provisions of the Contract shall apply to all Sections of the Work.

1.0  SCOPE

a. General: Work consists of providing all materials, labor and equipment required for complete
installation of asphaltic pavement including subgrade preparation, base and surface courses,
extruded concrete curb or curb and gutter with backfill, all as indicated on the drawings and/or
specified herein.

b. Replacement of Existing Pavement: The Contractor shall furnish all labor, materials,
equipment, services and duties to replace and restore all existing pavements in streets,
highways, paved shoulders, driveways or parking areas that are removed, destroyed or
damaged by construction. Pavement replacement includes base course replacement as
shown on the standard details.

c. Replacement of Existing Curbs, Gutters, and Sidewalks: The contractor shall furnish all labor,
materials, equipment, services and duties to replace and restore all existing curbs, gutters, and
sidewalks that are removed, damaged or destroyed by construction.

d. Standards for Replacement: In addition to other requirements of the Contract Documents, all
removal and replacement of pavements, sidewalks, curbs and gutters in state, city and county
roads shall comply with all requirements and provisions of the South Carolina Highway
Department or the Local City or County Engineer's Office, as applicable. All such work shall be
subject to inspection and approval by the South Carolina Highway Department or the Local
City or County Engineer's Office.

e. Traffic Control Requirements: The Contractor shall be responsible for conducting all work in
street, roads, and highways in accordance with any and all Regulatory Authorities' current
requirements. As a minimum, for any work in State Highways, the Contractor shall meet the
requirements of Traffic Controls for Street and Highway Construction and Maintenance
Operations, Part V of the South Carolina Manual on Uniform Traffic control Devices for Streets
and Highways - 1982, latest revision.

2.0  APPLICABLE PUBLICATIONS

The latest editions of the following publications apply to the specifications to the extent indicated
by references thereto:

a. South Carolina State Highway Department Standard Specification for Highway Construction
(SCSHDSSHC).

3.0  SUBGRADE PREPARATION

a. Preparation: Prior to constructing the base course, the subgrade shall conform to the grades
indicated on the drawings and any holes, ruts or depressions shall be filled with approved
material and compacted to requirements of SCSHDSSHC.

b. Frame, Cover, & Box Adjustment: The adjustment of water valve boxes and manhole frames
and covers to grade to conform to the finished street grade and cross section shall be as
follows:
1. **Water Lines**: Utility Contractor shall be responsible for setting all valve boxes to the proper height (finished grade of pavement) one time after base course has been placed. Valve boxes shall be set on a firm brick foundation a maximum of 24 hours prior to placement of finished surface course of the pavement. Any resetting of boxes, thereafter, shall be performed by the Paving Contractor at the time he applies the finished surface course. Any damage to water lines, valves, blow-offs or fire hydrants after the final setting of valve boxes by the Utility Contractor, shall be repaired or replaced by the Utility Contractor. It shall be the responsibility of the Utility Contractor to determine what caused the damage and recover any repair costs from the responsible party. Repair costs shall not be paid by the Owner.

2. **Sanitary Sewer Lines**: Manholes and/or appurtenance may be set to finished grade any time after base course has been placed and shall remain the responsibility of the Utility Contractor. Should a manhole and/or appurtenance be damaged after being set, it shall be the Utility Contractor's responsibility to repair or replace the manhole and/or appurtenances to finished grade. It shall be the responsibility of the Utility Contractor to determine what caused the damage to the manhole and/or appurtenance and recover any repair costs from the responsible party. Repair costs shall not be paid by the Owner.

   c. **Certification**: The subgrade shall be certified as required, by the Engineer prior to constructing base course.

### 4.0 BASE COURSE

a. **Stabilized Aggregate Base Course (with Primer)**: The base course thickness shall be as indicated on the drawings of stabilized aggregate base course Type 2, with MC-30 prime, when indicated, conforming to the requirements of Section 306, of the SCSHDSSHC except the entire paragraphs 306.15, 306.16, and 306.17 shall not apply.

b. **Hot Laid Asphaltic Aggregate Base Course**: The base course compacted thickness shall be as indicated on the drawings conforming to the requirement in Section 310 of the SCSHDSSHC except the entire paragraph 310.07 shall not apply. Minimum Marshall stability shall be 1,000 pounds.

c. **Tack Coat**: A tack coat shall be applied prior to the surface course when the asphalt aggregate base course is used. The application of the tack coat shall be as specified in subsection 401.22 of the SCSHDSSHC.

d. **Certification**: Regardless of the type base course used, the Engineer shall certify, as required, before and after all prime and sealer applications.

### 5.0 SURFACE COURSE

a. **Thickness**: The surface course shall be 1-1/2" (with stabilized aggregate base course) or 1" (with asphaltic aggregate base course) compacted thickness of hot laid asphaltic concrete surface course, Type 2, conforming to the requirements of Section 403 of the SCSHDSSHC, except paragraph 403.07 shall not apply.

b. **Weather Conditions**: The surface course shall be applied in strict accordance with weather restrictions as specified in Section 401, paragraph 401.14 of the same applicable specifications.

c. **Joints**: where new pavement abuts existing flexible pavement, cut back the existing surface course along uniform lines approximately 12 inches from the edge. Make a vertical cut and
extend cut full depth of the surface course. Prior to placing the surface course, paint the exposed edge of cold joints with a thin layer of bituminous tack coat.

d. Certification: During pavement application, the Engineer shall conduct necessary field observations and complete a "Construction Inspection Certification" and submit a copy to the Greenville County Engineering Department.

### 6.0 CONCRETE CURBS

a. **Concrete Curbs**: Concrete curbs shall be constructed as shown on the drawings. The material and installation shall be in accordance with applicable paragraphs of Section 720 of the SCSHDSSHC, and Section 02520.

b. **Backfilling Curbs**: It shall be the Contractor's responsibility to make sure that stockpiled topsoil is sufficient for backfilling curbs or to reflect any additional backfilling cost in the bid.

c. **Throat & Lid Adjustment**: The Contractor shall form the concrete curb to the throat of the catch basin and adjust lids and throats of catch basins to provide a 6 inch drainage opening.

### 7.0 CLEAN UP

a. **General Requirements**: In addition to other provisions of the Contract Documents, materials, debris, and surplus excavation shall be removed from rights-of-way and work areas. The rights-of-way and work areas shall be left neat, clean and serviceable.

### 8.0 PROJECT CLOSE OUT

a. **General Requirements**: The Contractor is responsible for maintaining all sanitary sewer frames and covers and water main valve boxes. Any frames, covers, or valve boxes damaged, displaced, misplaced, lost or broken during the paving operation will be replaced at the Contractor's expense.

END OF SECTION
STORM DRAINAGE
SECTION 02720

RELATED DOCUMENTS: Attention is directed to Divisions A (Bidding Requirements), B (Contract Documents), and 1 (General Requirements), which are binding in their entirety on this portion of the work and in particular to paragraphs concerning materials, workmanship, and substitutions.

General Conditions of the Contract and Special Conditions of the Contract shall apply to all Sections of the Work.

1.0 SCOPE

a. General Requirements: This section includes furnishing all labor, materials, and equipment for the installation of all drainage lines, including headwalls, inlets, catch basins, and other special appurtenances and structures as required for this project, shown on the drawings and specified herein.

b. Pipe Layout and Elevations: The layout of underground lines and invert elevations at governing points are shown on the drawings.

c. Inspection Required Before Backfilling: All pipe shall be inspected by the County inspector prior to backfilling operations.

d. Invert Elevations: All grades shown as pipe elevations are to the bottom of inside of pipe, unless otherwise noted.

e. Connections and Changes in Direction: All connections and changes of direction shall be made at inlets as shown.

f. Material Specifications: Where more than one material for an item is specified, the material used shall be as noted on the drawings or specified elsewhere in the Contract Documents.

g. Traffic Control: The Contractor shall be responsible for conducting all work in streets, roads, and highways in accordance with any and all Regulatory Authorities’ current requirements. As a minimum, for any work in State Highways, the Contractor shall meet the requirements of Traffic Controls for Street and Highways Construction and Maintenance Operations, Part V of the South Carolina Manual on Uniform Traffic Control Devices for Streets and Highways - 1982, latest revision.

2.0 MATERIALS

Note: All ASTM references shall be the latest version for the specific product.

a. Concrete: Concrete shall be 3000 psi mix using Portland Cement ASTM C-50 Type 1, sand ASTM C-33 and coarse aggregate ASTM C-33.

b. Rebar: Reinforcing bars shall conform to ASTM A 615, new billet steel, intermediate grade.

c. Water: Water shall be clean, free from oils, acids, alkalis, or organic or deleterious substances.

d. Reinforced Concrete Pipe (RCP): Reinforced concrete pipe shall be Tongue-and-Groove, Class III-Wall B, unless otherwise indicated on the drawings and shall conform to requirements of ASTM C-76.

e. Gray Iron Castings: Frames, solid covers and grates for drainage structures shall be gray iron conforming to ASTM A-48, size as indicated, free from blow holes, porosity, hard spots, shrinkage distortion or other defects, well cleaned and coated with asphalt paint which shall result in smooth
coating, tough and tenacious when cold, not tacky and not brittle. Bearing surface between frame and cover or grate shall be machined to prevent rocking and rattling.

f. Steps: Steps for manholes and drainage structures more than 4’ deep shall be manufacturer’s standard, spaced and embedded per OSHA requirements and approved by the Owner/Engineer.


h. Masonry: Masonry materials for drainage structures are detailed on plans as concrete brick. Concrete manhole block and precast sections are equally acceptable, subject to design approval by the Owner/Engineer.

   1. Concrete Brick: Concrete brick for storm inlets and catch basins shall be standard size, ASTM C-90, Class A.

   2. Concrete Block: Concrete block for storm drainage manholes shall comply with ASTM C-139.

   3. Precast Manholes: Precast concrete manhole sections shall be 4000 psi concrete, tongue and groove, steel fabric reinforced, cement mortar joints bitumastic sealed, in accordance with ASTM C-478. Precast manholes shall have a conical top, coursed with brick. Precast bottoms are permissible. Handling holes shall be plugged with mortar or stoppers.

   4. Portland Cement: Portland Cement shall be by an approved manufacturer, ASTM C-150, Type I.

   5. Sand: Sand shall comply with ASTM C-144.

   6. Lime: Lime shall be hydrated, ASTM C-207, Type N.

   7. Water: Water for masonry materials shall be potable, free of suspended matter, injurious amounts of acids, or alkalis, and containing no industrial or domestic wastes.

   8. Mortar: Mortar for drainage structures shall be 1 part of Portland Cement, 10% hydrated lime, 2 parts sand by volume, mixed with sufficient water to form a plastic mortar.

   9. Flexible Butyl Resin Sealant: Flexible Butyl Resin Sealant shall comply with AASHTO specification M-198 B, similar to Butyl Tite or ConSeal or approved equal.

i. PVC Pipe:

   1. Polyvinyl Chloride (PVC) Pipe and Fittings (10-Inch Diameter and Smaller): ASTM D-3033 or ASTM D-3034, SDR 35, with ends suitable for either solvent cement or elastomeric gasket joints.

   2. Polyvinyl Chloride (PVC) Perforated Pipe and Fittings: ASTM D-2729 with one-half inch diameter holes 5 to 8 inches on center, 120 degrees apart.

j. 2.17 Corrugated Aluminum Pipe and Fittings: Fed. Spec. WW-P-402 or AASHTO M-196, Class I or II, circular and arched; minimum thickness of metal shall be 18 gage.

k. 2.18 Corrugated Steel Pipe and Fittings: Fed. Spec. WW-P-405 and AASHTO M-36, Class I or II, circular and arched. Minimum thickness of metal shall be 18 gage. Pipe with annular corrugations shall be fully bituminous coated, half paved, for pipe diameters 18 inches and less. Pipe with helical corrugations shall be fully bituminous coated for pipe diameters 18 inches and less. Pipe larger than 18 inches diameter shall be fully bituminous coated and fully paved. Helical-corrugated pipe and fittings, when used with pipe joints, shall have a minimum of two factory-rolled annular corrugations at each end.
l. **Corrugated Metal Watertight Joints**: Fed. Spec. WW-P-405 for steel pipe and WW-P-402 for aluminum pipe. The circumference of the coupling bands shall be provided with a 3 inch lap minimum. For tightening each coupling band, provide four 1/2 inch galvanized steel bolts. Gaskets shall be cylindrical in shape, fabricated of 3/8 inch thick by 6-1/2 inch minimum width rubber conforming to ASTM D-1056. Diameter of cylindrical gasket shall be 10 percent less than the nominal pipe diameter. On riveted pipe and fittings, omit the longitudinal seam rivets which would be under the coupling band and weld that portion of the seam. Coupling bands shall be of one or two piece construction and bituminous coated when specified for the pipe.

m. **Filter Fabric**: Woven or nonwoven polypropylene, nylon or polyester containing stabilizers and/or inhibitors to make the fabric resistant to deterioration from ultraviolet light. Filter cloth shall be of the type recommended by its manufacturer for the intended application.

n. **Course Aggregate**: The aggregate shall consist of washed crushed stone or gravel conforming to SCHD “Standard Specifications for Highway Construction”, Section 406.09.

o. **Rip Rap**:

1. **Material Quality**: Stones shall be hard quarry of field stone and shall be of such quality that they will not disintegrate on exposure to water weathering. The stone shall be suitable in all respects for the purpose intended and shall conform with SCHD "Standard Specifications for Highway Construction", Section 804 except as modified herein.

2. **Hand Placed Rip Rap**: Stone for hand placing to a thickness of 12 inches shall range in weight from a minimum of 25 pounds to a maximum of 150 pounds. At least 50 percent of the stone pieces shall weigh more than 60 pounds. The stone pieces, except spalls, shall have a minimum dimension of at least 12 inches. Stone for hand placing to a thickness of 6 inches shall be no less than 3 inches in one dimension and no less than 6 inches in another dimension.

3. **Dumped Rip Rap**: Stone used in dumped rip rap shall be a quarried stone of reasonably uniform grading from the larger to the smaller pieces with the larger pieces preferable not above 24 inches in size.

4. **Grouted Rip Rap**: Grouted rip rap stone shall conform to the requirements for hand placed rip rap. The mortar for grout shall be composed of one part Portland Cement and three parts sand. The water content of the grout shall be such as to permit gravity flow into the interstices or voids with limited spading and brooming.

3.0 **PIPE TRENCH EXCAVATION**

a. **Classification**: Excavation shall be classified as defined in Section 02200.

b. **Required Trench Dimensions**: The trench shall be excavated by an approved method, to a depth to permit installation of the pipe along the lines and grades shown on the drawings. All side slopes for trench excavations shall be sloped by the Contractor to provide for safe working conditions by all personnel. The width of the trench shall be sufficient to allow thorough compacting of the backfill under and around the pipe. Where rock is encountered, the rock shall be removed to a depth below grade of at least 6 inches (6"), and the trench shall be refilled to grade with earth, sand, gravel, crushed stone or other suitable material as per the details on the drawings, firmly compacted to provide proper bedding for the pipe. Payment for rock will be to a depth of 6 inches below the invert and 12 inches on each side of the outside wall of the pipe.

c. **Removal of Unsuitable Material**: If directed by the Owner/Engineer, soft, mucky, or otherwise unstable or unsuitable material in the trench bottom shall be removed and replaced with crushed stone, or stabilized with crushed stone.
d. **Notification of Rock or Muck Excavation:** The Contractor shall notify the Owner/Engineer immediately if "Rock Excavation" or "Muck Excavation" is encountered. Rock removal or backfill shall not proceed until directed by the Owner/Engineer. Section 02200, Article 10 *Excavation* shall apply to "Rock Excavation" in trenches.

### 4.0 BRACING AND SHEETING

a. **General Requirements:** The sides of all trenches and excavations shall be adequately braced and sheeted to protect personnel, structures and property from slides, cave-ins, or settlement and to maintain the work clear of all obstructions. Bracing, shoring and sheeting shall comply with all applicable safety regulations governing the work. Full responsibility for the design, type and strength of shoring, sheeting and bracing shall rest with the Contractor.

### 5.0 DEWATERING

a. **General Requirements:** The Contractor shall do all pumping necessary for dewatering trenches and to provide safe, proper work conditions for installation of pipe and appurtenances. Pipe shall be installed on dry, stable trench bottoms.

### 6.0 BACKFILLING

a. **General Requirements:** Immediately after the pipes have been laid and checked, the trench shall be backfilled around the barrel of the pipe with fine materials, free from large stones deposited in level layers no more than 6 inches (6") in depth, each layer to be thoroughly tamped and compacted before the next layer is deposited. Care should be exercised to avoid any wedging action or eccentric action upon or against any pipe or structure and to avoid any disturbance or damage to the work.

b. **Backfilling in Traffic Areas:** In roads, across sidewalks and driveways and at other places subject to vehicular traffic or other superimposed loads, trench backfilling material as specified above shall be compacted in 6 inch (6") layers for the full depth of the trench and consolidated in such a manner to provide an unyielding foundation for vehicular traffic. Unless otherwise shown on the plans or required by governing authorities, the compaction density shall be equal to the density of the original adjacent material. However, the minimum compaction density shall be 95% of maximum density according to ASTM D-698, except that the upper 18 inches (18") under the roadway and parking lots shall be compacted to 100% of maximum density.

c. **Backfilling in Other Areas Subject to Superimposed Loads:** Material for the lower portion of the trench, above required pipe bedding material, shall consist of fine, loose earth, free of large clods, stones, vegetable matter, debris, and/or other objectionable material. It shall have a moisture content suitable for thorough compaction. It shall be deposited in horizontal layers not to exceed 6 inches (6") in thickness (before compaction) on each side of the pipe. Each layer shall be thoroughly tamped or rammed around the pipe with approved hand or power driven tools until enough material has been placed and compacted to provide a cover of not less than 18 inches (18") over the top of the pipe, or as otherwise shown on the plans or as directed by the County Engineer. Minimum compaction shall be 95% of maximum density according to ASTM D-698.

d. **Backfilling in Areas Not Subject to Superimposed Loads:** In all other areas not subject to superimposed loads, trench backfill may be placed from the level 18 inches (18") above the top of the pipe upward in 12 inch (12") layers with light compaction by mechanical tampers, and without damage to the pipe. Such backfill may contain coarser material than specified in Paragraph 6 (c) above, but shall be free from brush, trash, perishable matter, or stones larger than 6 inches (6") in any dimension.

e. **Maximum Stone Size:** No rock or boulders shall be used in the backfill for at least one foot (1') above the top of the pipe and in the upper 18 inches (18"). No stone larger than six inches (6") in its greatest dimension shall be used in the backfilling.
f. **Insufficient Fill Quantity**: Any deficiency in the quantity of material for backfilling the trenches, or for filling depressions caused by settlement, shall be supplied by the Contractor as part of the Scope of Work.

### 7.0 DRAINAGE LINE CONSTRUCTION

#### a. Installation of Pipe

1. **General Requirements**: Under no circumstances shall pipe be laid in water, on rock, or when trench conditions of weather is unsafe or unsuitable for such work. Each pipe shall be carefully examined by the Contractor before being laid, and any defective or damaged pipe shall be removed from the site. Proper equipment shall be provided for lowering sections of pipe into trenches. The pipe shall be laid true to line and grade, beginning at the lowest point with the spigot end pointing in the direction of flow, with uniform bearing upon the pipe bed for the full length of its barrel. Raising the pipe off the subgrade (bridging) to obtain the proper elevation will not be allowed. Each section shall be securely attached to the adjoining sections by the method required for the type of joint used. When laying concrete pipe, all joints shall be thoroughly wetted with water and then filled with a stiff mortar composed of one part Portland Cement and two parts sand. The mortar shall be placed so as to form a durable water tight joint. The lower portion of the hub or groove of each section of pipe laid shall be thoroughly wetted and plastered on the inside with cement mortar of sufficient thickness to bring the inner surfaces of the abutting pipes flush and even. As each section of the pipe is put in place, the remainder of the joint so formed shall be thoroughly wetted and filled with mortar, and sufficient additional mortar shall be used to form a bead along the outside of the joint. The inside of the joint shall be wiped and finished smoothly. After the initial set, the mortar on the outside shall be protected from the air and sun with thoroughly wetted earth or burlap cover.

2. **Optional Joint Sealant**: As an option, each joint connection of pipe shall be made watertight using a flexible Butyl Resin Sealant according to the manufacturer's specification.

3. **Reinstallation of Substandard Pipe**: Any pipe which is not in true alignment, is damaged, or which shows undue settlement after laying shall be removed and reinstalled without extra compensation.

4. **Joint and Fitting Installation**: Pipe joints and fittings shall be made up in strict accordance with the manufacturer's directions.

5. **Laser Alignment Control**: Laser beams shall be used for grading pipe trenches and placing pipe.

#### b. Drainage Structures

1. **General Requirements**: Drainage structures shall be constructed as shown on the drawings, walls of brick, plumb and true, bottoms of concrete.

2. **Brickwork**: All brick shall be wet before being laid in warm weather. Brick shall not be laid in freezing weather. The Contractor shall protect all brick work from the weather when storming or freezing; and at all times when necessary during the progress of the work.

3. **Setting Frames**: Cast iron frames shall be set in a full bed of mortar and to the elevation established by the Owner/Engineer.

4. **Backfilling**: Backfilling around drainage structures shall be accomplished by methods and requirements as specified for backfilling pipe trenches.

#### c. Headwalls

1. **General Requirements**: Headwalls shall be constructed at locations indicated on the drawings, with the headwall details. Concrete and reinforcing bars shall be as specified.
d. **Subdrain System**

1. **Procedure:** Refill excavations cut below indicated depth with granular fill during placement of granular fill. Trenches for underdrain shall be excavated to a width equal to 3 times the outside diameter of the pipe and to a depth as required to lay the pipe at the desired grade. Provide granular fill a minimum of one pipe diameter on each side of the pipe and on the bottom of the pipe. Place in 6 inch lifts up to the level indicated or directed by the Landscape Architect. The pipe shall be placed in 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 upstream. Perforated pipe shall be laid with the perforations on the underside of the pipe. Lateral connections shall be made with suitable tee, wye, bend, reducer, or increaser fittings as required. The upstream end not terminating in a structure shall be capped, plugged, or fitted as directed by the Landscape Architect.

2. **Wrapping Perforated Pipe:** Wrap PVC perforated pipe when indicated, with one layer of filter cloth, overlapping 6 inches at the longitudinal joint of the filter cloth. Wrap the filter cloth such that the edge of the outer layer points towards the bottom of the trench at the longitudinal joint and is in direct contact with the inner layer of the filter cloth. Obtain approval of filter cloth installation before placing fill. Place fill in a manner to prevent filter cloth damage or displacement.

3. **Wrapping Drainage Trench:** Provide a layer of filter cloth around the perimeter of the drainage trench. Filter cloth joints placed on the side of the drainage trench shall have the inner layer of filter cloth pointing towards the bottom of the trench. Unless specified otherwise, overlap filter cloth at joint a minimum of one foot. Repair damaged filter cloth by placing an additional layer of filter cloth over the damaged area, overlapping one foot in all directions.

e. **Placing Rip Rap**

1. **Hand Placed Rip Rap:** The thickness of hand placed rip rap shall be no less than that specified, measured perpendicular to the slope. The slope upon which this rip rap is to be placed shall conform with the cross section shown on the plans or as directed by the Landscape Architect. Depressions that may be filled in trimming and shaping shall be properly compacted. Rip Rap shall be firmly imbedded against the slope and the adjoining piece with the sides in contact and with well broken joints. The spaces between the larger pieces shall be filled with spalls of suitable size which shall be thoroughly rammed into place. The finished surface shall present an even, tight surface true to line, grade and section.

2. **Dumped Rip Rap:** Before placing of rip rap, the slopes and foundation trenches shall be constructed as necessary. The stone shall be handled or dumped into place so to produce a compact, well graded mass with a minimum percentage of voids. The material shall be placed to its full course thickness of 2 feet minimum, measured perpendicular to the slope, in one operation and in such manner that the slopes will be disturbed as little as possible. The larger pieces shall be well distributed and the finished layer of rock shall contain no segregated pockets of small pieces or groups of large pieces which would cause large open voids. Rearranging of the individual pieces by mechanical equipment, or by hand, may be required to the extent necessary to obtain a reasonably well graded distribution of sized as specified above. The surface of the completed rip rap shall be reasonably uniform in appearance, free from excessive humps or depressions.

3. **Grouted Rip Rap:** The aggregate, and method of placing the rip rap for grouted rip rap shall be as specified for hand placed rip rap. After the rip rap has been placed and approved, all interstices or voids between the stone shall be filled with mortar to a depth of not less than 4 inches below the surface of the stone. The face or surface of the stones shall be left reasonably free of grout. Plastering of the rip rap will not be permitted. The spaces between the stones shall be reasonably free of sand or other material and shall be wet during the placing of the grout.

f. **Cleaning, Inspection and Testing**

ATTACHMENT B: TECHNICAL SPECIFICATIONS
1. General Requirements: All storm lines, and drainage structures upon completion or at such time as directed shall be cleaned, inspected, and tested. The storm drain system shall have a true grade and line and shall be entirely clean and ready for use.

8.0 SITE CLEAN UP

a. General Requirements: The Contractor shall remove all excess material from excavations to points designated by the Owner/Engineer, and clean the site of the work of all debris collected during the construction.

END OF SECTION
1.0 SCOPE OF WORK:

a. General Requirements: Provide seedbed preparation, topsoiling, liming, fertilizing, seeding, sodding, and mulching of all newly graded finish earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

2.0 MATERIALS:

a. Fertilizer and Lime: Deliver materials to the site in original, unopened containers bearing the manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to State and Federal laws.

b. Fertilizer: Commercial grade, free flowing, uniform in composition granular fertilizer shall contain a minimum percentage by weight of 10 percent nitrogen, 10 percent available phosphoric acid, and 10 percent potash. Apply fertilizer at the rate of 1000 pounds per acre.

c. Lime: Lime shall be commercial agricultural limestone containing a minimum of 94 percent of total carbonates, 80 percent calcium, and 14 percent magnesium. Agricultural limestone shall be incorporated into the soil at the rate of 2000 pounds per acre.

d. Seed: Deliver seed to the site in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, weedseed content, and inert material. Label in conformance with USDA Federal Seed Act and applicable State seed laws. Wet moldy, or otherwise damaged seed will be rejected. Seed shall be State-certified seed and of the latest season's crop. Mix seed on site according to the following mixtures by weight:

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<tr>
<td>Annual Rye</td>
<td>90%</td>
<td>98%</td>
<td>0%</td>
</tr>
<tr>
<td>Bermuda (hulled), Spring</td>
<td>90%</td>
<td>98%</td>
<td>0%</td>
</tr>
<tr>
<td>Bermuda (unhulled), Fall</td>
<td>90%</td>
<td>98%</td>
<td>0%</td>
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<tr>
<td>Fall</td>
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<td></td>
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e. Mulch: Free from noxious weeds, mold, or other deleterious material. Provide wood cellulose fiber mulch when hydroseeding.
f. **Straw**: Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment or by hand.

g. **Wood Cellulose Fiber**: Processed to contain no growth or germination-inhibiting factors and dyed an appropriate color to facilitate visual metering of material's application. Composition on air-dry weight basis: 9-15 percent moisture, pH range from 3.5 to 5.0.

h. **Emulsified Asphalt Adhesive**: ASTM D-977, Grade RS-1. Use with straw mulch.

i. **Water**: Suitable quality for irrigation.

j. **Erosion Control Matting**: Provide as specified in Section 02270 - "Erosion Control".

### 3.0 SEEDING:

a. **Storage and Handling**: Store lime, fertilizer, and seed in dry locations away from contaminants. Protect seed from drying out. Do not drop or dump materials from vehicles.

b. **Soil Preparation**: At the completion of rough grading, spread topsoil over areas to be seeded or as indicated, to a minimum thickness of 4 inches. Topsoil shall be the material stripped from the site during the grading operations. Do not spread topsoil when frozen or excessively wet or dry. Areas not receiving topsoil shall be loosened to a minimum depth of 4 inches before agricultural lime, fertilizer or seed is applied. Lawn areas shall be fine graded to a smooth, positively draining slope, removing all stones over one inch.

c. **Seeding**: Seed shall be sown within 24 hours following the application of fertilizer and lime, and preparation of the seedbed. Do not seed when the ground is muddy, frozen, snow covered, or in any unsatisfactory condition for seeding. If special conditions exist that may warrant a variance in the above seeding dates or conditions, submit a written request to the County Engineer stating the special conditions and proposed variance.

   Sow seed with approved sowing equipment using one or a combination of the following methods at the rate of 130 pounds per acre. Sow 1/2 the seed in one direction, and sow the remainder at right angles to the first sowing. For Drill, Broadcast, and Drop Seeding, incorporate fertilizer and lime into the soil to a minimum depth of 6 inches prior to seeding. For Hydrosowing, apply liquid fertilizer in amounts sufficient to promote the specified stand of turf and apply lime manually during subgrade preparation.

d. **Drill Seeding**: Use cultipacker seeders or grass seed drills. Drill seed uniformly to a maximum depth of 1/4 inch in clayed soils and 1/2 inch in sandy soils. Cover seed by spiketooth harrow, cultipacker, or other approved devices.

e. **Broadcast Seeding and Drop Seeding**: Use Broadcast or Drop Seeders. Cover seed uniformly to a maximum depth of 1/4 inch in clayey soil and 1/2 inch in sandy soils. Cover seed by spike tooth harrow, raking, or other approved devices. Immediately after seeding, firm entire area, except for slopes in excess of 3 to 1, with a roller not exceeding 90 pounds for each foot of roller width.

f. **Hydrosowing**: Mix seed, fertilizer, and wood cellulose fiber in required amount of water to produce a homogeneous slurry. After seed, water, and fertilizer have been thoroughly mixed, add 200 pounds of wood cellulose fiber per acre (dry weight) and apply the slurry. Seed shall not remain in water containing fertilizer for more than one hour prior to application, unless otherwise approved. Keep liquid fertilizer agitated during application. Immediately following application of slurry mix, make separate application of wood cellulose mulch at the rate of 800 pounds (dry weight) per acre. When hydraulically sprayed on the ground, material shall form a
blotterlike cover impregnated uniformly with grass seed. Cover shall allow rainfall of applied water to percolate to underlying soil.

g. Mulch: Except when hydroseeding, spread straw mulch evenly at the rate of 1.5 tons per acre. Anchor by crimping mulch with a serrated disc or by spraying asphalt emulsion on the mulched surface at the rate of 5 gallons per 1000 square feet. Take precautionary measures to prevent asphalt materials from marking or defacing structures, pavements, utilities, or plantings and do not use asphalt near pedestrian traffic areas.

h. Erosion Control Matting: Install as specified in Section 02270 - "Erosion Control".

i. Protection of Seeded Areas: Immediately after seeding, protect the area against traffic or other use by erecting barricades, as required, and placing approved signs at appropriate intervals until final acceptance.

4.0 SODDING:

a. Preparation of Sodbed: Prepare sodbed as specified for Soil Preparation and apply fertilizer and lime as specified.

b. Laying of Sod: Place first line of sod along straight walk, edging, building face, or staked string, and butt following courses closely to preceding courses, taking care that lateral joints do not coincide. Place boards over sod for foot traffic and tamp all pieces to insure total sod contact with sodbed. Lightly topdress with topsoil and/or sand and work into joint between sod pieces using a broom or mat. Thoroughly soak sodded area with water. After roots have developed sufficiently to hold sod firmly in place, allow surface to become quite dry and then apply additional topdressing of topsoil or sand to true the lawn surface. The sod shall then be rolled with a lawn roller to finish surface.

c. Interim Maintenance: Perform all maintenance operations necessary to properly care for sodded areas until they can be maintained by the County without danger of dislodgment or other significant damage to sod pieces.

d. Replacement of Sod: All portions of sodded areas shall give evidence of development into a smooth, homogeneous lawn of the material specified and shall have roots sufficiently developed to hold sod pieces in place during County maintenance operations. Sod which does not properly root and develop into a homogeneous lawn shall be replaced at no extra cost using the procedures specified above.

RESTORATION, ESTABLISHMENT, & FINAL INSPECTION

a. Restoration: Restore to original condition existing lawn areas which were damaged during grassing operations. Keep at least one paved pedestrian access route and one paved vehicular access route to each building clean at all times. Clean other paving when work in adjacent areas is complete.

b. Establishment Period: The establishment period will be in effect until the seeded and sodded areas are mowed three times. During the establishment period, the Contractor shall mow the seeded and sodded areas to an average height of 2 inches whenever the average height of grass reaches 4 inches. The Contractor shall remove excess clippings, eradicate weeds, water, fertilize, overseed, and perform other operations necessary to promote growth.

c. Final Inspection and Acceptance: At the end of the establishment period, final inspection will be made upon written request at least 10 days prior to the anticipated date. Final acceptance will be based upon a satisfactory stand of grass, defined as 95 percent ground cover of the
specified species. The Contractor will repair any bare spots over 2 inches square due to uneven seed distribution, drought specified planting dates.

d. Reseeding and Repair: Any areas that require reseeding and/or refertilization will be designated by the County Engineer. Any damage following seeding or if seedings are destroyed, the portion affected shall be repaired to re-establishment condition and grade of the soil prior to original seeding, and then reseeded following the above specifications.

END OF SECTION
RELATED DOCUMENTS: Attention is directed to related sections of the Specifications, as they pertain to the guidelines, materials, and methods described in this section. Also, the General Provisions and Special Provisions of the Contract shall apply to all Sections of the Work.

1.0 SCOPE:

a. General Requirements: Provide the work of this section as indicated and specified as follows:

1. Preparation of planting areas, including topsoil and soil amendments for beds.
2. Furnishing and installation of plants and related materials.
3. Furnishing and installation of sod and related materials.
4. Fine grading and seeding of lawns.
5. Interim maintenance of all work until acceptance.

2.0 INSPECTIONS AND REPORTS:

a. Inspection Of Plant Material - all planting beds shall be prepared and all plant material shall be on site for an inspection by the County project manager prior to planting.

b. Punch list inspection - upon substantial completion of work.

c. Inspection for Acceptance of Work - upon completion of work.

d. Inspection for Final Approval - at end of Guaranty Period.

e. Report of Unfavorable Conditions - promptly notify the County project manager of adverse soil drainage conditions or other unfavorable conditions which would affect plant health. See later section concerning Subsurface Drainage Investigations.

3.0 TEMPORARY FACILITIES:

a. Protective Devices: Provide barricades, lanterns, signs, etc., necessary to protect the public from dangerous conditions resulting from work and to protect work from trespass.

b. Pavement Cleaning: Clean pavements at end of working day and before onset of inclement weather to prevent staining by or tracking of materials.

4.0 INSPECTION FOR ACCEPTANCE OF WORK:

a. Punch List Preparation: When work had been substantially completed; except for very minor items, Contractor shall notify the County project manager that work is ready for Punch List Inspections. The County project manager or representative, within a reasonable time, will check the work and prepare a Punch List stating observed deficiencies of work which need correction prior to Acceptance Inspection. The Punch List is for the Contractor's convenience and shall not relieve him of any obligations of the Contract. The County project manager may waive this requirement upon consultation with the Landscape Contractor.
b. Preparation for Acceptance Inspection(s): Contractor is expected to review Contract Documents and to inspect work to determine that all requirements have been met prior to Acceptance Inspection(s). All items on the County's punch list shall also have been attended to prior to Acceptance Inspection(s).

c. Acceptance of Work: After Inspection, Contractor will be notified of Acceptance of work in writing by the County provided work offered for acceptance comprises all required work entirely completed, but exclusive of possible future replacement of plants. Final payment will be due at this time.

5.0 GUARANTY, INSTRUCTIONS, INSPECTIONS, AND REPLACEMENTS:

a. Guaranty: All trees, shrubs, and ground covers shall be guaranteed to have acceptable appearance, to be alive and healthy, and to have exhibited vigorous normal growth for one full year from date of acceptance of the work. Seeded and sodded areas shall be guaranteed for 1 full year. All seeded areas shall have a vigorous stand comprising 100% coverage of all seeded areas. (No bare areas or washout areas).

b. Maintenance Instructions: Contractor shall provide to County two written copies each of adequate and reasonable maintenance procedures to be followed by the property owner(s) during the one year Guaranty Period.

c. Contractor's Inspections of Owner's Maintenance: During guaranty period, Contractor shall make periodic visits to site (especially during times of unusually severe weather conditions) to inspect plants installed and guaranteed by him. If he should determine that conditions such as maintenance which are not directly under his control are not sufficient to sustain plants, he shall promptly file written notice with the County project manager stating his findings and giving recommendations for corrections. If insufficient maintenance or other damaging condition continues, Contractor may request that the County inspect the site and make a determination of the situation.

e. Voiding of Plant Guaranty: If the County project manager concurs with Contractor after inspection, the Contractor may then file written notice with the County that unless proper maintenance or other necessary work has been completed by a reasonable given date, and sustained thereafter, the terms of Plant Guaranty will become null and void for all or stated portions of work.

f. Dead or other Unsatisfactory Plants: Remove promptly upon discovery, and during periodic visits; mark location with stake to facilitate future replacement.

g. Replacements: All replacements required under Guaranty shall be made at no cost to the County or private property owner during earliest favorable weather and season following original specifications unless directed otherwise by the County project manager. The County project manager shall be notified in writing if and when any replacements are made.

h. Satisfaction of Guaranty: Near end of Guaranty Period, the County project manager or representative shall determine if plants are in satisfactory condition. When all plants are acceptable to the County, the Contractor shall be notified and will be relieved of the responsibility of any further replacements.
6.0 GRADING FOR LAWNS:

a. Fine Grading: Fine grading of all lawn areas is to be performed by the Contractor.

7.0 SUBSURFACE DRAINAGE INVESTIGATION:

a. Required Tests: Subsurface drains have not been included as part of project, therefore, Contractor shall make such reasonable percolation tests approved by the County project manager as may be necessary to determine if subsurface drainage conditions in landscape areas are so poor as to support moisture conditions potentially fatal to plantings. The following procedure is recommended:

1. Wait at least 24 hours after rain and dig test pit 12 inches square to depth of bottom of plant bed, trench or pit; remove all loose soil (if standing water is visible, notify the County project manager).

2. Quickly fill pit bottom with 6 inches (approximately 3-1/4 gallons) of water.

3. Record length of time from filling until disappearance of water and divide number of minutes by 6 to give average of 1 inch fall.

4. Compare 1 inch fall time with following table:

<table>
<thead>
<tr>
<th>TIME INTERVAL</th>
<th>SOIL CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3 Minutes</td>
<td>Rapid Absorption</td>
</tr>
<tr>
<td>3 - 5 Minutes</td>
<td>Medium Absorption</td>
</tr>
<tr>
<td>5 - 30 Minutes</td>
<td>Slow Absorption</td>
</tr>
<tr>
<td>30 - 60 Minutes</td>
<td>Semi-Impervious</td>
</tr>
<tr>
<td>Over 60 Minutes</td>
<td>Impervious</td>
</tr>
</tbody>
</table>

b. Impervious or Semi-Impervious Condition: If soil is indicated to be semi-impervious or impervious, or if water is initially found in test pit, notify the County project manager before proceeding further.

c. Contractor Responsibility for Subsurface Water Damage: If Contractor does not make tests at representative locations and file records of results with the County project manager, or if he plants in areas shown to have poor drainage without written release from Owner, he shall be liable for any future guaranteed replacements due to subsurface water damage. If Contractor makes proper tests and files complete records indicating no semi-impervious or worse conditions, he will not be held responsible for future subsurface water damage to work of Contract. The County project manager may supervise testing at any time.

d. Relocation or Omission of Plants: Where subsurface conditions provide inadequate drainage and subsurface drainage system is not to be used as remedy, make reasonable relocation of plants as directed by the County project manager. Drainage conditions necessitating omission of plants shall be covered by Change Order.

e. Authorization of Drains as Extra Work: The County project manager or representative may authorize installation of subsurface drains to alleviate moisture problems at locations determined by the County project manager or representative. Perform work at agreed extra cost; begin work only after receipt of Change Order. Locations, appropriate materials, and construction techniques will be agreed upon prior to issuance of Change Order.
8.0 TOPSOIL:

a. **Source of Topsoil**: If obtained from off-site locations, use well-drained sites not previously stripped.

b. **Soil Characteristics**: Natural, friable, fertile, fine, loamy soil representative of topsoils in job site vicinity which produce heavy growth.

c. **Cleanliness**: Free of subsoil, objectionable weeds, litter, sods, stiff clay, stones larger than 1 inch diameter, stumps, roots, trash, toxic substances, or any matter harmful to plant growth or a hindrance to installation or maintenance.

d. **Moisture Content**: Not frozen or muddy when delivered or spread.

e. **Soil Depth**: Depth of topsoil shall depend on depth required to fine grade site to finish grade, but in no case shall the depth of topsoil be less than 4 inches in all areas shown on the plans to receive topsoil.

f. **Clean-Up**: Before the placement of any topsoil, all objectionable material shall be removed from the subgrade to a depth of not less than 12 inches.

g. **Placement**: Areas to receive topsoil (including all planting beds) to be disked and pulverized to a depth of 12-16” before the placement of topsoil.

9.0 SOIL CONDITIONING MATERIALS:

a. **Aluminum Sulfate**: Unadulterated, in manufacturer’s original unopened container labeled with analysis and net weight. Use to acidify soil (lower pH).

b. **Limestone**: Raw, ground agricultural limestone, containing at least 90 percent calcium carbonate; 90 percent shall pass No. 10 sieve and 50 percent pass No. 50 sieve. Use to decrease acidity of soil (raise pH).

c. **Peat**: Domestic or imported material consisting of at least 50 percent partially de-composed vegetable matter of natural occurrence, brown in color, clean, low in mineral and woody content, mildly acid, and either granulated or shredded.

10.0 FERTILIZERS AND LIME:

a. **Fertilizer**: Shall be 16-4-8 slow release fertilizer as manufactured by Pendleton Oil Mill, Pendleton, South Carolina at the rate of 30-lbs./1000-sq.ft. Other blends and manufacturers of fertilizer are acceptable provided they are approved by the County project manager before application. Fertilizer will be delivered mixed as specified, in standard unopened containers showing weight, analysis, and name of manufacturer. Fertilizer to be kept dry at all times to insure retention of effectiveness and free-flowing composition. Bulk delivery and spreading is acceptable when authorized by the County provided the Contractor supplies the County with written affidavit certifying weight and analysis of fertilizer.

b. **Lime**: Ground dolomitic limestone acceptable as agricultural limestone containing not less than 85% of total carbonates shall be applied at the rate of 50-lbs./1000 SF (not less than 2000 lbs per acre). Lime shall meet requirements of Section 810, SCHD Standard Specification, Edition 1973. Liming operation shall be sufficient to provide a pH of 6.5.
c. **Soil Incorporation**: In areas to be seeded or sodded, all of required lime (50-lbs./1000-sq.ft.) and fertilizer (50-lbs./1000-sq.ft.) shall be thoroughly and evenly incorporated with the soil to a minimum depth of 4 inches (4") by disking or other approved methods. In areas inaccessible to power equipment, it shall be incorporated with the soil by use of hand tools.

### 11.0 PLANT MATERIALS:


b. **Specifications**: Except when stated otherwise, specifications refer to standards for nursery stock, published by the American Association of Nurserymen, Washington, D.C. In case of conflict of stated measurements use greater requirement.

c. **Abbreviations**: Terms abbreviated hereinafter may include:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baled and Burlapped</td>
<td>B&amp;B</td>
</tr>
<tr>
<td>Division</td>
<td>DIV.</td>
</tr>
<tr>
<td>Espalier</td>
<td>ESP.</td>
</tr>
<tr>
<td>Clump</td>
<td>CLP.</td>
</tr>
<tr>
<td>Container Grown</td>
<td>CONT.</td>
</tr>
</tbody>
</table>

d. **Substitutions and Alternatives**: Plants specified shall be used unless sufficient evidence is submitted to the County project manager indicating plant is unavailable from sources east of Mississippi River and south of Kentucky and Virginia (unless source has been otherwise specified) and upon request of filed Change Order authorizing substitution.

e. **Substitution of B&B and Container Plants**: Root types may be freely substituted in case of B&B and Cont., all other specifications remaining unchanged.

f. **Alternate Material**: If alternate has been specified, it may be used only for entire quantity of original material without prior approval of the County project manager.

g. **Condition of Plants Supplied**: Well-shaped within normal habit of growth; sound, healthy, vigorous, of proper color and free from insects, pests, disease or physical injury.

### 12.0 SOD MATERIAL:

a. **Material Quality**: Sod shall be dense, well rooted sod composed of approximately 2" of roots and soil. It shall be free of weeds, debris or other undesirable grasses.

b. **Chemical Treatment**: Sod shall not be treated with any chemical herbicide or insecticide for a minimum of 7 days prior to cutting and transport to the site.

c. **Transport & Handling**: Sod must be kept moist for protection and to facilitate handling. Sod shall be rolled in tight rolls or laid on boards or planks and lifted and transported to storage piles or carried to the point of installation without breaking or tearing. No sod shall be dumped from vehicles, it must be loaded and unloaded by hand or by such methods as not to disturb root mat.

d. **Storage**: Sod shall not remain in storage piles longer than 24 hours and it shall be protected from wind and rain during such storage periods.
13.0 SEED MATERIAL

a. Material Quality: Grass Seed shall be certified, fresh, clean, new crop composed of the following varieties having the indicated quality.

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>%GERMINATION</th>
<th>%PURITY</th>
<th>NOXIOUS WEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentucky 31 Fescue</td>
<td>90%</td>
<td>98%</td>
<td>0%</td>
</tr>
<tr>
<td>Annual Rye</td>
<td>90%</td>
<td>98%</td>
<td>0%</td>
</tr>
<tr>
<td>Bermuda (hulled), Spring</td>
<td>90%</td>
<td>98%</td>
<td>0%</td>
</tr>
<tr>
<td>Bermuda (unhulled), Fall</td>
<td>90%</td>
<td>98%</td>
<td>0%</td>
</tr>
</tbody>
</table>

b. Standards and Requirements: All seed shall meet the requirements of the Seed Laws of the State of Georgia and the U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date bids are received.

c. Delivery and Storage: Seed shall be delivered in standard unopened containers with seed quality tag affixed. Seed which has become wet, moldy or damaged in transit or storage will not be acceptable.

d. Rate of Application: Grass areas shall be sown with Bermuda (hulled) at the rate of 3-lbs./1000-sq.ft., Annual Rye at the rate of 2-lbs./1000-sq.ft. and Kentucky 31 Fescue at the rate of 5-lbs./1000-sq.ft.

e. Hydraulic Seeding:
   1. Hydroseeding may be substituted for mechanical seeding with the County project manager's approval.
   2. Seed Rates:
      
      K-31 Fescue 15 lbs per 1000 SF
      Common Bermuda 5 lbs per 1000 SF
      
      3. Seed shall be sown using with 500 lbs. per acre approved hydromulch (i.e., Conwed, Conwed 2000, Weyerhaeuer, etc.).
      
      4. Hydromulch at 2000 lbs. per acre will then be applied in a separate operation.
      
      5. Any material applied to building, lighting fixtures, fencing or paving shall be removed at Contractor's expense.
      
      6. Note: Soil amendments will be applied mechanically and incorporated into the soil, not applied hydraulically.

14.0. STAKING, GUYING AND WRAPPING MATERIALS:

a. Tree Stakes: Sound, durable lumber with minimum uniform cross-section above point of 2 x 3 inches nominal dimensions, capable of withstanding above ground and underground conditions until Final Acceptance.

b. Guy Stakes: Sound, durable lumber with minimum uniform cross-section above point of 2 x 3 inches nominal dimensions, capable of withstanding above ground and underground conditions until Final Acceptance; or steel rod, minimum of 1/2 inch diameter.
c. **Guy Wires**: No. 12 gauge, malleable, galvanized iron wire, twisted into double strand, turn buckles optional.

d. **Protective Encasement**: Material to cover guy wire where looped around trees shall be two-ply, 1/2 inch minimum diameter reinforced rubber hose or approved comparable, non-injurious product, length sufficient to properly protect trunk.

e. **Trunk Wrapping Material**: Commercial tree wrapping product of bituminous impregnated tape, heavy crepe paper, or other approved material 4 to 12 inches wide.

f. **Twine**: Not less than a two ply jute twine or comparable non-metallic material of neat, inconspicuous appearance.

### 15.0 MULCH AND EDGING MATERIALS:

a. **Pine Straw Mulch**: Free of bark, sticks, pine cones.

b. **Materials Specified as Requiring Approval**: Secure representative sample(s) and arrange for Owner to inspect; if disapproved, resubmit additional sample(s) until approved; keep approved sample for reference until near end of project before incorporating it in work.

c. **Other Materials** will be inspected upon Contractor's request; otherwise, inspection may take place at any time. Maintain sample(s) for reference.

### 16.0 GENERAL SEEDING PROCEDURES:

a. **Seed Bed Preparation**: Soil to be leveled off and raked smooth for reception of seed.

b. **Fine Grading**: All seed beds shall be fine graded so as to insure positive drainage. Areas graded so as to allow "birdbaths" and accumulation of silt and/or water which is detrimental to the establishment of turf will not be acceptable.

c. **Seed Application**: Seeding shall take place immediately after the incorporation of lime and fertilizer into the soil. The required amount of seed should be applied by an accepted method utilizing a minimum of two (2) passes at right angles over the prescribed area.

d. **Rolling & Surface Compaction**: Immediately after seeding, the entire area shall be compacted by means of a culti-packer, roller or approved equipment weighing approximately 90-lbs. (90#) per linear foot roller. A pneumatic roller (not wobble-wheel) will be required if the soil is of such type that satisfactory operation cannot be obtained through use of a smooth or corrugated roller. Final rolling of the area shall be at right angles to existing slopes to prevent any erosion by runoff.

### 17.0 GENERAL SODDING PROCEDURES:

a. **Subgrade Preparation**: Preparation of the subgrade and fine grading shall be as outlined in **16.0 GENERAL SEEDING PROCEDURES**.

b. **Orientation**: Sod shall be rolled out in the orientation as directed by the County project manager or representative.

c. **Laying Sod**: The rolls of sod shall be lain to provide tight joints between abutting rolls. No pieces of sod of less than 12" square shall be lain in any location.
d. **Rolling**: After the sod is in place it shall be rolled with a roller consisting of a minimum of 50 lbs. per linear foot of roller length.

e. **Repair of Depressed Areas**: After rolling, any depressions of greater than 1" within an 18" radius shall be filled by removing the sod and placing soil in the depression sufficient to bring the sod up to grade. Any depressions under 1" in an 18" radius shall be brought to grade by a topdressing of sand.

f. **Watering**: The Contractor shall be responsible for keeping all sod watered during sodding operations. After all sod is in place, watering shall be the responsibility of the private property owner.

### 18.0 GENERAL PLANTING PROCEDURES:

a. **Preplanting Care**: Fully protect plants from damage by sun, wind, drought, water and other injurious conditions during transportation to site and during temporary storage before planting. Store B&B plants heeled-in individually; mulch around container plants. Water plants as necessary until planting time.

b. **Time of Planting**: Plant under favorable weather conditions. At option of and under full responsibility of Contractor, planting operations may be conducted under unseasonable conditions without additional compensation.

c. **Plant Quantities**: A Materials List is provided in Drawings summarizing quantities of major materials required. Under lump sum contract, Contractor shall be wholly responsible for confirming quantities shown on Drawings and on List, for promptly reporting any discrepancy to the County project manager before bidding and for performing all work required by the Drawings and Specifications.

d. **Plant Locations**: Place individual plant pits, beds and trenches as indicated in Drawings. Make reasonable adjustments as directed by the County project manager or representative. Staking of layout is recommended, but optional.

e. **Obstructions**:

   1. **At or Below Grade**: Remove where possible. Man-made obstructions such as functioning utilities, irrigation systems, etc. shall be avoided and not disturbed. Natural objects too massive to be removed with tractor mounted backhoe will require plant relocations as directed by the County project manager or representative.

   2. **Above Ground**: Report overhead interference such as telephone or power lines and relocate plantings as directed.

   3. **Repairs**: Promptly inform the County project manager of any damage and repair any damage to utilities, etc.

### 19.0 EXCAVATION OF PLANT LOCATION:

a. **Tree and Shrub Pits**: Dig pits with vertical sides to 6 inches deeper than depth of root ball, make diameter 1 foot greater than ball diameter of root spread; remove excavated subsoil from site.

b. **Trenches and Beds**: Dig out entire area to 6 inches below plant roots and to lines 6 inches outside root ball diameters or root spread; remove excavated subsoil from site. Beds for groundcovers shall be excavated at least 8 inches deep. All plant beds should be a constant
grade to facilitate the proper installation of metal edging. The County project manager or representative shall inspect each bed prior to planting.

20.0 PREPARATION AND PLACEMENT OF PLANTING SOIL MIXTURE:

a. Mixture for Trees and Shrubs: Homogenous blend of 1/3 (by volume) peat or finely ground pine bark and 2/3 topsoil with necessary soil conditioners added. Place and compact mixture to 6 inch depth in bottom of pit, bed or trench; reserve enough mixture for backfill. Incorporate fertilizer in proper season.

b. Groundcover Beds: Till and pulverize soil to depth of 12-16” inches. Add fertilizer according to common horticultural practice.

c. Treatment of Planting Beds with Post-Emergent Herbicides: All planting beds which have existing vegetative cover shall be treated with an approved post-emergent herbicide prior to bed preparation. The herbicide shall be Round-Up or Paraquat (or approved equal) according to season. Follow manufacturer’s recommendations as to rate and method of application with special emphasis on the time the chemical must be in place prior to a rain. The herbicides shall be used strictly in accordance with the manufacturer’s directions with respect to the effective and safe application of such toxic substances.

d. Treatment of Planting Beds with Pre-Emergent Herbicides: After bed preparation, all planting beds shall be treated with Ronstar G., Treflan or a comparable pre-emergent herbicide, that will not harm the type plants to be installed in the beds. These herbicides shall be used strictly in accordance with manufacturer’s directions as to application quantity, methods and precautions to be used for effectively and safely applying such a toxic product.

21.0 SETTING TREES AND SHRUBS:

a. Orientation: Place each plant in vertical position and rotate to obtain visual appearance and proper relationship to nearby buildings or adjacent plants.

b. Root and Ball Preparation: Remove container from Cont. plants and lightly scarify sides of the root mass. Remove burlap from around trunk of B&B material.

c. Crown to Grade Relationship: After settlement, crown of root ball shall remain a minimum of 2 inches above average finished grade with compacted planting soil sloping away from trunk or stem and blending with finished grade.

d. Backfill: Fill remaining hole with planting soil mix; compact lightly and create saucer to trap water. Soak pit, trench or bed thoroughly with water soon after planting.

22.0 WRAPPING AND STAKING OR GUYING OF TREES:

a. Time: Stake or guy each tree promptly after planting.

b. Wrapping: Use on high-branched trees; not required on trees branched to ground. Apply insecticide to trunk and then begin wrapping at ground; neatly and snugly spiral wrapping upward with minimum 1-1/2 inch overlap; stop above lowest branch. Tie wrapping securely but not tight enough to constrain trunk growth. Do not wrap River Birch.

c. Trees, 2” Caliper or Less: Use one or more stakes of length sufficient for height and spread of tree (top of stake shall be at least 4 feet above grade for safety reasons) and locate per Drawings. Do not sever roots. Secure tree to stake with hose encased wire or other approved
tie device; keep guys or ties as low as possible on trunk to encourage more rapid root establishment.

d. **Trees over 2” Caliper**: Use 3-point support system per Drawings. Method is optional unless only a staking or only a guying detail is shown; then use only method detailed.

e. **Wires**: Encase each wire encircling a tree trunk with hose or other protective device to prevent bark abrasion. Tighten wires and maintain them taut; turnbuckle use is optional.

f. **Flags**: Place warning flags on guy wires in areas of pedestrian or maintenance hazard.

g. **Removal of Stakes and Guys**: Remove as soon as danger of overturning has passed.

### 23.0 SETTING GROUNDCOVERS:

a. **Shaping Bed**: Finish grade per Drawings to required contours and provide positive surface drainage.

b. **Plant Spacing**: Unless otherwise specified, center to center spacing of plants refers to planting bed surface plane, **NOT** a horizontal plane. Quantity estimates include allowances for such variation.

c. **Root Preparation**: Remove container plants and scarify roots in several places before placing in position.

d. **Position of Plants**: Place each plant in vertical position or in a manner that will provide best coverage. On steep slopes, this may mean axis of plant is not vertical.

e. **Crown to Grade Relationship**: Place crown high enough so plant will not be smothered by mulch. Slope planting mix upward from finished grade to meet crown.

f. **Backfilling and Watering**: Fill around roots with planting soil mixture and firmly compact, and form water saucer. Soak bed thoroughly with water soon after planting.

g. **Mulching Groundcovers on Steep Slopes**: After planting apply pine straw mulch 4” thick.

### 24.0 FERTILIZER APPLICATIONS:

a. **Time of Application**: Apply at time of planting or promptly thereafter; except do not apply during period of August 16th through March 1st unless otherwise directed by Landscape Architect.

b. **Methods of Application**:

   1. **Commercial Granules**: Spread on soil surface (under mulch) or preferably mix into planting soil at specified rate. Uniform distribution is essential.

   2. **Tablets**: Place as recommended by manufacturer.

c. **Rates of Application**: Follow manufacturer's recommendations based upon plant sizes.
25.0 PLACEMENT OF MULCH:

a. **Time and Purpose**: Place mulch to required uniform depth soon after planting to prevent drying of planting soil around roots. Unless other operations such as top dressing or fertilization necessitate delay, mulch promptly after planting. Do not delay more than 3 days after plants have been set.

b. **Mulch Depths**:

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Depth Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREES AND SHRUBS</td>
<td>4” Depth, over entire saucer, bed, or trench</td>
</tr>
<tr>
<td>GROUNDCOVERS</td>
<td>2” Depth</td>
</tr>
<tr>
<td>PLANTING BEDS</td>
<td>4” Depth</td>
</tr>
</tbody>
</table>

26.0 PRUNING AND REPAIR OF PLANTS:

a. **Time and Purpose**: Prior to inspection for Acceptance of work, perform minor pruning of plants to remove any growth damaged during handling, to compensate for root loss, or to enhance visual appearance as instructed by the County project manager or representative.

b. **Care of Cuts and Abrasions**: Where surface of any pruning cut exceeds 3/4 inch diameter, thoroughly apply tree wound paint. Where minor abrasions into living tissue may exist, cut back injured cambium per good arboriculture practice and thoroughly apply tree wound dressing.

27.0 REPLACEMENT OF PLANTS:

Any plants to be replaced prior to Acceptance of work or under terms of Guaranty shall be installed following procedure set forth above.

a. **Standard for Acceptance of Plantings**: Each plant shall be of proper type, properly installed and maintained in good health. All water saucers and beds shall be neatly mulched and free of weeds and erosion damage.

b. **Clean-Up, Protection, and Repairs**: During landscape work, protect materials from loss, damage and deterioration during storage, installation and maintenance periods. Protect from unauthorized persons (trespassers) and landscape operations. Wherever possible, avoid replacement of damaged work, by treating or repairing to restore work to an acceptable condition as directed by the County project manager or representative.

END OF SECTION