

SECTION 02 41 18
SITE DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Demolish and remove from the site those items so indicated on the Drawings, including but not limited to buildings, building pads, 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 other divisions 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 site 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.

END OF SECTION

SECTION 03 30 02
CONCRETE CURB AND GUTTER, AND SIDEWALK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide cast-in-place concrete, including formwork, where shown on the Drawings, as specified herein, and as 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 other divisions 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. Reference standards: Comply with the following codes, specifications and standards, except as otherwise shown or specified:
 - 1. American Concrete Institute (ACI) Publications:
 - ACI 305 Recommended Practice for Hot Weather Concreting
 - ACI 306 Recommended Practice for Cold Weather Concreting
 - 2. American Society for Testing and Materials (ASTM) Publications:
 - A 185 Welded Steel Wire Fabric for Concrete Reinforcement
 - C 31 Making and Curing Concrete Test Specimens in the Field
 - C 33 Concrete Aggregates
 - C 39-72 Compressive Strength of Cylindrical Concrete Specimens
 - C 94 Ready-Mixed Concrete
 - C 150 Portland Cement
 - C 260 Air-Entraining Admixtures for Concrete
- C. Testing agency: A testing laboratory will be retained by the Owner to perform material evaluation tests required by these specifications.
- D. Qualifications of contractors performing concrete work: Minimum of two (2) years experience on comparable concrete projects.
- E. Plant qualification: Plant equipment and facilities shall meet all requirements of the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association and ASTM C 94.

1.3 SUBMITTALS

- A. Comply with the pertinent provisions of the contract documents.

- B. Within 15 calendar days after receiving the Owner's Notice to Proceed, submit proposed mix designs for approval.
 - 1. Proportions shall be determined by means of laboratory tests of concrete made with the cement and aggregate proposed for use.
 - 2. Provide report in detail from an approved testing laboratory showing 7-day and 28-day strengths obtained using materials proposed.
 - 3. Required average strength above specified strength:
 - a. Determinations of required average strength above specified strength (f'c) shall be in accordance with ACI 318 and ACI 301.
 - 4. Cost of this work shall be borne by the Contractor.
- C. Manufacturer's data: Submit manufacturer's specification with application instructions for proprietary materials and items, including curing compound, form release agents, admixtures, patching compounds, and others as required by the Engineer.

1.4 PRODUCT HANDLING

- A. Comply with the pertinent provisions of the contract documents.

PART 2 - PRODUCTS

2.1 FORMS

- A. Use form materials conforming to ACI 347.
- B. Form coatings: Form release coating shall be neat oil with surface wetting agent or chemical release agent which effectively prevents absorption of moisture, prevents bonding with concrete, is non-staining to concrete and leaves the concrete with a paintable surface.
 - 1. On surfaces to receive an applied coating, use a residual free chemical form release agent that is compatible with the applied coating and will not prevent the applied finish from satisfactorily bonding to the concrete.

2.2 SIDEWALK REINFORCEMENT

- A. Fiber reinforcing:
 - 1. Use fiber reinforcing where indicated on the drawings.
 - 2. Provide polypropylene or co-polymer fibers as manufactured by High Tech Fibers, Inc., Fibermesh Company or an approved equal.
 - 3. Where required, use fiber reinforcing at a rate of 2.0 lbs. per cubic yard unless another rate is indicated on the drawings.
- B. Provide welded wire mesh for sidewalk reinforcement in compliance with ASTM A 185.

2.3 PREMOLDED JOINT FILLERS

- A. In concrete pavements (exterior) and concrete sidewalks, use self-expanding cork joint fillers complying with ASTM 1752, Type III.

2.4 CONCRETE MATERIALS

- A. Cement: Use portland cement: ASTM C 150, Type I, Type I-P or Type II, low alkali.
- B. Aggregates:
 - 1. Fine aggregate: Conform to ASTM C 33.
 - 2. Coarse aggregate: Conform to ASTM C 33, Size #57.
- C. Water: Clean and potable and free from injurious amounts of deleterious materials.
- D. Admixtures:
 - 1. Air entraining admixture: ASTM C 260.
 - 2. Water reducing, set controlling admixture: Conform to ASTM C 494.
 - a. Type A - water reducing.
 - b. Type D - water reducing and retarding.
 - 3. Do not use admixtures containing calcium chloride.
- E. Curing compounds:
 - 1. On all vertical and formed surfaces and construction joints, use a non-residual, non-staining curing compound conforming to ASTM C 309 Type 1 and 1D. Acceptable products are:
 - a. L&M Cure by L&M Construction Chemicals, Inc.
 - b. Horn WB-75 by A.C. Horn Company.
 - c. Sonosil by Sonneborn, Inc.
 - d. Approved equal.

2.5 CONCRETE MIXES

- A. Provide concrete with the compressive strength of 3000 psi for a 28-day strength as minimum:
- B. Entrained air: 3000 psi concrete, 5% \pm 1%.
- C. Slump: 3000 psi concrete, 4" \pm 1".
- D. Production of concrete:
 - 1. General: Concrete shall be ready mixed and shall be batched, mixed and transported in accordance with ASTM C 94 except as otherwise indicated.
 - 2. Monitor time and mix proportions by plant delivery slips.
 - 3. Air-entraining admixtures: Add air-entraining admixture into the mixture as a solution and measure by means of an approved mechanical dispensing device.
 - 4. Water reducing and retarding admixture: Add water reducing and retarding admixture and measure as recommended by the manufacturer.
 - 5. Addition of water to the mix upon arrival at the job site shall not exceed that necessary to compensate for a 1" loss in slump, nor shall the design maximum water-cement ratio be exceeded. Water shall not be added to the batch at any later time.
 - 6. Weather conditions: Control temperature of mix as required by ACI 306 "Cold Weather Concreting" and by ACI 305 "Hot Weather Concreting".

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.
- B. Water, mud, organic, and other detrimental material shall be removed from excavations before concrete is deposited.
- C. Notify the Engineer prior to placing concrete and place no concrete until the formwork, reinforcing and embedded items have been inspected by the Engineer.

3.2 FORMWORK

- A. General:
 - 1. Construct forms in conformance with ACI 347.
 - 2. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement.
 - 3. Coat form contact surfaces with approved form coating compound prior to placing reinforcing steel.
- B. Formwork reuse: Reuse only forms that are in good condition and which maintain a uniform surface texture on exposed concrete surfaces.
 - 1. Apply a light sanding as necessary to obtain a uniform texture.
- C. Removal of forms:
 - 1. Do not disturb or remove forms until the concrete has hardened sufficiently to permit form removal with complete safety.
 - 2. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged and that corners are true, sharp and unbroken.
 - 3. Whenever the formwork is removed during the curing period, continue to cure the exposed concrete by one of the methods specified herein.

3.3 PLACING CONCRETE

- A. Preparation:
 - 1. Remove foreign matter accumulated in the forms.
 - 2. Rigidly close openings left in the formwork.
 - 3. Wet wood forms sufficiently to tighten up cracks. Wet other material sufficiently to maintain workability of the concrete.
 - 4. Use only clean tools.
 - 5. Provide and maintain sufficient tools and equipment on hand to facilitate uninterrupted placement of the concrete.
 - 6. Before commencing concrete, inspect and complete installation of formwork and wire mesh.

- B. Conveying:
1. Transport and handle concrete from the truck to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients to maintain the quality of the concrete.
 2. Provide equipment for lifting, dumping, chuting, pumping or conveying the concrete, of such size and design as to ensure a practically continuous flow of concrete at the delivery and without separation of materials.
 3. Do not use concrete that is not placed within 1½ hours after water is first introduced into the mix unless the slump is such that it meets the specified limits without the addition of water to the batch.
- C. Placing:
1. Deposit concrete as nearly as practicable in its final location so as to avoid separation due to rehandling and flowing.
 2. Place concrete at such a manner that concrete upon which fresh concrete is deposited is still plastic.
- D. Hot weather placement: Place concrete in hot weather in accordance with ACI 305 "Hot Weather Concreting" and as specified herein.
1. Do not place concrete whose temperature exceeds 100°F.
 2. Thoroughly wet forms and reinforcing prior to placement of concrete.
 3. Use additional set retarder as necessary to increase set time.
 4. Start curing as soon as the concrete is sufficiently hard to permit without damage.
- E. Cold weather placement: Place concrete in cold weather in accordance with ACI 306 and as specified herein.
1. Do not place concrete when the atmospheric temperature is below 40°F.
 2. Do not add salts, chemicals, or other materials to the concrete mix to lower the freezing point of the concrete.
- F. Consolidation:
1. Consolidate each layer of concrete immediately after placing, by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.
 - a. Use vibrators having a 2" head diameter and a minimum frequency of 8000 vibrations per second.
 - b. Provide sufficient number of vibrators to properly consolidate the concrete, keeping up with placement operations.
 - c. Provide at least one spare vibrator on site.
 2. Insert and withdraw vibrators at points approximately 18" apart.
 3. Do not vibrate forms.
 4. Do not use vibrators to transport concrete inside the forms.

3.4 PROTECTION

- A. Protect the surface finish of newly placed concrete from damage by rainwater or construction traffic.
- B. Do not apply design loads to structures until the concrete has obtained the specified strength.

3.5 CURING

- A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures and mechanical injury.
- B. Curing compound: Apply curing compound immediately after completion of the finish on unformed surfaces and within two hours after removal of forms on formed surfaces.
 - 1. Spray the entire surface with two coats of liquid curing compound, applying the second coat in the direction of 90° to the first coat.
 - 2. Apply compound in accordance with the manufacturer's instructions to cover the surface with a uniform film that will seal thoroughly.

3.6 CONCRETE FINISHING

- A. Finish schedule: Unless otherwise indicated on the drawings, finish all concrete surfaces in accordance with the following schedule:
 - 1. Form finish: Formed surfaces not ordinarily exposed to view, including the underside of slabs not exposed to view.
 - 2. Broom finish: Exterior, outdoor slabs exposed to view including:
 - a. Outdoor floor slabs and walkways.
 - b. Other floors which may become wet or otherwise require a non-skid surface.
 - c. Sidewalks and concrete pavements.
 - 3. Edge finish: Exposed edges of slabs not receiving chamfer including:
 - a. Sidewalk edges and joints.
 - b. Pavement edges and joints.
 - c. Other slab edges not chamfered.
- B. Finishing procedures:
 - 1. Form finish:
 - a. Repair defective concrete.
 - b. Fill depressions deeper than 1/4".
 - c. Fill tie holes.
 - d. Remove fins exceeding 1/8" in height.
 - 2. Broom finish:
 - a. Float finish as specified herein.
 - b. Provide a scored texture by drawing a broom across the surface.
 - 3. Edge finish: Tool slab edges and joints with a 1/4" radius edging tool.

3.7 SURFACE REPAIR

- A. Patching mortar:
 - 1. Make a patching mortar consisting of 1 part portland cement to 2-1/2 parts sand by damp loose volume.
 - 2. Mix the mortar using one part acrylic bonding admixture to two parts water.
- B. Surface defects:
 - 1. Remove all defective concrete down to sound solid concrete.
 - 2. Chip edges perpendicular to the concrete surface or slightly undercut, allowing no feathered edges.
 - 3. Dampen surfaces to be patched.

4. Patch defects by filling solidly with repair mortar.
- C. Allow the Engineer to inspect the work before placing the patching mortar.
- D. Repair defective areas greater than 1 sq. ft. or deeper than 1-1/2" as directed by the Engineer using materials approved by the Engineer at no additional expense to the Owner.

3.8 JOINTS

- A. Construction joints:
 1. Unless otherwise approved by the Engineer, provide construction joints every ten (10) feet, or as shown on the drawings.
 2. Continue all reinforcing across construction joints and provide 1-1/2 " deep keyways unless indicated otherwise on the drawings.
- B. Expansion joints: Provide 1/2" expansion joints with premolded joint filters every thirty (30) feet.

3.9 FIELD QUALITY CONTROL

- A. Concrete cylinder tests:
 1. During construction, prepare test cylinders for compressive strength testing, using 6" diameter by 12" long single use molds, complying with ASTM C 31.
 - a. Make a set of three test cylinders from each pour.
 - b. Identify each and tag cylinder as to date of pour and location of concrete which it represents.
 - c. Deliver cylinders to testing lab selected by the Owner.
 - d. Cost for preparation and delivery of cylinders shall be borne by the Contractor. Cost for testing cylinders will be borne by the Owner.
 2. Should strengths shown by test cylinders fail to meet specified strengths for the concrete represented, then:
 - a. Engineer shall have the right to require changes in the mix proportions as he deems necessary on the remainder of the work.
 - b. Additional curing of those portions of the structure represented by the failed test cylinders shall be accomplished as directed by the Engineer.
 - c. Upon failure of the additional curing to bring the concrete up to specified strength requirements, strengthening or replacement of those portions of the structure shall be as directed by the Engineer.
 - d. The Engineer may require additional testing of concrete in question by either non-destructive methods such as the Swiss Hammer, Windsor Probe or Ultrasonics or by coring and testing the concrete in question in accordance with ASTM C 42. Such testing shall be performed at no additional cost to the Owner.
- B. Other field concrete tests:
 1. Slump tests: Either the Engineer or a testing laboratory representative will make slump tests of concrete as it is discharged from the mixer.
 - a. Slump test may be made on any concrete batch at the discretion of the Engineer.

- b. Failure to meet specified slump requirements will be cause for rejection of the concrete.
 - 2. Temperature: The concrete temperature may be checked at the discretion of the Engineer.
 - 3. Entrained air: Air content of the concrete will be checked by a representative of the testing laboratory at the discretion of the Engineer.
- C. Coordination of laboratory services: The Contractor shall be responsible for coordination of laboratory services.
 - 1. Maintain a log recording quantities of each type of concrete placed, date and location of pour.
 - 2. Inform the testing laboratory of locations and dates of concrete placement and other information as required to be identified in the laboratory's test reports.
- D. Tests required because of extensive honeycombing, poor consolidation of the concrete or any suspected deficiency in the concrete will be paid for by the Contractor.
- E. Dimensional tolerances for allowable variations from dimensions or locations of concrete work, including the locations of embedded items shall be as given in ACI 301.
- F. Concrete which fails to meet strength requirements, dimensional tolerances, watertightness criteria, or is otherwise deficient due to insufficient curing, improper consolidation or physical damage shall be replaced or repaired as instructed by the Engineer at no expense to the Owner.

3.10 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 31 10 01
SITE CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Remove trees, underbrush, undesirable growth, stumps, roots, etc., from the area to the limits shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in other divisions of these Specifications.
 - 2. Erosion and Sediment Control.

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.
- C. Comply with requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

No products are required for this work.

PART 3 - EXECUTION

3.1 AREA INCLUDED

- A. All areas included within the limits as indicated on the Drawings.

3.2 PROCEDURES

- A. Clearing and grubbing: The entire area within the limit lines described above shall be cleared and grubbed. Remove all vegetation, trees, brush, stumps, etc., from the area. All debris from this operation shall be burned if allowed by local regulations or shall otherwise be disposed of off the Owner's property.
- B. Selective clearing shall be done in areas designated by the Engineer. Selective clearing shall consist of removing vegetation, brush, stumps, etc., from the area. Selected trees shall be left

standing and care shall be taken not to damage trees to be left. All debris from this operation shall be disposed of off the Owner's property. Grubbing will not be required in areas designated for selective clearing.

- C. Removal of trees and shrubs: All trees to be removed shall be felled in such a manner as to avoid injury to remaining trees and to other features not proposed for removal. Trees shall be cut up and the trunks, limbs, and other debris shall be removed from the site. Undesirable shrubs and small trees shall be selectively removed as directed.
- D. Burning is not allowed.
- E. Stumps and roots: All stumps and roots larger than 2" in diameter shall be completely removed by grubbing except in areas of building site, parking areas and drives, they may be cut off not less than 18" below any subgrade. The area of operation then shall be cleared of resulting debris and matted roots, weeds and other extraneous matter and such shall be hauled away from the site. Generally, all material that cannot be compacted to 90% maximum density in lawn areas and 95% of maximum density elsewhere shall be removed.
- F. 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.
- G. Erosion control: Construct and maintain erosion control as shown on the Drawings and in accordance with Section 31 40 01: Erosion and Sediment Control, and the local City'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 31 20 01
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, paved areas and open areas to the lines and grades shown on the drawings.
1. The work includes, but is not necessarily limited to:
Excavations and formations of embankments.
Dressing of graded areas, shoulders and ditches.
Roadway, parking area, drive and walk subgrade preparation.
 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 other divisions of these specifications.
 2. Site Clearing and Grubbing.
 3. Trenching, Backfilling for Utilities.
 4. Erosion and Sediment Control.
 5. Storm Drainage System.
- 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 the contract documents.

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 bladegrader, 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 (where a conflict exists between these requirements and those of the supplied subsurface investigation, the more stringent shall apply, unless otherwise approved, in advance, by the engineer):

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%
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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 removed from the site, unless the owner approves areas on-site for disposal.

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 31 30 02
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 other divisions 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, 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 is not permitted.

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 31 40 01
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 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 32 92 02 – Grassing for Stabilization.

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 SC150, 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 RIP-RAP

- A. Comply with Section 31 40 02 - Rip-Rap.

2.6 FILTER FABRIC (Temporary Stone Check Dam)

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

2.7 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.

2.8 COMPOST FILTER SOCK

- A. Refer to the requirements in the plans.

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 32 92 02.
- 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 32 92 02.

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 TEMPORARY STONE CHECK DAMS

- A. Utilize temporary stone check dams as indicated on the plans or directed by Engineer.
- B. Provide temporary stone check dams constructed of both rip-rap and #57 stone, as illustrated on the plans.

3.8 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

3.9 COMPOST FILTER SOCK

- A. Refer to the requirements in the plans.

3.10 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 ".

3.11 REMOVAL

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

3.12 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 31 40 02
RIP-RAP

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Furnishing all labor, materials, and equipment and performing all operations in conjunction with placing protective coatings of broken stone in accordance with these specifications and in conformity with the lines, grades and thicknesses shown on the plans or established by the Engineer.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in other divisions 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.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of the contract documents.

PART 2 - PRODUCTS

2.1 STONE FOR HAND PLACED RIP-RAP

- A. Provide SCDOT Class B rip-rap which complies with Section 804 of the SCDOT's "Standard Specifications for Highway Construction" and latest revisions and supplements.

2.2 GROUTED RIP-RAP

- A. Stone to conform to the requirements for hand placed rip-rap.
- B. Mortar for grout shall consist of one part portland cement and three parts sand.
- C. Water content of the grout shall be such that permits gravity flow into the voids with limited spading and brooming.

2.3 FILTER FABRIC

- A. Provide Mirafi 600X or approved equal.

PART 3 - EXECUTION

3.1 HAND PLACED RIP-RAP

- A. Where thickness is not shown on the plans, it shall be 12".
- B. 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 Engineer.
- C. Properly compact depressions that may be filled in trimming and shaping the slope.
- D. Install filter fabric, lapping sides 12".
- E. Begin placing in a trench at least 2' below the toe of the slope.
- F. Firmly imbed against the slope and the adjoining piece with the sides in contact and with broken joints.
- G. Fill the spaces between the larger pieces with spalls of suitable size, thoroughly ram into place.
- H. The finished surface shall present an even, tight surface true to line, grade and section.

3.2 GROUTED RIP-RAP

- A. The preparation and placement shall be the same as specified above for hand placed rip-rap.
- B. All voids between stone shall be filled with mortar to a depth of not less than 4" below the surface of the stone.
- C. Surface of the stones shall be left reasonably free of grout.
 - 1. Plastering of the rip-rap will not be allowed.
- D. Spaces between the stones shall be reasonably free of sand or other material and shall be wet during the placing of grout.

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 31 40 03
FABRIC UNDERLAY MATERIAL**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide stabilization fabric underlay material on existing grade under paving as shown on the Drawings, as specified herein, and as 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 31 20 01 - Site Grading.
 - 3. Section 32 12 17 - Stone Base Course.

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.

1.3 SUBMITTALS

- A. 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. Certificates, signed by the materials producer and the asphalt paving subcontractor, stating that the materials meet or exceed the specified requirements.

PART 2 - PRODUCTS

2.1 PROPERTIES

- A. Provide fabric woven from isolactic polypropylene monofilaments, non-biodegradable, resistant to chemicals and treated to withstand exposure to ultraviolet degradation.
- B. Fabric shall have the following properties:

1. Grab Tensile Strength	315 lb.
2. Grab Elongation	15%
3. Mullen Burst Strength	600 psi
4. Trapezoid Tear Strength	120 lb.
5. Apparent Opening Size (AOS) .425 mm	40 (US Sieve)
6. Permittivity	0.05 Sec ⁻¹
7. Flow Rate	4.0 gal/min/ft ²
8. Thickness	25 mils

- | | | |
|-----|-----------------------|-----------------|
| 9. | Weight | 6.0 oz./sq. yd. |
| 10. | Ultraviolet Stability | 70% @ 500 hours |

C. Fabric underlay material shall be Mirafi 600X or approved equal.

PART 3 - EXECUTION

3.1 EQUIPMENT AND CONSTRUCTION METHODS

A. Equipment and construction methods shall conform with the requirements of the SCDOT's "Standard Specifications for Highway Construction" and latest revisions and supplements.

3.2 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 32 12 16
ASPHALT PAVING**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide asphaltic concrete paving where shown on the Drawings, as specified herein, and as 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 31 20 01 - Site Grading.
 - 3. Section 32 12 17 - Stone Base Course.
 - 4. Section 32 12 20 - Milling, Cutting, and Replacing Pavements.

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.

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. Certificates, signed by the materials producer and the asphalt paving Subcontractor, stating that materials meet or exceed the specified requirements.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials and products used shall comply with pertinent sections of the South Carolina Department of Transportation's (SCDOT) "Standard Specifications for Highway Construction" and latest revisions and supplements.

2.2 ASPHALTIC CONCRETE MIXTURE (INTERMEDIATE COURSE)

- A. Materials and composition of mixture shall comply with Section 402 of the SCDOT's "Standard Specifications for Highway Construction" and latest revisions and supplements.
- B. Provide hot plant mixed asphaltic concrete paving materials.
 - 1. Temperature leaving the plant: 290°F minimum, 320°F maximum.
 - 2. Temperature at time of placing: 280°F minimum.

2.3 ASPHALTIC CONCRETE MIXTURE (SURFACE COURSE)

- A. Materials and composition of mixture shall comply with Section 403 of the SCDOT's "Standard Specifications for Highway Construction" and latest revisions and supplements.
- B. Provide hot plant mixed asphaltic concrete paving materials.
 - 1. Temperature leaving the plant: 290°F minimum, 320°F maximum.
 - 2. Temperature at time of placing: 280°F minimum.

2.4 EQUIPMENT

- A. Comply with requirements of Section 401 of SCDOT's "Standard Specifications" and latest revisions and supplements.

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.
 - 1. Sweep primed surfaces if needed.
 - 2. Adjust frames and covers if needed.

3.2 WEATHER RESTRICTIONS

- A. Do not apply asphalt mixtures to a wet or frozen surface or when air temperature is below 40°F in the shade and falling, or below 35°F in the shade and rising.

3.3 SPREADING AND FINISHING

- A. On arrival at point of use, dump directly into mechanical spreader.
- B. Immediately spread and strike off true to the line, grade and cross section indicated, to such loose depth that when work is completed, the indicated thickness or weight per square yard will be secured.
- C. Correct irregularities while the mixture is still hot.

- D. At locations not readily accessible to mechanical spreaders, acceptable hand spreading methods may be used.
- E. Finished surfaces placed adjacent to curbs, gutters, manholes, etc., shall be approximately 1/4" above the edges of these structures.

3.4 COMPACTION

- A. Perform initial rolling with 3-wheel steel roller or a steel wheel 2-axle tandem roller.
- B. Follow initial rolling with at least four complete coverages by a pneumatic tired roller.
- C. Complete rolling with steel wheel 2-axle tandem roller.
- D. Rolling shall start longitudinally at the sides and proceed gradually toward the center of the pavement, overlapping on successive trips approximately 1/2 the width of the roller.
- E. Use hand or mechanical tampers in areas not accessible to powered rollers.
- F. Surface mixture after compaction shall be smooth and true to the established crown and grade.
- G. Finished paving smoothness tolerance:
 - 1. Free from birdbaths.
 - 2. No deviations greater than 1/8" in 6'.

3.5 PROTECTION OF SURFACE

- A. Allow no traffic on surface until the mixture has hardened sufficiently to prevent distortion.

3.6 FLOOD TEST

- A. Flood the entire asphaltic concrete paved area with water by use of a tank truck or hoses.
- B. If a depression is found where water ponds to a depth of more than 1/8" in 6', fill or otherwise correct to provide proper drainage.
- C. Feather and smooth the edges of fill so that the joint between fill and original surface is invisible.

3.7 MEASUREMENT AND PAYMENT

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

END OF SECTION

SECTION 32 12 17
STONE BASE COURSE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide crushed stone base constructed on the compacted subgrade where shown on the Drawings, as specified herein, and as 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. Site Grading.

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.

1.3 SUBMITTALS

- A. Not Used.
- B. Certificates, signed by materials producer, stating that materials meet the specified requirements.

1.4 PRODUCT HANDLING

- A. Not Used.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials and products used shall comply with pertinent sections of the South Carolina Department of Transportation's (SCDOT) "Standard Specifications For Highway Construction," latest edition with revisions and supplements.

2.2 FINE AGGREGATE

- A. All materials and products used shall comply with pertinent sections of the South Carolina Department of Transportation's (SCDOT) "Standard Specifications For Highway Construction," latest edition with revisions and supplements.

2.3 COARSE AGGREGATE

- A. All materials and products used shall comply with pertinent sections of the South Carolina Department of Transportation's (SCDOT) "Standard Specifications For Highway Construction," latest edition with revisions and supplements.

2.4 COMPOSITE MIXTURE

- A. All materials and products used shall comply with pertinent sections of the South Carolina Department of Transportation's (SCDOT) "Standard Specifications For Highway Construction," latest edition with revisions and supplements.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

- A. Proofroll all areas to receive crushed stone paving.
 - 1. Make not less than three passes over the full area, using a 35 to 50 ton rubber tired roller.
- B. Remove all soft, unstable or unsuitable material that will not compact readily.
 - 1. Remove to full depth of unsuitable material, or to a depth of 30", whichever is less.
 - 2. Replace with satisfactory materials.
- C. Fill all holes, ruts or depressions which develop in the subgrade with approved on-site material, bringing subgrade to indicated line and grades.
- D. Compact subgrade using suitable construction procedures to provide not less than 95% Standard Proctor Maximum Dry Density.
- E. Seal roll the subgrade surface with a steel wheel roller, sealing the surface against excessive water infiltration.

3.2 PLACING AND MIXING OF PAVING MATERIAL

- A. Place aggregates using spreader boxes or other approved spreaders uniformly on one operation.
- B. Take care to avoid segregation of the fine from the coarse aggregate during handling, spreading or shaping operations.
- C. Mix, while at proper moisture, with motor grader or other equipment and maintain to required section and grade until thoroughly compacted.

3.3 ROLLING AND COMPACTING

- A. Perform using 3-wheel steel wheel roller weighing not less than 10 tons, tandem roller weighing at least 8 tons, or other rollers approved by the Engineer.

- B. Start rolling at edges and proceed toward the center, continue rolling until aggregates are firmly keyed or set.
- C. When initial compaction is completed, should voids remain, place fine aggregates on the surface in an amount only sufficient to fill the voids.
- D. Broom, wet and roll until coarse aggregate is set, bonded and thoroughly compacted for full width and depth.
- E. Compact stone base course to provide not less than 95% Modified Proctor Maximum Dry Density.

3.4 ALLOWABLE TOLERANCES

- A. Thickness tolerance: Provide the compacted thicknesses shown on the Drawings within a tolerance of minus 1/2".
 - 1. Depth measurements will be made by digging through the base at intervals no closer than 250', nor greater than 500' apart.
 - 2. Where thickness is less than depth specified minus 1/2", it shall be corrected as directed by the Engineer.
- B. Smoothness tolerance: Provide the lines and grades shown on the Drawings within a tolerance of 3/8" in 10', parallel to the center line of the roadway nor more than 1/2" from a template conforming to the cross sections shown on the plans.
- C. Deviations: Correct by removing materials, replacing with new materials, and reworking or recompacting as required.

3.6 MEASUREMENT AND PAYMENT

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

END OF SECTION

SECTION 32 12 20
MILLING, CUTTING AND REPLACING PAVEMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Milling, cutting and replacement of existing pavements for installation of utility lines, as specified herein, and as needed for a complete and proper installation of transitions to existing pavement at project boundaries.
- 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 31 30 02 - Trenching, Backfilling for Utilities.
 - 3. Section 32 12 16 - Asphalt Paving.

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 for proper performance of the work of this Section.

1.3 SUBMITTALS - Not Used

1.4 WARRANTY

- A. All remove and replace pavement work shall be warranted for two years beginning on the date of acceptance by the Owner.

PART 2 - PRODUCTS

2.1 CONCRETE

- A. Comply with Section 03 30 02, using strength specified herein.

2.2 ASPHALTIC CONCRETE

- A. Comply with Section 32 12 16.

2.3 AGGREGATE BASE COURSE WITH PRIME

- A. Comply with Sections 32 12 16 and 32 12 17.

PART 3 - EXECUTION

3.1 GENERAL

- A. Remove to neat lines and dispose of as directed.
- B. Replace with bases and pavements as required by Sections 32 12 16 and 32 12 17 and the Construction Plans.

3.2 CUTTING

- A. Asphalt pavement or base:
 - 1. Cut on straight and true lines, to a minimum depth of 2", using powered concrete saw.
 - 2. Shear off remaining depth with pneumatic tools.
- B. Concrete sidewalks shall be removed back to the nearest joint on each side of the crossing.
- C. Cut to straight and true lines with powered concrete saw.

3.3 MILLING

- A. Use self-propelled milling equipment capable of maintaining accurate cut depth and slope and providing smooth cut edges.
- B. Ensure the equipment can accurately and adequately establish profile grade and control cross slope.
- C. Equip the milling machine with integral material pickup and truck discharges.
- D. Ensure the milling machine has effective means for dust control.
- E. Material size to comply with SCDOT specifications.
- F. All asphalt pavement designated for milling, unless otherwise provided, must be disposed of by the Contractor at no additional cost to the Owner.

3.4 REPLACEMENT

- A. Concrete sidewalks:
 - 1. Replace with 4000 psi concrete.
 - 2. Depth shall be equal to existing section removed, but not less than 4".
 - 3. Finish surface to match existing sidewalk.
- B. Flexible pavements:
 - 1. Compact subgrade as required.
 - 2. Undercut each edge 6" to form a shelf.
 - 3. Reconstruct roadway according to details shown on the Construction Plans.

4. Taper resurfacing to existing pavement evenly for a distance of 50 feet beyond repaired area, or as shown on the Construction Plans.
5. Comply with Section 32 12 16.

3.5 MEASUREMENT AND PAYMENT

- A. No separate measurement or 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 32 92 02
GRASSING FOR STABILIZATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section is being supplied as a supplement to the plans-specified use of SCDOT Supplemental Technical Specification SC-M-810-4 (latest edition). Where the two are in conflict, the most stringent shall apply.
- B. All grassing for the project shall be permanent grassing.
- C. 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 not stabilized by field turf.
- D. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in other divisions 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 the contract documents.
- 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 the contract documents.
- 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 SC150, 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.

3.2 SEEDING SCHEDULES

- A. See plans.

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 as needed.
- 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 will be accepted when the grass attains a height of 2".
- B. No acceptance will be made of temporary seeded areas. 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

SECTION 33 41 00
STORM DRAINAGE SYSTEM

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 other divisions 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. All materials in this Section are to be manufactured in the United States.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of the contract documents.
- 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. Comply with pertinent provisions of the contract documents.

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 all 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.

2.3 DRAINAGE STRUCTURES

- A. Precast drop inlets, catch basins, curb inlets, manholes, junction boxes, etc., and associated inlet castings, steps, frames, covers, etc., shall be as approved by SCDOT.
- B. All other precast structures (i.e., headwalls, flared end sections, etc.) shall be approved by Engineer prior to installation.

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 31 30 02 and Section 32 12 20 of these specifications, and the following requirements:
 - 1. Maximum trench widths, depths, bedding and tamping methods and requirements shall be in accordance with the details in the plans or as required by the SCDOT "Standard Specifications for Highway Construction" latest edition.
Additionally:
 - a. 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.
 - b. Include cost of special bedding and tamping in unit prices bid for sewer.
- B. 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 SCDOT 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.

3.3 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 BUILT-IN-PLACE STRUCTURES

- A. Construct bottom of all structures using 3000 psi concrete, to dimensions indicated on the Contract Drawings.
- B. Lay brick carefully embedded in mortar on bottom and ends.
- C. Plaster outside of structures with a smooth coat of cement mortar.
- D. Set frames and tops to grades indicated, mortar into place.

3.5 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