

Contract Documents and Specifications

For

Carolina Tennis Center Erosion Repairs

For

University of South Carolina

Project # CP00423791

June 15, 2015

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Project Name: Carolina Tennis Center Erosion Repairs

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SE-311

INVITATION FOR MINOR CONSTRUCTION QUOTES

PROJECT NAME: Carolina Tennis Center Erosion RepairPROJECT NUMBER: CP00423791PROJECT LOCATION: 1300 Block of Heyward Street, Columbia SCBID SECURITY REQUIRED? Yes No PERFORMANCE BOND REQUIRED? Yes No PAYMENT BOND REQUIRED? Yes No CONSTRUCTION COST RANGE: \$ < \$ 30,000.DESCRIPTION OF PROJECT: Regrade hillside slope, add catch basin and storm drain line to alleviate erosion issues by Carolina Tennis Center. Small and minority business participation is encouraged.BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM: purchasing.sc.edu; Facilities/Const Solicitations and AwardsPLAN DEPOSIT AMOUNT: \$ \$0.00 IS DEPOSIT REFUNDABLE Yes No N/A

Bidders must obtain Bidding Documents/Plans from the above listed source(s) to be listed as an official plan holder. Only those Bidding Documents/Plans obtained from the above listed source(s) are official. Bidders rely on copies of Bidding Documents/Plans obtained from any other source at their own risk.

IN ADDITION TO THE ABOVE OFFICIAL SOURCE(S), BIDDING DOCUMENTS/PLANS ARE ALSO AVAILABLE AT:
N/A*All questions & correspondence concerning this Invitation shall be addressed to the A-E.*A-E NAME: AECOMA-E CONTACT: Bryan ThomasA-E ADDRESS: Street/PO Box: 101 Research DriveCity: ColumbiaState: SCZIP: 29203-EMAIL: bryan.thomas@aecom.comTELEPHONE: 803-254-4400FAX: 803-771-6676AGENCY: University of South CarolinaAGENCY PROJECT COORDINATOR: Juaquana BrookinsADDRESS: Street/PO Box: 743 Greene StreetCity: ColumbiaState: SCZIP: 29208-EMAIL: jbrookin@fmc.sc.eduTELEPHONE: 803-777-3596FAX: 803-777-7334PRE-QUOTE CONFERENCE: Yes No MANDATORY ATTENDANCE: Yes No PRE-QUOTE DATE: 6/24/2015 TIME: 11am PLACE: 743 Greene St, Cola, SC 29208, Conf rm 53QUOTE CLOSING DATE: 7/1/2015 TIME: 3pm PLACE: 743 Greene St, Cola, SC 29208, Conf rm 53

QUOTE DELIVERY ADDRESSES:

HAND-DELIVERY:

Attn: Juaquana Brookins743 Greene StColumbia, SC 29208

MAIL SERVICE:

Attn: Juaquana Brookins743 Greene StColumbia, SC 29208APPROVED BY: _____ DATE: 6/15/2015*(Agency Project Coordinator)*

SE-331
QUOTE FORM

Quotes shall be submitted only on SE-331.

QUOTE SUBMITTED BY: _____
(Offeror's Name)

QUOTE SUBMITTED TO: University of South Carolina
(Owner's Name)

FOR: PROJECT NAME: Carolina Tennis Center Erosion Repairs
PROJECT NUMBER: CP00423791

OFFER

- In response to the Invitation for Minor Construction Quotes, and in compliance with the Instructions to Bidders for the above-named Project, the undersigned OFFEROR proposes and agrees, if this Quote is accepted, to enter into a Contract with the Owner in the form included in the Solicitation Documents, and to perform all Work as specified or indicated in the Solicitation Documents, for the prices and within the time frames indicated in the Solicitation and in accordance with the other terms and conditions stated.
- Pursuant to Section 11-32-3030(1) of the SC Code of Laws, as amended, OFFEROR has submitted Bid Security as follows in the amount and form required by the Solicitation Documents:

Bid Bond with Power of Attorney Electronic Bid Bond Cashier's Check

(Bidder check one)

- OFFEROR acknowledges the receipt of the following Addenda to the Solicitation documents and has incorporated the effects of said Addenda into its Quote (Bidder, check only boxes that apply.):

ADDENDA: #1 #2 #3 #4 #5

- OFFEROR agrees that this Quote, including all bid alternates, if any, may not be revoked or withdrawn after the opening of quotes, and shall remain open for acceptance for a period of 60 Days following the Quote Date, or for such longer period of time that OFFEROR may agree to in writing upon request of the Owner.
- OFFEROR agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the amount of \$_____ for each calendar day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted Contract Time for Substantial Completion, as provided in the Contract Documents.
- OFFEROR herewith submits its offer to provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fee, permits, licenses and applicable taxes necessary to complete the following items of construction work:

6.1 BASE QUOTE \$ _____
(enter BASE QUOTE in figures only)

6.1.1 ALTERNATE NO. 1 \$ _____ to be ADDED / DEDUCTED from BASE QUOTE.
(circle one)

6.1.2 ALTERNATE NO. 2 \$ _____ to be ADDED / DEDUCTED from BASE QUOTE.
(circle one)

SC Contractor's License Number: _____

Classification(s) & Limits: _____

Address: _____

Telephone/Fax _____

E-mail _____

This Quote is hereby submitted on behalf of the Offeror named above.

BY: _____
(Signature of Offeror's Representative)

(Print or Type Name of Offeror's Representative)

TITLE: _____

USC SUPPLEMENTAL GENERAL CONDITIONS
FOR CONSTRUCTION PROJECTS

1. Contractor's employees shall take all reasonable means not to interrupt the flow of student traffic in building corridors, lobbies and stairs. All necessary and reasonable safety precautions shall be taken to prevent injury to building occupants while transporting materials and equipment through the building to the work area. Providing safe, accessible, plywood pedestrian ways around construction may be required if a suitable alternative route is not available.
2. Fraternalization between Contractor's employees and USC students, faculty or staff is strictly prohibited-zero tolerance!
3. USC will not tolerate rude, abusive or degrading behavior on the job site. Heckling and cat-calling directed toward students, faculty or staff or any other person on USC property is strictly prohibited. Any contractor whose employees violate this requirement will be assessed a fine of up to \$500 per violation.
4. Contractor's employees must adhere to the University's policy of maintaining a drug-free and smoke-free/tobacco free workplace.
5. Contractor must sign a Contractor Key Receipt/Return form before any keys are issued. Keys must be returned immediately upon the completion of the work. The Contractor will bear the cost of any re-keying necessary due to the loss of or failure to return keys.
6. A welding permit must be issued by the University Fire Marshall before any welding can begin inside a building. Project Manager will coordinate.
7. Contractor must notify the University immediately upon the discovery of suspect material such as those potentially containing asbestos or other such hazardous materials. These materials **must not** be disturbed until approved by the USC Project Manager.
8. At the beginning of the project, the USC Project Manager will establish the Contractor's lay-down area. This area will also be used for the Contractor's work vehicles. No personal vehicles will be allowed in this area, or in any areas surrounding the construction site that are not regular or authorized parking lots. Personal vehicles must be parked in the perimeter parking lots. Parking permits can be obtained at the USC Parking Office located in the Pendleton Street parking garage. The lay down area will be clearly identified to the contractor by the PM, with a sketch or drawing provided to Parking. In turn, the contractor will mark off this area with a sign containing the project name, PM name, Contractor name and contact number, and end date. Where this area is subject to foot traffic, protective barriers will be provided as specified by the PM. The area will be maintained in a neat and orderly fashion. Vehicles parked in the lay down area (or designated parking areas) will be clearly marked or display a CPC furnished placard for identification.

9. Contractor will be responsible for providing its own temporary toilet facilities, unless prior arrangements are made with the USC Project Manager.
10. Use of USC communications facilities (telephones, computers, etc.) by the Contractor is prohibited, unless prior arrangements are made with the USC Project Manager.
11. For all projects over \$100,000, including IDC' s, an SE-395, Contractor Performance Evaluation, will be completed by the USC Project Manager and reviewed with the GC at the beginning of the project and a copy given to the GC. At the end of the project the form will be completed and a Construction Performance rating will be established.
12. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied at least 1 times per week. Construction waste must not be placed in University dumpsters. THE CONSTRUCTION SITE MUST BE THOROUGHLY CLEANED WITH ALL TRASH PICKED UP AND PROPERLY DISPOSED OF ON A DAILY BASIS AND THE SITE MUST BE LEFT IN A SAFE AND SANITARY CONDITION EACH DAY. THE UNIVERSITY WILL INSPECT JOB SITES REGULARLY AND WILL FINE ANY CONTRACTOR FOUND TO BE IN VIOLATION OF THIS REQUIREMENT AN AMOUNT OF UP TO \$1,000 PER VIOLATION.
13. **Contractor must provide all O&M manuals, as-built drawings, and training of USC personnel on new equipment, controls, etc. prior to Substantial Completion. Final payment will not be made until this is completed.**
14. The contractor will comply with all regulations set forth by OSHA and SCDHEC. Contractor must also adhere to USC's internal policies and procedures (available by request). As requested, the contractor will submit all Safety Programs and Certificates of Insurance to the University for review.
15. Tree protection fencing is required to protect existing trees and other landscape features to be preserved within a construction area. The limits of this fence will be evaluated for each situation with the consultant, USC Arborist and USC Project Manager. The tree protection fence shall be 5' high chain link fence unless otherwise approved by USC Project Manager. No entry or materials storage will be allowed inside the tree protection zone. A 4" layer of mulch shall be placed over the tree protection area to maintain moisture in the root zone.
16. Where it is necessary to cross walks, tree root zones (i.e., under canopy) or lawns the following measures shall be taken: For single loads up to 9,000 lbs., a 3/4" minimum plywood base shall be placed over areas impacted. For single loads over 9,000 lbs., two layers of 3/4" plywood is required.
17. For projects requiring heavy loads to cross walks tree root zones or lawns. A construction entry road consisting of 10' X 16' oak logging mates on 12" coarse, chipped, hardwood base. Mulch and logging mats shall be supplemented throughout the project to keep

matting structurally functional.

18. Any damage to existing landscaping (including lawn areas) will be remediated before final payment is made.
19. Orange safety fence to be provided by the contractor. (USC Arborist, Kevin Curtis may be contacted at 777-0033 or 315-0319)

Campus Vehicle Expectations

1. All motorized vehicles on the University campus are expected to travel and park on roadways and/or in parking stalls.
2. All motorized vehicle traffic on USC walkways must first receive the Landscape Manager=s authorization. Violators may be subject to fines and penalties.
3. All motorized vehicles that leak or drip liquids are prohibited from traveling or parking on walks or landscaped areas.
4. Contractors, vendors, and delivery personnel are required to obtain prior parking authorization before parking in a designated space. Violators may be subject to fines and/or penalties. See Item 10 below.
5. Drivers of equipment or motor vehicles that damage university hardscape or landscape will be held personally responsible for damages and restoration expense.
6. Vehicle drivers who park on landscape or drives must be able to produce written evidence of need or emergency requiring parking on same.
7. All vehicles parked on landscape, hardscape, or in the process of service delivery, must display adequate safety devices, i.e. flashing lights, cones, signage, etc.
8. All drivers of equipment and vehicles will be respectful of University landscape, equipment, structures, fixtures and signage.
9. All incidents of property damage will be reported to Parking Services or the Work Management Center.
10. Parking on campus is restricted to spaces designated by Parking Services at the beginning of the project. Once the project manager and contractor agree on how many spaces are needed, the project manager will obtain a placard for each vehicle. This placard must be hung from the mirror of the vehicle, otherwise a ticket will be issued and these tickets cannot be “fixed”. Parking spaces are restricted to work vehicles only; no personal vehicles.

Project Name: Carolina Tennis Center Erosion Repairs

Project Number: CP00423791

University of South Carolina

CONTRACTOR'S ONE YEAR GUARANTEE

STATE OF _____

COUNTY OF _____

WE _____
as General Contractor on the above-named project, do hereby guarantee that all work executed under the requirements of the Contract Documents shall be free from defects due to faulty materials and /or workmanship for a period of one (1) year from date of acceptance of the work by the Owner and/or Architect/Engineer; and hereby agree to remedy defects due to faulty materials and/or workmanship, and pay for any damage resulting wherefrom, at no cost to the Owner, provided; however, that the following are excluded from this guarantee;

Defects or failures resulting from abuse by Owner.

Damage caused by fire, tornado, hail, hurricane, acts of God, wars, riots, or civil commotion.

[Name of Contracting Firm]

*By _____

Title _____

*Must be executed by an office of the Contracting Firm.

SWORN TO before me this _____ day of _____, 2____ (seal)

_____ State

My commission expires _____

SECTION 02060

DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Demolish and remove from the site those items so indicated on the Drawings, including parking and roadway areas, miscellaneous structures, poles, walls, utilities, signs, etc.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with the International Building Code with due regard to the protection of the public and the provision of safeguards during the performance of the work.
- C. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.
- D. Comply with requirements of governmental agencies having jurisdiction.
- E. Contractor is responsible for being aware of and complying with Asbestos NESHAP regulations, as well as other applicable codes, laws and regulations.
 - 1. The Owner is to be notified immediately upon discovery of asbestos materials.

PART 2 - PRODUCTS

- A. No products are required in this Section.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the safe, timely, and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 DEMOLITION

- A. General:
 - 1. Prior to start of demolition, carefully study the Drawings and these Specifications.
 - 2. In company with the Owner's representative, visit the site and verify the extent of demolition to be performed under this Contract.
- B. Using only the means and equipment approved for this purpose by the governmental agencies having jurisdiction, demolish and completely remove from the job site the existing construction designated to be removed.
 - 1. Shut off, cap, reroute, and otherwise protect existing public utility lines in accordance with the requirements of the public agency or utility having jurisdiction.
 - 2. Remove rocks larger than 3" diameter, roots, wood, and debris.
- C. Demolished material shall be considered to be property of the Contractor and shall be completely removed from the job site.
- D. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- E. Use any means necessary to protect the public safety during the demolition process.
- F. Use whatever means necessary to protect the adjacent structures from damage during demolition.
- G. Protection of trees: It may become desirable to save certain trees in areas where cut or fill is eighteen inches or less and in parking areas. Consequently, the Contractor shall obtain approval from Engineer prior to removal of significant trees from such areas. The Contractor shall protect existing trees to remain during construction by constructing barricades around such trees as directed.
- H. Erosion control: Construct and maintain erosion control as shown on the Drawings and in accordance with the local County's requirements.

3.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the lump sum price bid for the project.

END OF SECTION

SECTION 02210

SITE GRADING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Cut, fill, excavate, backfill, compact and grade the site as necessary to bring the roads, drives, building sites, paved areas and open areas to the lines and grades shown on the drawings.
1. The work includes, but is not necessarily limited to:
 - a. Roadway, parking area, drive and walk subgrade preparation.
 - b. Excavations and formations of embankments.
 - c. Dressing of graded areas, shoulders and ditches.
 2. Classification: All excavation is unclassified and excavation of every description, regardless of material encountered within the grading limits of the project, shall be performed to the lines and grades indicated.
- B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 3. Section 02221 - Trenching, Backfilling for Utilities.
- C. Definitions:
1. Open areas: Open areas shall be those areas that do not include building sites, paved areas, street right-of-way and parking areas.
 2. Maximum density: Maximum weight in pounds per cubic foot of a specific material.
 3. Optimum moisture: Percentage of water in a specific material at maximum density.
 4. Rock excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery. To be considered as rock excavation, the material shall be continuous; individual boulders or rocks in soil will not be considered rock excavation.
 5. Muck: Materials unsuitable for foundation because of organic content, saturation to the extent that it is somewhat fluid and must be removed by dragline, dredge or other special equipment, are designated as muck. No extra payment will be made for muck removal.
 6. Unsuitable material: Unsuitable material is defined as earth material unsatisfactory for its intended use and as classified by the soils technician. In addition to organic matter, sod, muck, roots and rubbish, highly plastic clay soils of the CH and MH descriptions, and organic soils of the OL and OH descriptions, as defined in the Unified Soil Classification System shall be considered as unsuitable material.

7. Suitable material: Where the term suitable material is used in specification sections pertaining to earthwork, it means earth or materials designated as being suitable for their intended use by soils technicians or the Engineer. Suitable material shall be designated as meeting the requirements of the Unified Soil Classification System types SW, GW, GC, SC, SM, ML, CL or as designated in these specifications.
 8. Select material: Select material is defined as granular material to be used where indicated on the drawings or where specified herein consisting of soils conforming to the Unified Soil Classification types SW, SM, GW or GM or as otherwise approved by the Engineer as select fill. Select material shall contain no stones or rubble larger than 1-1/2" in diameter.
 9. Crushed stone (gravel): Crushed stone shall be No. 57 aggregate or equal conforming to ASTM C-33.
 10. Excavation: Excavation is defined as unclassified excavation of every description regardless of materials encountered.
- D. The Contractor must determine for himself the volume of material required by the site.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with requirements of governmental agencies having jurisdiction.
- C. A testing laboratory retained by the Owner will make such tests as are deemed advisable. The Contractor shall schedule his work so as to permit a reasonable time for testing before placing succeeding lifts of fill material and shall keep the laboratory informed of his progress. The cost of the initial tests shall be paid for by the Owner. Subsequent tests required as a result of improper compaction shall be paid for by the Contractor.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

1.4 JOB CONDITIONS

- A. Notification of intent to excavate:
 1. South Carolina Underground Utility Damage Prevention Act (S.C. Code Ann, 58-35-10, CT-SEQ, Supp. 1978) requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty of up to one thousand dollars (\$1,000) for each violation of the Act.
 2. Notification of intent to excavate may be given by calling this toll free number: 1-800-922-0983.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Soil material used as fill, backfill, subgrade for structures or pavements, embankments, or site grading shall consist of suitable material as found available on site until such supply of on-site material is depleted.
 - 1. Provide suitable material free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-1/2" in their greatest dimension.
 - 2. Do not permit rocks having a dimension greater than 1" in the upper 6" of fill or embankment.
- B. Should the quantity of suitable on-site material be insufficient to complete the work, suitable borrow material as approved by the Engineer shall be provided by the Contractor at no additional expense to the Owner.
- C. Select materials may be provided from on-site if acceptable material as approved by the Engineer is available on site. Otherwise approved select material shall be provided by the Contractor from an off-site source.

2.2 TOPSOIL

- A. Use topsoil consisting of material removed from the top 3" to 6" of existing on-site soils.
- B. Use topsoil containing no stones, roots or large clods of soil.
- C. Stockpile topsoil separate from other excavated material.

2.3 WEED KILLER

- A. Provide a dry, free-flowing, dust free chemical compound, soluble in water, capable of inhibiting growth of vegetation and approved for use on this work by governmental agencies having jurisdiction.

2.4 EQUIPMENT

- A. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner without undue waste or damage of material.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Clearing and grubbing: Clear and grub areas to be graded prior to commencement of the grading operations.
- B. Where so directed by the Owner, protect and leave standing designated desirable trees.

- C. Complete any demolition and/or removal work as may be required prior to grading operations.
- D. Dispose of all clearing, grubbing and demolition debris and other deleterious material off the project site. Vegetation, roots, brush, rubbish, stumps, etc. may be burned on-site where permitted by local authorities and regulations and approved by the Engineer.
- E. Topsoil: Strip topsoil to a depth of 3" to 6" without contamination from the subsoil and stockpile topsoil separate from other excavated materials.
 - 1. Transport and deposit topsoil in storage piles convenient to areas that are to receive topsoil or in other locations as indicated or approved by the Engineer.
 - 2. Deposit topsoil in areas that are already graded and will not be disturbed by on-going construction.
 - 3. Dispose of unsuitable or unusable stripped material off-site or as otherwise directed by the Engineer.
- F. Sampling and preliminary testing:
 - 1. Prior to beginning the grading operations, the Contractor shall submit to the Engineer his proposed sequence of excavation operations.
 - 2. Based upon the sequence of excavation, samples of the fill materials will be obtained as excavation proceeds and tested for grain size permeability and moisture density relationship using the Standard Proctor Method (ASTM D698, Method A).
 - 3. Allow sufficient time for completion of laboratory tests before any fill operations begin, using the soils being tested.

3.3 FINISH ELEVATIONS AND LINES

- A. Construct areas outside of building or structure lines true to grades shown.
 - 1. Where no grade is indicated, shape finish surface to drain away from buildings or structures, as approved by the Engineer.
- B. Degree of finish shall be that ordinarily obtainable from blade grader, supplemented with hand raking and finishing.
- C. Finish surfaces to within 0.10' above or below the established grade or approved cross section.

3.4 GENERAL PROCEDURES

- A. Existing utilities:
 - 1. Unless shown to be removed, locate and protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
 - 2. If active utility lines are encountered and are not shown on the drawings or otherwise made known to the Contractor, promptly notify the Engineer and take necessary steps to assure that service is not interrupted.
 - 3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
 - 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.

5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.
- B. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of this Work, and post warning lights on property adjacent to or with public access.
 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.
- C. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- D. Maintain access to adjacent areas at all times.
- E. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

3.5 EXCAVATING (CUTS)

- A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades and elevations indicated and specified herein.
- B. Provide sloping, sheeting, shoring, and bracing for excavations conforming with 29CFR1926 Subpart P-Excavations and the Contract Documents.
- C. Suitable excavated materials:
1. Use all suitable materials removed from the excavation as far as practicable in the formation of the embankments, subgrades, shoulders, building sites and other places as directed.
 2. Surplus suitable materials from excavations shall be wasted on the site as indicated, spreading and leveling as directed.
- D. Unsuitable excavated material: Remove from the site and dispose of all unsuitable material unless otherwise approved by the Engineer.
- E. Rock excavation:
1. Notify the Engineer upon encountering rock or similar material which cannot be removed or excavated by conventional earth moving or ripping equipment.
 2. Do not use explosives without written permission from the Engineer.
 3. When explosives are permitted, use only experienced powdermen or persons who are licensed or otherwise authorized to use explosives. Store, handle and use explosives in strict accordance with all regulatory bodies and the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc.
 4. The Contractor shall be solely responsible for any damage resulting from the use of explosives.
 5. The Contractor is responsible for securing all permits required in performing this work.

- F. Unauthorized excavation:
 - 1. Excavation of material to depths below the grades indicated unless so directed by the Engineer will be deemed unauthorized excavation.
 - 2. Unauthorized overexcavation shall be backfilled and compacted without any additional expense to the Owner.
- G. Authorized overexcavation:
 - 1. In the event that it is necessary to remove unsuitable material to a depth greater than that shown on the drawings or otherwise specified, the Contractor shall remove, replace and compact such material with suitable material as directed by the Engineer at no additional expense by the Owner.

3.6 FILLING AND BACKFILLING

- A. Use fills formed of suitable material placed in layers of not more than 8" in depth measured loose and rolled and/or vibrated with suitable equipment until compacted.
- B. Do not place rock that will not pass through a 6" diameter ring within the top 12" of the surface of the completed fill or rock that will not pass through a 3" diameter ring within the top 6" of the completed fill.
- C. Do not use broken concrete or asphaltic pavement in fills.
- D. Selection of borrow material:
 - 1. Material in excess of that available on the site shall be suitable material furnished by the Contractor from private sources selected by the Contractor. The material shall be approved by the Engineer before use. All expenses involved in securing, developing, transporting and placing the material shall be borne by the Contractor.
- E. Placing and compacting:
 - 1. Place backfill and fill materials in layers not more than 8" in loose depth.
 - 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
 - 3. Compact each layer to required percentage of maximum density for the area.
 - 4. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
 - 6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structures to approximately the same elevation in each lift.
- F. Moisture control:
 - 1. Do not use soil material that is either too dry or too wet to achieve proper compaction.
 - 2. Where subgrade or layer of soil material is too dry to achieve proper compaction, uniformly apply water to surface of soil material such that free water does not appear on the surface during or subsequent to compacting operations.
 - 3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
 - 4. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by

discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Engineer.

G. Compaction requirements:

1. Compact soils to not less than the following percentages of maximum dry density as determined in accordance with ASTM D698, Method A (Standard Proctor).
2. Fill beneath roadway:

Top 12" of subgrade	100%
All other fill material	95%
3. Embankments:

Top 12" of subgrade	98%
All other fill material	95%
4. Fill beneath walkways:

Top 12" of subgrade	95%
All other fill material	90%
5. Lawn and unpaved open areas:

All other fill material	90%
-------------------------	-----

3.7 FINISH GRADING

A. General:

1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Grade with uniform levels or slopes between points where elevations are shown on the drawings, or between such points and existing grades.
4. Where a change of slope is indicated on the drawings, construct a rolled transition section having a minimum radius of approximately 8'0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.

B. Grading adjacent to structures: Grade areas adjacent to buildings to achieve drainage away from the structures and to prevent ponding.

C. Ditches and gutters and swales:

1. Cut accurately to the cross sections, grades and elevations shown.
2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the work.
3. Dispose of excavated materials as specified herein; do not in any case deposit materials within 3'0" of the edge of a ditch.

3.8 FIELD QUALITY CONTROL

A. Secure the Engineer's construction review and observation and approval of subgrades and fill layers before subsequent construction is permitted thereon.

B. Field density determinations will be made, at no cost to the Contractor, to ensure that the specified densities are being obtained. Field density tests will be performed as determined by the Engineer, considering the following:

1. At areas to receive paving, at least one field density test for every 5,000 sq. ft. of subgrade area, but not less than three tests.
2. In each compacted fill layer, one field density test for every 5,000 sq. ft. of overlaying paved area, but not less than three tests.

3. In fill beneath structures, one field density test for every 2,500 sq. ft. in each layer.
 4. Other tests as deemed necessary by the Engineer.
- C. If, in the Engineer's opinion based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing until specified requirements are met.
1. Additional testing will be provided by the Owner's selected testing laboratory and all costs for the additional testing will be borne by the Contractor.
- D. Proofrolling:
1. The Contractor shall proofroll subgrade of areas to receive paving, structures on fill or impervious lining material.
 - a. Make not less than 3 passes of a 25 to 50 ton rubber tired roller over the full area.
 - b. Unstable, soft or otherwise unsuitable materials revealed by the proofrolling shall be removed and replaced with satisfactory materials, compacted as specified herein.

3.9 PLACING TOPSOIL

- A. Upon completion of site grading and other related site work, topsoil shall be uniformly spread over the graded or improved areas. Topsoil shall be evenly distributed to conform to final grade elevations shown on the plans.
- B. Place, level and lightly compact topsoil to a depth of not less than 3".
- C. Maintain topsoil free of roots, rocks, debris, clods of soil and any other objectionable material which might hinder subsequent grassing or mowing operations.
- D. Any surplus materials shall be disposed of in approved areas on the site.

3.10 MAINTENANCE

- A. Protection of newly graded areas:
 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds.
 2. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

3.11 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the lump sum price bid for the project.

END OF SECTION

SECTION 02221

TRENCHING, BACKFILLING FOR UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

1.3 JOB CONDITIONS

- A. Existing utilities:
 - 1. There now exists in the construction areas, waterworks, storm drainage, sanitary sewers, street paving, gas mains and other utilities.
 - 2. Approximate location of certain underground lines and structures are shown on the plans for information only, other underground lines or structures are not shown.
 - 3. Locate these and other possible unknown utility lines using electronic pipe finder, or other approved means.
 - 4. Locate, excavate and expose all existing underground lines in advance of trenching operations.
 - 5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these utilities in the execution of his work under this Section.
 - 6. The Contractor shall familiarize himself with the existing conditions and be prepared to adequately care for and safeguard himself and the Owner from damage.
- B. Notification of intent to excavate:
 - 1. South Carolina Underground Utility Damage Prevention Act (S.C. Code Ann, 58-35-10, CT-SEQ, Supp. 1978) requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty of up to one thousand dollars (\$1,000) for each violation of the Act.
 - 2. Notification of intent to excavate may be given by calling this toll free number: 1-888-721-7877.

- C. Protecting trees, shrubbery and lawns:
1. Trees and shrubbery in developed areas and along the trench line shall not be disturbed unless absolutely necessary, and subject to the approval of the Engineer.
 - a. Any such trees and shrubbery necessary to be removed shall be heeled in and replanted.
 2. Where trenches cross private property through established lawns, sod shall be cut, removed, stacked and maintained in suitable condition until replacement is approved by the Engineer.
 - a. Topsoil underlying lawn areas shall be removed and kept separate from general excavated materials.
- D. Clearing:
1. Perform all clearing necessary for installation of the complete work.
 2. Clearing shall consist of removing all trees, stumps, roots, brush and debris in the rights-of-way obtained for the Work.
 3. All timber of merchantable size shall remain the property of the Owner and shall be trimmed and cut in such lengths as directed and stacked along the edge of the right-of-way.
 4. All other material, including trimmings from above, shall be completely disposed of in a satisfactory manner.
- E. Removing and resetting fences:
1. Where existing fences must be removed to permit construction of utilities:
 - a. Remove such fences and, as the Work progresses, reset the fences in their original location and condition, unless otherwise shown on the plans.
 - b. Provide temporary fencing or other safeguards as required to prevent stock and cattle from wandering to other lands.
- F. Restoration of disturbed areas:
1. Restore all areas disturbed by, during or as a result of construction activities to their existing or better condition.
 - a. For existing areas with sod type grasses, replace with new sod. Existing sod may be reused where properly removed and stored.
 2. Do not interpret this as requiring replacement of trees and undergrowth in undeveloped sections of the rights-of-way.
- G. Minimizing silting and bank erosion during construction:
1. During construction, protective measures shall be taken and maintained to minimize silting and bank erosion of creeks and rivers adjacent to the work being performed during construction.
- H. Blasting:
1. Store all explosives in a secure manner, complying with all laws, ordinances, and regulations.
 2. Contractor shall be responsible for damage caused by blasting operations.

PART 2 - PRODUCTS

2.1 EXCAVATED MATERIALS

- A. Perform all excavation of every description and of whatever substances encountered to depths indicated or specified.
- B. Pile material suitable for backfilling in an orderly manner at safe distance from banks or trenches to avoid overloading and to prevent slides or cave-ins.
- C. Remove and deposit unsuitable or excess materials as directed by the Engineer.

2.2 BACKFILL MATERIALS

- A. Provide from materials excavated for installation of utility.
 - 1. Select soil material free from organic matter and deleterious substances, containing no rocks or lumps over 2" in greatest dimension for backfill up to 12" above top of utility being covered.
 - 2. Do not permit rocks larger than 2" in greatest dimension in top 6" of backfill.

2.3 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.
- B. Should the quantity of suitable on-site material be insufficient to complete the work, provide suitable borrow material as approved by the Engineer at no additional expense to the Owner.
- C. Provide select materials from on-site if acceptable material as approved by the Engineer is available on-site. Otherwise, provide approved select material from an off-site source.

PART 3 - EXECUTION

3.1 PROCEDURES

- A. Existing utilities:
 - 1. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the Owner.
 - 2. If active utility lines are encountered and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
 - 3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
 - 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
 - 5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

- B. Locations within streets or highways:
1. Comply with South Carolina Department of Transportation's (SCDOT) "Encroachment Permit" issued for the Work, and the South Carolina Department of Transportation's (SCDOT) "*A Policy for Accommodating Utilities on Highway Rights-of-Way*".
 2. Take all precautions and comply with all requirements as may be necessary to protect the improvements, including barricades for protection of traffic.
 3. Keep minimum of one lane open to traffic at all times where utility crosses street or highway.
- C. Protection of persons and property:
1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
 3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.
- D. Dewatering:
1. Remove all surface and subsurface waters from excavations and maintain the excavation in a dry condition during construction operations.
 2. Maintain the ground water level a minimum of 3-feet below the trench bottom during excavation, installation and backfilling.
 - a. Material disturbed below the invert elevation due to improper dewatering shall be removed and replaced with crushed stone or lean concrete at no expense to the Owner.
 - b. Use sumps, pumps, drains, trenching, wells, vacuum or well point system as necessary to maintain the ground water level a minimum of 3-feet below the trench bottom and maintain a dry excavation.
 - c. Dewatering by trench pumping will not be permitted if migration of fine grained natural material (running sand) from bottom, side walls or bedding material will occur.
 - d. Provide monitoring wells sufficient in size, location, number and depth to monitor the ground water level in the construction area during excavation and backfill operations.
 - e. Maintain dewatering operations until backfilling and compaction operations are complete.
 3. Water pumped or drained from trenches must be treated by an appropriately sized sediment and erosion control device prior to leaving the site. Discharging untreated or contaminated dewatering effluent is prohibited.
 - a. Contractor is responsible for acquiring all permits required to discharge the water and shall protect waterways from turbidity during the operation.
 - b. Prevent flooding of streets, roadways, or private property.
 - c. Prevent onsite erosion that can be caused by concentrated discharges related to dewatering pumping, drains, or trenching.
 - d. Provide engines driving dewatering pumps with residential type mufflers.
- E. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- F. Maintain access to adjacent areas at all times.

3.2 TRENCH EXCAVATION (Unclassified)

- A. Provide sloping, sheeting, shoring, and bracing for excavations conforming with 29CFR1926 Subpart P-Excavations and the Contract Documents.
- B. Remove all materials of whatever substance encountered.
- C. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.
- D. Open cut:
 - 1. Excavate for utilities by open cut.
 - 2. If conditions at the site prevent such open cut, and if approved by the Engineer, tunneling may be used.
 - 3. Short sections of a trench may be tunneled if, in the opinion of the Engineer, the conductor can be installed safely and backfill can be compacted properly into such tunnel.
 - 4. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.
 - 5. Remove wet or otherwise unstable soil incapable of properly supporting the utility, as determined by the Engineer, to depth required and backfill to proper grade with stone bedding material, at no additional cost to the Owner.
 - 6. Excavating for appurtenances:
 - a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
 - b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the Engineer, and at no additional cost to the Owner.
- E. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.
- F. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.
 - 1. Remove in units when level of backfilling has reached the elevation necessary to protect the utility work and adjacent property.
 - 2. Sheeting at the bottom of trenches over 10' deep for sewers 15" and larger in size, shall remain in place and be cut off no less than 2" above top of pipe, at no additional cost to the Owner.
- G. Depressions:
 - 1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
 - 2. Except where rock is encountered, do not excavate below the depth indicated or specified.
 - 3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified, and to provide 6" clearance in any horizontal direction from all parts of the utility and appurtenances.
- H. Special requirements relating to excavation for specific types of utilities shall comply with the following:

1. Electrical conduit:
 - a. Provide depth of cover shown or minimum cover of 36", whichever is greater.
 - b. Where minimum cover only is required, carry excavations to depths necessary to properly grade the conduit on tangents and vertical curves as directed by the Engineer.
 - c. Provide minimum clearance of 12" between conduit and trench wall or sheeting and bracing lines.
 - d. If minimum cover of 36" cannot be provided, then thermoplastic piping may not be used. Use ductile iron piping or other Engineer-approved material.

I. Comply with pertinent OSHA regulations in regards to the excavation of utilities.

3.3 BACKFILLING

A. General:

1. Backfill trenches and excavations immediately after the pipes are laid, unless other protection is directed or indicated.
2. Select and deposit backfill materials with special reference to the future safety of the pipes.
3. Reopen trenches which have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the Engineer.
4. Surplus material shall be disposed of as directed by the Engineer.
5. Original surface shall be restored to the approval of the Engineer.
6. Maintain proper dewatering during backfill and compaction operations.

B. Lower portion of trench:

1. Deposit approved backfill and bedding material in layers of 6" maximum thickness, and compact with suitable tampers to the density of the adjacent soil until there is a cover of not less than 24" over sewers and 12" over other utility lines.
2. Take special care in backfilling and bedding operations not to damage pipe and pipe coatings.

C. Remainder of trench:

1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6" or 1/2 the layered thickness, whichever is smaller, in any dimension.
2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density directed by the soil engineer.

D. Adjacent to buildings: Mechanically compact backfill in 6" layers within ten (10') feet of buildings.

E. Under roads, streets and other paved areas:

1. Mechanically tamp in 6" layers using heavy duty pneumatic tampers or equal.
2. Tamp each layer to a density equivalent of not less than 100% of an ASTM D 698 Proctor Curve.
3. Provide additional compaction by leaving the backfilled trench open to traffic while maintaining the surface with crushed stone.
4. Refill any settlement with crushed stone and continue such maintenance until replacement of pavement is authorized by the Engineer.

F. Undeveloped areas:

1. Backfill in wooded, swampy or undeveloped areas shall be as specified hereinbefore, except that tamping of the backfill above a level 2' over the top of the pipe will not be required.
2. Mound excavated material neatly over the ditch to provide for future settlements.

3.4 MEASUREMENT AND PAYMENT

- A. No measurement or direct payment will be made for the Work under this Section and all costs for same shall be included in the lump sum price bid for the project.

END OF SECTION

SECTION 02260
EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide protection of the environment during the construction of this project to reduce soil erosion and siltation to the lowest reasonably achievable level.

1.2 GENERAL

- A. Exercise every reasonable precaution, throughout the life of the project, to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground or roadway surfaces, or other property. Erosion control practices to be used for this project are shown on the drawings and are to conform to South Carolina Department of Health and Environmental Control (SCDHEC) regulations.

PART 2 - PRODUCTS

2.1 CRUSHED STONE

- A. Provide No. 1 aggregate (ASTM C 33) as defined in Section 815 of the SCDOT Standard Specifications for Highway Construction, Latest Edition, for the stabilized construction entrance and exit.
- B. Provide #57 crushed stone for temporary sediment barriers around inlets and for temporary stone check dams.

2.2 GRASSING

- A. Comply with Section 02930 - Grassing.

2.3 SILT FENCE

- A. All posts to be self-fastener angle steel, 5' in length.
 - 1. Wooden posts are not acceptable.
- B. Woven wire shall conform to the requirements of ASTM A 116, Class I zinc coating for wire. Each woven square shall measure 5.33" X 12". The top and bottom wires shall be 10 gauge. All other wires shall be 12-1/2 gauge.
 - 1. Securely attach woven wire to posts with wire ties.
- C. Provide filter fabric meeting the requirements of the South Carolina Department of Health and Environmental Control (SCDHEC), complying with the most current edition of the SCDOT Standard Specifications for Highway Construction and appearing on the SCDOT Approved Materials Sheet #34.
 - 1. Limit splices in filter fabric using continuous rolls whenever possible.
 - 2. Whenever splices are necessary a minimum overlap of 6" is required and all splices must occur at a post so that the integrity of the fence is not compromised.
 - 3. Securely attach filter fabric to top of woven wire and at posts with wire ties.

- D. Silt fences should be continuous and transverse to the flow. The silt fence should follow the contours of the site as closely as possible. Place the fence such that the water cannot runoff around the end of the fence.

2.4 EROSION CONTROL BLANKET

- A. Use erosion control blanket S150, from North American Green or approved equal.
 - 1. Use Biostakes where staples are required or indicated on the drawings for stabilization.
 - a. Staple in pattern recommended by blanket manufacturer.
 - 2. Staple locations must be clearly marked on the blanket when stakes are used.

2.5 FILTER FABRIC (Temporary Stone Check Dam)

- A. Use Stabilenka Filter Fabric (T-140N), Mirafil (140N) or approved equal.

2.6 SEDIMENT TUBES

- A. Use sediment tubes as designated on the plans to control erosion along contours, around inlets, and in drainage conveyance swales.
- B. Use sediment tubes manufactured by an experienced manufacturer producing tubes for erosion control.
- C. Tube fill is to be composed of 100% weed free materials consisting of a mix of some or all of the following: curled excelsior wood, natural coconut fibers, hardwood mulch and agricultural straw.
- D. Tubular netting is to be constructed of a flexible outer netting that will contain the fill materials and sediment. Netting is to be constructed from seamless high density polyethylene, polyester, and/or ethyl vinyl acetate, photodegradable materials, treated with ultraviolet stabilizers.
- E. Tubes are to be minimum 20-inches in diameter with minimum weight of 3.2 lbs per foot +/- 10%. Minimum tube length is 10-feet. Netting weight is to be 0.35 oz/foot minimum.

PART 3 - EXECUTION

3.1 GENERAL

- A. Construct and maintain all erosion control measures until the substantial completion of the project.

3.2 TEMPORARY CONSTRUCTION ENTRANCE/EXIT

- A. Construct a gravel area or pad at points where vehicles enter and leave a construction site.
- B. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade and place gravel to the grade and dimensions shown on the plans.

- C. Construct drainage channels to carry water to a sediment trap or other suitable outlet.
- D. Use geotextile fabrics to improve stability of the foundation in locations subject to seepage or high water table.
- E. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site by periodic top dressing with two inches of stone.
- F. After each rainfall, inspect any structure used to trap sediment and clean it out as necessary.
- G. Immediately remove objectionable materials spilled, washed, or tracked onto public roadways.

3.3 TEMPORARY GRASSING

- A. Provide a temporary cover for erosion control on disturbed areas that will remain unstabilized for a period of more than 30 days in accordance with Section 02930.
- B. This practice applies to cleared areas, diversions, dams, temporary sediment basins, temporary road banks, and topsoil stockpiles where vegetation is needed for less than 1 year.
- C. Provide grassing on slope 5% or greater within 14 days of disturbance. Comply with Section 02930.

3.4 SILT FENCE

- A. Provide silt fence barrier where shown on the plans and on utility construction parallel to the disturbed trench where perpendicular sheet flow runoff occurs on disturbed areas with slopes greater than 4%.
- B. Place at the extreme limits of the area to be disturbed as shown.
- C. Construct temporary sediment barriers of filter fabric, buried at the bottom, stretched and supported by posts and install below small disturbed areas as indicated on the drawings to retain sediment by reducing the flow velocity to allow sediment deposition.
- D. Space posts 10'-0" on center, maximum or as indicated on the drawings.
- E. Remove sediment deposits prior to reaching one-third height of the fence.
- F. Monitor site frequently and place additional silt fencing should evidence indicate that erosion is about to occur at locations other than those shown on plan.

3.5 INLET PROTECTION

- A. Construct temporary sediment barriers around storm drain curb inlets using block and gravel as indicated on the drawings.
- B. Construct metal frame barriers around grate and frame of drop inlets as indicated on the drawings.
- C. Inspect structure after each rainfall and repair as required.
- D. Remove sediment when trap reaches one-half capacity.

E. Remove structure when protected areas have been stabilized.

3.6 EROSION CONTROL BLANKET

A. Provide on areas as shown on the plans or on all embankments with slopes equal to or steeper than 2-1/2:1.

3.7 SEDIMENT TUBES

A. Construct small U-shaped trench that is 20% of depth of tube perpendicular to stormwater flow pattern.

B. Anchor tube in trench according to manufacturers recommendations.

C. Compact the upstream soil surface adjacent to the tube.

D. Backfill sediment tube with coarse filter material on the upstream side.

E. Follow manufactures recommendation on installation.

F. Maintain, repair and/or replace sediment tubes as required to maintain their effectiveness throughout the project

3.8 MAINTENANCE

A. Place all erosion control devices or measures prior to any land disturbing activity within the drainage area they are located.

B. Inspect erosion control devices and clean or otherwise remove silt buildup as necessary once a week or 24-hours following a rain event of ≥ 0.1 ".

3.9 REMOVAL

A. Remove temporary structures after protected areas have been stabilized.

3.10 MEASUREMENT AND PAYMENT

A. No separate measurement or direct payment will be made for the items under this Section and all costs for same shall be included in the lump sum price bid for the project.

END OF SECTION

SECTION 02721
SEWERS: STORM DRAINAGE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide storm drainage sewer as shown on the drawings, specified herein, and needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 2. Section 02221 - Trenching, Backfilling for Utilities.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. All materials in this Section are to be manufactured in the United States.

1.3 SUBMITTALS

- A. Not used.
- B. Product data: Within 15 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

- A. Not used.

1.5 ORDER AND ACCEPTANCE OF WORK

- A. Engineer shall direct on what line or street the Contractor shall work and the order thereof.
 - 1. Generally, work shall commence at the lower end of a system and proceed upgrade.

1.6 PROTECTION OF OTHER UTILITIES

- A. Location:
 - 1. Approximate location of certain known underground lines is shown.
 - 2. Existing small lines not shown.

3. Locate small and other possible utility lines using electronic pipe finder, or other approved method.
 4. Excavate and expose existing underground utilities ahead of trenching operations.
- B. Repair or replace any damaged utility line or structure at no additional cost to Owner.

1.7 CONFLICTING UTILITIES

- A. Remove and/or relay conflicting utilities, when so directed by the Engineer, at the expense of the Owner.
- B. Where alterations to existing utilities are shown to avoid conflicts, make alterations at no cost to Owner.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe shall be subject to Engineer's observation, at plant, trench or other point of delivery, for culling and rejecting pipe, independent of laboratory tests, not conforming to specifications.
- B. Rejected pipe will be marked by the Engineer and Contractor shall remove it from project site.

2.2 PIPE AND MATERIALS

- A. Reinforced concrete pipe (RCP):
1. Pipe to comply with ASTM C-76 for Class III, Wall B (unless higher class is indicated on the drawings).
 2. Furnish pipe with joints designed for flexible watertight gaskets.
 3. Provide integral bell and spigot or tongue and groove joints.
 4. Provide gaskets on bell and spigot pipe:
 - a. O-ring rubber complying with ASTM C-443; or
 - b. Preformed plastic gaskets complying with AASHTO Designation M-198 for Type B, Flexible Plastic Gasket.
 5. Provide butyl ribbon sealant conforming to ASTM C990 for tongue and groove pipe joints.
- B. High density polyethylene pipe (HDPE):
1. Manufacture from High Density Polyethylene (HDPE) virgin compounds conforming to cell classifications as listed in AASHTO M-252 and M-294, Type S, MP7-97 (Type D and DP).
 2. Form with annular corrugation, conforming to AASHTO M-294.
 - a. Furnish a Certificate of Compliance to the Engineer for each type of plastic pipe furnished.
 - b. Provide integrated bell and spigot joints with ASTM F-477 rubber gasket on spigot end.

2.3 DRAINAGE STRUCTURES

- A. Precast drop inlets, catch basins, curb inlets, etc. shall be as manufactured by Knight's Precast of Summerville, SC or equal units by others, and as approved by SCDOT.

- B. All other precast structures (i.e., headwalls, flared end sections, etc.) shall be approved by Engineer prior to installation.
- C. Inlet Castings.
1. Provide gray iron castings, complying with ASTM A-48, Class 35B iron and AASHTO M-306.
 2. Provide a minimum recycled material content of 75 consisting of post-consumer material.
 3. Provide uniform quality, free from sand holes, gas holes, shrinkage, cracks and other surface defects.
 4. Grind smooth and clean by shot blasting.
 5. Cast or machine bearing surfaces between grates and frames with such precision to prevent rocking.
 6. Casting dimensional tolerances shall be +/- 1/16" per foot.
 7. All published casting weights may vary no more than +/- 5%.
 8. Conduct a first article proof load test and provide the results of that proof load upon request.
 - a. Conduct in accordance with the method and procedure that is outlined in AASHTO M-306.
 - b. Test on a suitable and calibrated load testing machine. Casting shall hold a 40,000 pound proof load for one minute without experiencing any cracks or detrimental permanent deformation.
 - c. Test results for each lot of castings be maintained Foundry to for a minimum of seven years. Make available upon request.
 9. Inspect in accordance with AASHTO M-306.
 10. Furnish a foundry certification stating that samples representing each lot have been tested, inspected, and are in accordance with this specification.
 11. Each casting shall be identifiable and show, at a minimum, the following: name of the producing foundry, country of manufacture, ASTM material designation, recycle symbol, individual part number, cast or heat date.
 12. Castings shall include all lettering as shown on the specification drawings.
 13. Patterns and weights shall be as indicated on the Contract Drawings.
 14. Coat frames and covers with two (2) shop coats of water based bitumastic paint, MC4 MPFC by Molecular Coating Specialist of Cedar Hill, Texas or approved equal.
 15. All castings are to be manufactured in the United States.

2.4 MANHOLES

- A. Use precast manholes:
1. Provide reinforced precast concrete ring and eccentric cone sections complying with ASTM C-478 and the following.
 2. Use portland cement complying with ASTM C-150, Type II.
 3. Cast ladder rungs into the units.
 4. Provide tongue and groove or o-ring rubber gasketed joints.
 5. Use vulcanized butyl rubber sealant with tongue and groove joints.
 6. Provide flat slab tops where manhole depth is less than 4'0".
- B. Steps:
1. Provide polypropylene plastic steps reinforced with 3/8" diameter steel rod, M.S.A. Industries, Inc. Model PS-K, or equal.
 2. Provide steps having non-skid top surfaces, safety slope at each end, minimum width of 10" and not less than 5" projection from wall.

C. Frames and covers:

1. Provide gray iron castings, complying with ASTM A 48, Class 35B iron and AASHTO M-306.
2. Provide a minimum recycled material content of 75 consisting of post-consumer material.
3. Castings shall be of uniform quality, free from sand holes, gas holes, shrinkage, cracks and other surface defects ground smooth and clean by shot blasting.
4. Cast or machine bearing surfaces between rings and covers with such precision to prevent rocking.
5. Casting dimensional tolerances shall be +/- 1/16" per foot.
6. Conduct a first article proof load test and make the results of that proof load available upon request.
 - a. Conduct in accordance with the method and procedure outlined in AASHTO M-306.
 - b. Test casting on a suitable and calibrated load testing machine. Casting shall hold a 40,000 pound proof load for one minute without experiencing any cracks or detrimental permanent deformation.
 - c. Maintain test results for each lot of castings by the foundry for a minimum of seven years. Make available upon request.
7. Provide inspections in accordance with AASHTO M-306 and furnish results of these tests upon request.
8. Furnish a foundry certification stating that samples representing each lot have been tested, inspected, and are in accordance with this specification.
9. Each casting shall be identifiable and show, at a minimum, the following: name of the producing foundry, country of manufacturer, ASTM material designation, recycle symbol, individual part number, cast or heat date.
10. Provide frames and covers weighing not less than 285 lbs. with inside opening between 22" and 24".
11. Provide circular cover with two "pick" holes, one 1" diameter vent hole, and weighing not less than 130 lbs.
12. Covers to have the words "STORM SEWER" cast in the metal.
13. Coat frames and covers with two (2) shop coats of water based bitumastic paint, MC4 MPFC by Molecular Coating Specialist of Cedar Hill, Texas or approved equal.
14. All castings are to be manufactured in the United States.
15. Provide East Jordan Iron Works, Inc. Model V-1384 or approved equal.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 LAYING OUT WORK

- A. Provide all materials, labor, instruments, etc. required to lay out Work.
- B. Prepare "cut sheets" under direct supervision of the Engineer.
- C. Exercise proper precaution to verify figures on the drawings prior to laying out Work. Contractor will be held responsible for any errors therein that otherwise might have been avoided.

- D. Promptly inform Engineer of errors or discrepancies found, in order that proper corrections may be made.

3.2 INSTALLATION

- A. Trench, backfill and compact for the work of this Section in strict accordance with pertinent provisions of Section 02221 of these specifications, and the following requirements:

1. Maximum trench widths, depths and bedding methods.
 - a. Install all sewers complying with tables for depths of cut and class of bedding included hereinafter.
 - b. Where trenches are excavated beyond specified widths, or trench walls collapse, lay sewer complying with requirements of the next better class of bedding at no additional cost to the Owner.
 - c. Include cost of special bedding and tamping in unit prices bid for sewer.
2. Reinforced concrete pipe (RCP) - Class III:

		MAXIMUM DEPTHS IN FEET			
		CLASS OF BEDDING			
		D	C	B	A
Pipe Size	Max. Trench Width	Flat Bottom Trench	Type 1 or Type 2	Special Earth Bedding	Special Concrete Bedding
12"	2'-6"	7.5	11.5	20	30
15"	2'-10"	7.0	11.0	15	30
18"	3'-2"	10.5	16.5	22.5	30
21"	3'-6"	9.0	14.0	22	30
24"	3'-10"	9.0	13.5	22	30
30"	4'-7"	10.0	14.5	20.5	30
36"	5'-5"	10.0	13.5	18	30
42"	6'-1"	11.0	14.5	19.5	30
48"	6'-6"	12.0	15.5	21	30

3. High density polyethylene pipe (HDPE) to be installed per ASTM D2321 and AASHTO Section 30 requirements.
4. High density polyethylene pipe (HDPE) and polyvinyl chloride pipe (PVC):

		MAXIMUM DEPTHS IN FEET			
		CLASS OF BEDDING			
		D	C	B	A
Pipe Size	Min. Trench Width	Flat Bottom Trench	Type 1 or Type 2	TYPE 2* ONLY	Special Concrete Bedding
4"	2'0"	**	**	30	**
6"	2'2"	**	**	30	**
8"	2'4"	**	**	30	**
10"	2'6"	**	**	30	**
12"	3'0"	**	**	30	**
15"	3'3"	**	**	30	**
18"	3'6"	**	**	30	**
24"	4'0"	**	**	30	**
30"	5'6"	**	**	30	**
36"	6'6"	**	**	30	**

		MAXIMUM DEPTHS IN FEET			
		CLASS OF BEDDING			
		D	C	B	A
42"	7'0"	**	**	30	**
48"	7'8"	**	**	30	**
* Class B Bedding (Type 2) shall extend to the top of the pipe.					
** Do not use this Class of bedding for this pipe size and trench width.					

B. Bedding and tamping requirements for the various classes of bedding shall comply with the following specifications:

1. Class A Bedding - Excavate trench to one-fourth of nominal pipe diameter below pipe grade; lay pipe to grade on concrete blocking; place 2500 psi concrete around pipe for full width of trench up to one-fourth nominal pipe diameter above the invert.
2. Class B (Type 1) Bedding - Shape bottom of trench to a level two inches below bottom of pipe; bring bed to proper level by spreading and thoroughly tamping fine granulated moist earth and sand to conform accurately to one-fourth circumference of pipe barrel; provide suitable material if not available from trench excavation; lay pipe, backfill and hand tamp in thin layers to height three-fourths of pipe diameter, using material same as bedding material; complete trench backfill complying with Section 02221.
 - a. Bring trenches excavated to excess depths to grade with stone or gravel bedding at the Contractor's expense.
 - b. Exercise care to avoid disturbing pipe grade, alignment or joints at all times.
 - c. In lieu of this class bedding, Contractor may elect to use Class B (Type 2) bedding.
3. Class B (Type 2) Bedding - Undercut 4" below pipe barrel, full width of trench; bring pipe to grade with crushed stone complying with SCDOT Aggregate No. 5; except for HDPE and PVC, use SCDOT Aggregate No. 57.
 - a. For RCP pipe, place stone in 6" layers to mid-point of pipe, compacting by slicing with shovel.
 - b. For HDPE and PVC pipe, place stone (Aggregate No. 57) in 6" layers to the top of the pipe, compacting by slicing with shovel.
 - c. Complete trench backfill complying with Section 02221.
4. Class C (Type 1) bedding - Shape trench bottom by hand to conform accurately to bottom one-quarter of pipe barrel circumference.
 - a. Use Class C (Type 2) bedding if unable to properly shape trench bottom.
 - b. If shaping is not performed accurately, the Contractor will be required to use Class C (Type 2) bedding.
5. Class C (Type 2) Bedding - Undercut 4" below bottom of pipe barrel; full width of trench; bring pipe to grade with compacted crushed stone complying with SCDOT Aggregate No. 5; lay pipe; place stone in six-inch layers to quarter-point of pipe, compacting by slicing with shovel; complete backfill complying with Section 02221.
6. Class D Bedding:
 - a. For RCP - Excavate bell holes in flat bottomed trench; lay pipe; backfill complying with Section 02221.
7. Where piping is installed under roadways, use controlled density fill for trench backfill to a distance of two (2) feet beyond edge of pavement.

C. Pipe laying:

1. General:

- a. Protect pipe during handling against shocks and free fall. Remove extraneous material from the pipe interior.
 - b. Lay pipe by proceeding upgrade with the spigot ends of bell-and-spigot pipe pointing in direction of flow.
 - c. Lay each pipe accurately to the indicated line and grade, aligning so the sewer has a uniform invert.
 - d. Continually clear interior of the pipe free from foreign material.
 - e. Before making pipe joints, clean and dry all surfaces of the pipe to be joined.
 - f. Use gasket lubricants or joint primers as recommended by the pipe manufacturer.
 - g. Place, fit, join and adjust the joints to obtain the degree of water tightness required.
2. Reinforced concrete pipe (RCP):
- a. Select proper bedding class from preceding table as determined by pipe size and depth of cut.
 - b. Provide uniform and continuous support of pipe barrel between bell holes when utilizing Class D bedding.
 - c. Joints:
 - 1) O-ring gaskets: Lubricate and install gaskets in accordance with manufacturer's recommendations.
 - a) Align the pipe with previously installed pipe, and push the joint together. Using feeler gage, determine that gasket is properly fitted.
 - 2) Preformed plastic gaskets:
 - a) Apply primer to clean, dry joint surfaces and allow to dry.
 - b) Attach plastic strips end to end to the leading edge of the tongue, forming a continuous gasket around the entire circumference of the joint.
 - c) Align pipe with previously laid joint and push the joint together. Sufficient pressure shall be applied to assure the joint is home and slight squeeze out of the gasket materials occurs.
3. High density polyethylene pipe (HDPE):
- a. Provide proper equipment for hoisting and lowering pipe into the trench without damaging the pipe or disturbing the bedding and the sides of the trench.
 - b. Remove shipping collars prior to placing pipe in trench.
 - c. Lay pipe with the green stripe up.
 - d. Align the joint and push the spigot home.
 - e. Use a bar and wood block on larger diameters when necessary making sure the block protects the pipe end from the bar.
 - f. When pushing the joint home, make sure the bedding material is not pulled into the bell by the spigot.
 - g. Take up and re-lay any pipe which is not in alignment or which shows any undue settlement after laying, without additional compensation.
4. Polyvinyl Chloride (PVC) Pipe:
- a. Provide pipe with integral bell and spigot joints.
 - b. Lay pipe upgrade from lowest point with bell of pipe in upstream direction.
 - a. Provide a wye in the pipe and a vertical cleanout at each change in pipe direction.
 - b. Provide all necessary fittings for proper installation of system.
 - c. Minimum depth of cover shall be 3' unless otherwise specified on plans.

3.3 MANHOLES AND PRECAST STRUCTURES

- A. Set bases level so that walls will be plumb.
- B. Apply joint sealer, or ring gasket to wall section(s), set firmly in place to assure watertight joints.
- C. Form manhole invert channels directly in the concrete of the manhole base, with mortar, or by laying full section sewer pipe through the manhole and breaking out the top half after surrounding concrete has hardened. Smooth the floor of the manhole outside the channels, and slope toward the channels at not less than 1" per foot nor more than 2" per foot.
 - 1. Shape the invert channels to be smooth and semicircular, conforming to the inside of the adjacent sewer section.
 - 2. Make changes in direction of flow with a smooth curve of as large a radius as the size of the manhole will permit.
 - 3. Make changes in size and grade of channels smoothly and evenly.
 - 4. Slope invert uniformly from invert of inlet to invert of outlet.

3.4 OBSERVATIONS

- A. General:
 - 1. Clean and prepare for observation each block or section of sewer upon completion, or at such other time as the Engineer may direct.
 - 2. Each section between manholes shall show a full circle of light when viewed from either end.
 - 3. Repair all visible leaks.
 - 4. Correct broken or cracked pipe, mislaid pipe and other defects.
 - 5. All repairs, relaying of sewers, etc. required to bring the sewers to specified status shall be made at no additional cost to the Owner.

3.6 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the items under this Section and all costs for same shall be included in the lump sum price bid for the project.

END OF SECTION

SECTION 02930

GRASSING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide grassing of the areas specified herein, or as indicated, for a complete and proper installation.
 - 1. All cleared areas and areas disturbed by the construction operation.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Seed: Conform to all State laws and to all requirements and regulations of the South Carolina Department of Agriculture.
 - 1. Deliver to site each variety of seed individually packaged and tagged to show name, net weight, origin and lot number.
- C. Fertilizer: Conform to State fertilizer law.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Complete materials list of items proposed to be provided under this Section.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. At time of delivery, furnish the Engineer invoices of all materials received in order that application rates may be determined.
- C. Immediately remove from the site materials that do not comply with the specified requirements, and promptly replace with materials meeting the specified requirements.

PART 2 - PRODUCTS

2.1 FERTILIZER

- A. Provide commercial balanced 16-4-12 or 12-4-8 fertilizer delivered to the site in bags labeled with the manufacturer's guaranteed analysis.

2.2 GRASS SEED

- A. Provide grass seed that is:
 - 1. Free from noxious weed seeds, and recleaned.
 - 2. Grade A recent crop seed.
 - 3. Treated with appropriate fungicide at time of mixing.
 - 4. Delivered to the site in sealed containers with dealer's guaranteed analysis.

2.3 LIME

- A. Provide agricultural grade, standard ground limestone conforming to current "Rules, Regulations and Standards of the Fertilizer Board of Control" issued at Clemson University.
- B. Bag tags or delivery slip for bulk loads shall indicate brand or trade name, calcium carbonate equivalent, and other pertinent data to identify the lime.

2.4 WOOD CELLULOSE FIBER

- A. Provide wood chip particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer.
- B. Material to be heat processed so as to contain no germination or growth inhibiting factors.
- C. It shall be dyed (non-toxic) an appropriate color to facilitate metering.

2.5 STRAW MULCH

- A. Provide straw or hay material.
 - 1. Straw to be stalks of wheat, rye, barley or oats.
 - 2. Hay to be timothy, peavine, alfalfa, or coastal bermuda.
- B. Material to be reasonably dry and reasonably free from mature seed bearing stalks, roots, or bulblets or Johnson Grass, Nutgrass, Wild Onion and other noxious weeds.

2.6 EXCELSIOR FIBER MULCH

- A. To consist of 4" to 6", average length, wood fibers cut from sound, green timber.
- B. Make cut in such a manner as to provide maximum strength of fiber, but at a slight angle to natural grain of the wood.

2.7 EROSION CONTROL BLANKET

- A. Provide on areas as shown on the plans.
- B. Provide Erosion Control Blanket S150, from North American Green, or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Seed these areas immediately upon completion of grading or construction and clean-up operations.
 - 1. Slopes greater than four horizontal to one vertical.
 - 2. Utility rights-of-way adjacent to stream banks.
- B. Areas ready for planting between August 16 and February 28 shall be planted with a temporary cover of Schedule No. 2. At the acceptable seasons for planting Schedule No. 1, the turf shall be destroyed by reworking the soil, and Schedule No. 1 seeding established as specified herein.
- C. Use Rate A lbs. per 1000 sq. ft. on slopes over 5' horizontal to 1' vertical in height and use Rate B lbs. per 1000 sq. ft. on slopes less than 5' horizontal to 1' vertical.

3.2 SEEDING SCHEDULES

- A. Mixtures of different types of seed for the various schedules shall be weighed and mixed in proper proportions in the presence of the Engineer.
- B. Schedule No. 1 - Planting dates March 1 to August 15:

Common Name of Seed	Rate A	Rate B
Rye Grain	1	1
Common Bermuda (hulled)	0	1.5
Sericea Lespedeza (clay soils)	1	0
Weeping Love Grass (sandy soils)	1	0
Centipede	0.5	0.5

- C. Schedule No. 2 - Planting dates August 16 - February 28:

Common Name of Seed	Rate A	Rate B
Rye Grain	0	1
Common Bermuda (hulled)	0	1.5
Brown Top Millet	5	0
Common Bermuda (unhulled)	0	2.0

3.3 GROUND PREPARATION

- A. Bring all areas to proper line, grade and cross section indicated on the plans.
- B. Repair erosion damage prior to commencing seeding operations.
- C. Loosen seed bed to minimum depth of 3".
- D. Provide and prepare topsoil in accordance with Section 02210.
- E. Conduct soil test to determine pH factor.
 - 1. If pH is not in the range of 6.0 to 6.5, adjust.

3.4 APPLICATION OF FERTILIZER

- A. Spread uniformly over areas to be seeded at:
 - 1. Rate of 18 lbs. per 1000 sq. ft. when using 16-4-12.
 - 2. Rate of 25 lbs. per 1000 sq. ft. when using 12-4-8.
 - 3. Use approved mechanical spreaders.
- B. Mix with soil to depth of approximately 3".

3.5 SOWING METHODS

- A. General:
 - 1. Perform seeding during the periods and at the rates specified in the seeding schedules.
 - 2. Do not conduct seeding work when ground is frozen or excessively wet.
 - 3. Produce satisfactory stand of grass regardless of period of the year the Work is performed.
- B. Seeding, slopes less than four horizontal to one vertical:
 - 1. Shall conform to Methods EA, WF or WCF as specified hereinafter.
 - 2. Method EA (Emulsified Asphalt):
 - a. Sow seed not more than 24 hours after application of fertilizer.
 - b. Use mechanical seed drills on accessible areas, rotary hand seeders, power sprayers, etc. may be used on steep slopes or areas not accessible to seed drills.
 - c. Cover seed and lightly compact with cultipacker if seed drill does not.
 - d. Within 24 hours following compaction of seeded areas, uniformly apply 0.2 gallons per square yard of emulsified asphalt over the seeded area.
 - 3. Method WF:
 - a. Sow seed as specified for Method EA.
 - b. Within 24 hours following covering of seeds, uniformly apply excelsior fiber at the rate of 100 lbs. per 1000 sq. ft.
 - c. Apply material hydraulically.
 - d. Seeded areas to be lightly rolled to form a tight mat of the excelsior fibers.
 - 4. Method WCF:
 - a. Apply seed, fertilizer and wood fiber mulch using hydraulic equipment.
 - b. Equipment to have built-in agitation system with capacity to agitate, suspend and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed and water.
 - c. Minimum capacity of slurry tank: 1000 gallons.
 - d. Apply fiber mulch at rate of 35 lbs. per 1000 sq. ft.
 - e. Regulate slurry mixture so that amounts and rates of application will result in uniform application of all materials at not less than the specified amounts.
 - f. Apply slurry in a sweeping motion, in an arched stream, so as to fall like rain, allowing the wood fibers to build upon each other.
 - g. Use color of wood pulp as guide, spraying the prepared seed bed until a uniform visible coat is obtained.
- C. Seeding, slopes greater than four horizontal to one vertical:
 - 1. Sow seed as specified for Method EA, unmulched.
 - 2. Cover seeded area with erosion control blanket.

3.6 SECOND APPLICATION OF FERTILIZER

- A. When plants are established and showing satisfactory growth, apply nitrogen at the rate of 1.0 lb. per 1000 sq. ft.
- B. Apply in dry form unless otherwise directed by the Engineer.
- C. Do not apply to stands of temporary grasses.

3.7 MAINTENANCE

- A. Maintain all seeded areas in satisfactory condition until final acceptance of the Work.
- B. Areas not showing satisfactory evidence of germination within six weeks of the seeding date shall be immediately reseeded, fertilized and/or mulched.
- C. Repair any eroded areas.
- D. Mow as necessary to maintain healthy growth rate until final acceptance of the Work.

3.8 ACCEPTANCE

- A. Permanently seeded areas (Schedule No. 1) will be accepted when the grass attains a height of 2".
- B. No acceptance will be made of temporary seeded areas (Schedule No. 2). Rework and seed with Schedule No. 1.

3.9 MEASUREMENT AND PAYMENT

- A. No measurement and payment will be made for the work under this Section and all costs for same shall be included in the lump sum price bid for the project.

END OF SECTION