Section 02270 – EROSION AND SEDIMENT CONTROL

1. SCOPE. This section covers temporary erosion and sediment control measurers to be exercised by the Contractor as necessary to stabilize disturbed areas.

Seeding is covered in the seeding and mulching section.

2. GENERAL. Contractor shall prevent erosion of soil on the site and on adjacent property resulting from his construction activities. Effective erosion and sediment control measures shall be initiated prior to the commencement of clearing, excavation, or other operations that will disturb the natural protection.

Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion.

Erosion and sediment control shall be provided at the locations indicated on the Drawings as required by construction activities. Erosion and sediment control devices shall be constructed as indicated on the Drawings. In addition, the Contractor shall be required to provide additional erosion control at other locations designated by the Engineer, Owner, or state regulatory agency.

At the completion of the Work or at such time as the Engineer, Owner, and state regulatory agency determine that adequate permanent erosion control measures have been established, the Contractor shall remove the erosion control measures and dispose them off site. All disturbed areas shall be seeded.

Erosion and sediment control measures shall be in accordance with the North Carolina "Erosion and Sediment Control Planning and Design Manual."

If erosion control measures, in addition to those specified and required on the Drawings, are required by NCDEHNR due to the actions or processes of the Contractor, all costs shall be at the Contractor's expense and at no additional cost to the Owner.

3. STATUTORY REQUIREMENTS. As required by the North Carolina Sedimentation Pollution Control Act, the Contractor shall protect all natural resources and properties adjoining the site from the effects of accelerated erosion resulting from land-disturbing activities during construction. The Contractor shall comply with the following minimum standards of the Act:

a. A copy of the Owner's approved soil erosion and control plan shall be on file in the Contractor's office at the site.

b. A buffer zone, sufficient to restrain sedimentation, shall be maintained between the land-disturbing activity and any adjacent property or watercourse.

c. New of affected slopes shall be at an angle that can be retained by vegetative cover, and exposed slopes shall be provided with a ground cover sufficient to restrain erosion within 30 working days of completion of any phase (rough or final) of grading. Rye grass is not an acceptable substitute for the providing of a ground cover.

d. A permanent ground cover, sufficient to restrain erosion, shall be provided within the shorter of 30 working or 120 calendar days after completion of construction or development.

4. EROSION AND SEDIMENT CONTROL PRACTICES. The minimum erosion and sediment control practices shall consist of the following types or other means acceptable to the Engineer, Owner, and state regulatory agency and shall be installed in accordance with Division of Land Resources, Land Quality Section manual. If there are nay conflicts between this specification and the Division of Land Resources, Land Quality Section manual, the manual shall govern.

4.01 Temporary Construction Entrances. Temporary construction entrances shall be provided where indicated on the Drawings. In locations where grass is established and no change in grade is to be made, the temporary construction entrance shall be installed on top of existing grade to the dimensions indicated.

4.02 Silt Fences. Contractor shall use silt fences as a temporary erosion and sediment control measure in the locations indicated on the Drawings and where required. Silt fences shall be constructed in accordance with the details indicated on the Drawings and the following.

Silt fence posts shall be 6 feet in height and of the self-fastener angle steel type. Posts shall be spaced not greater than 8 feet on centers, or as required by the Engineer.

Woven wire fencing shall conform to ASTM A116 for Class 3 galvanizing. Fabric shall be a minimum of 32 inches in width and shall have a minimum of 6 line wires with 12 inch stay spacing. The top and bottom wires shall be 10-gage while the intermediate wires shall be 12-1/2 gage. Wire fabric shall be fastened to wood posts with not less than No. 9 wire staples 1-1/2 inches long.

Filter fabric shall be burlap unless the silt fence is to be used more than 45 days, in which case a synthetic filter fabric shall be used. Burlap shall be 10 ounces in weight per 3 foot width, with a minimum width of 36 inches. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life. The filter fabric shall have a minimum 85 percent filtering efficiency, slurry flow rate of 0.3 gal/sq ft/min, and 30 lb/inch tensile strength at 20 percent elongation.

4.03 Sediment Basins. Sediment basins shall be installed where indicated on the Drawings and shall be the size indicated at each location. The area which will be covered by the berms for each basin shall be stripped of all vegetation and top soil. The basin shall be excavated and

suitable excavated material shall be used to build the berms around the excavated areas. The berm shall be compacted and filled to six inches above the desired height. All cut and fill slopes shall be 2 horizontal to 1 vertical or flatter.

The outlet for each basin shall be constructed of riprap and gravel and shall have a minimum width at the base of three feet with a side slope of 1:1 tying into the berm. The top of the outlet shall have a weir 1.5 feet below the top of the berm. The outlet shall extend beyond the toe of the berm until stable conditions are reached.

After the basin is installed, the berms and all disturbed areas around the basin shall be stabilized with grass or by other acceptable means.

4.04. Drop Inlet Protection. Drop inlets shall be protected by the Contractor with sediment filters as indicated on the Drawings. Filters shall have concrete blocks surrounding the inlet with one block on each side of the basin placed on its side. The base of the block shall rest against the top of the basin to provide adequate lateral support. A wire screen shall be placed over the blocks and rock shall be placed against the wire to the top of the barrier. Drop inlet protection shall be maintained such that it can retain sediment as designed.

4.05. Curb Inlet Protection. Curb inlets shall be protected by the Contractor with burlap bags filled with clean gravel or stone. Three bags shall be placed on their sides abutting the curb at either side of the inlet. Curb inlet protection shall be maintained such that it can retain sediment as designed.

4.06. Matting. Matting shall be placed where needed to aid in stabilizing disturbed areas. Matting for erosion control shall be jute matting or excelsior matting. Other acceptable material manufactured especially for erosion control may be used when approved by the Engineer in writing before being used. Matting for erosion control shall not be dyed, bleached, or otherwise treated in a manner that will result in toxicity to vegetation.

Jute matting shall be of uniform open plain weave of single jute yarn, 48 inches in width plus or minus 1 inch. The yarn shall be of loosely twisted construction and shall not vary in thickness by more than one half its normal diameter. There shall be 78 warp ends, plus or minus 2, per width of the matting; 41 weft ends, plus or minus 1, per linear yard; and the weight shall average 1.22 pounds per linear yard of the matting with a tolerance of plus or minus 5 percent.

Excelsior matting shall be wood excelsior 48 inches in width plus or minus 1 inch, shall have a minimum thickness of ¼ inch, and the weight shall average 1.07 pounds per linear yard of the matting with a tolerance of plus or minus 5 percent. The excelsior matting shall be covered on one side with a woven fabric consisting of either twisted paper cord or cotton cord having a minimum mush size of 1 inch by 1 inch, and a maximum mesh size of 1-1/2 inch x 3 inches.

Staples shall be machine made of No. 11 gage new steel wire formed in a “U” shape. The size when formed shall not be less than 6 inches in length with a throat of not less than 1 inch in width.

Matting shall be installed on seeded areas on slopes and in ditches where it is needed to aid in stabilization of areas not otherwise protected by riprap, or on other areas as directed by the Engineer. Matting shall be placed immediately following seeding. The earth surface shall be smooth and free from stones, clods, or debris which will prevent the contact of the matting with the soil. Care shall be taken to preserve the required line, grade and cross section of the area treated.

Matting shall be unrolled in the direction of the flow of water and without stretching so that it will lie smoothly but loosely on the soil surface. The up-channel or top of slope end of each piece of matting shall be buried in a narrow row trench at least 5-inches deep. The trench shall be closed and firmly tamped after the end of the matting is buried. Where one roll of matting ends and a second roll begins, the end of the upper roll shall be brought over the buried end of the second roll so that there will be a 4 to 6 inch overlap. Check slots shall be constructed at 50 feet longitudinally or as directed by the Engineer. Slots shall be narrow trenches at least 5 inches deep. Matting shall be folded over and buried to the full depth of the trench, and the trench shall then be closed and firmly tamped. Where two or more widths of matting are laid side by side, the overlap shall be at least 4 inches.

Staples shall be placed approximately 10 inches apart across matting ends, junctions, and check slots. Staples shall be placed 3 feet apart along the outer edges and down the center of each strip of matting. Lapped edges shall be stapled every 24 to 36 inches.

When excelsior matting is used, the matting shall be installed with the fabric on the top side.

After matting has been placed and stapling completed, the matting shall be rolled with an approved roller to assure that it is in proper contact with the soil.

In the installation of erosion control matting on cut or fill slopes, the Engineer may require adjustments in the trenching or stapling requirements to fit individual slope conditions.

4.07 Riprap. Stone for riprap shall conform to the NCDOT Standard Specifications for Road and Structures, Section 942-1.

The stone shall be graded to meet the following requirements:

> For Class A Riprap: Stone shall be of hard, durable, natural rock and shall range in size from 2-inches to 6-inches with the stone gradation being equally distributed within the required size range.
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> For Class B Riprap: Stone shall be of hard, durable, natural rock and shall range in size from 5 inches to 15 inches with the stone gradation being equally distributed within the required size range.

For Class I Riprap: Stone shall vary in weight from 5 to 200 pounds. At least 30 percent of total weight of the riprap shall be in individual pieces weighing a minimum of 60 pounds each. Not more than 10 percent of the total weight of the riprap may be individual pieces weighing less than 15 pounds each.

For Class II Riprap: Stone shall vary in weight from 25 to 250 pounds. At least 60 percent of the total weight of the riprap shall be in individual pieces weighing a minimum of 100 pounds each. Not more than 5 percent of the total weight of the riprap may be individual pieces weighing less than 50 pounds each.

All disturbed soil at creek crossings or other areas shown on the Engineer's Drawings shall be riprapped. Riprap shall be placed a minimum of 10 feet on each side of the centerline of the pipe. Riprap shall be placed to the satisfaction of the Engineer.

Stone for riprap shall be sound, durable, weather-resistant rock and shall be free from overburden soil.

The use of broken concrete will not be permitted.

4.07.01. Preparation. Prepare subgrade to the required lines and grades as shown on the details or indicated on the Drawings. Place any fill required in the subgrade to a density equal to that of the surrounding area.

4.07.02. Filter Cloth. The filter cloth shall be composed of strong rot-proof synthetic fibers formed into a fabric of the nonwoven type. Fabric shall be free of any treatment or coating that might significantly alter its physical properties after installation.

During all periods of shipment and storage, the cloth shall be maintained, wrapped in a heavy duty protective covering to protect the fabric from direct sunlight, ultraviolet rays, mud, dirt, dust, and debris.

The filter cloth shall have a puncture strength to withstand a minimum force of 80 pounds, in accordance with ASTM D751.

Installation shall be in accordance with the manufacturer's recommendations. Care shall be taken to insure that the cloth develops no rips, holes, deterioration or damage during installation.

Filter cloth as manufactured by Enka, Monsanto, Carthage Mills, Inc., or equal will be acceptable.

4.07.03. Installation. Deliver and place riprap in a manner that will insure that riprap shall be reasonably homogeneous with the smaller stones and spalls filling in the voids between the larger stones. Place riprap in a manner that will prevent damage to the filter cloth. Repair any damage cloth in a manner acceptable to the Engineer. Place riprap by mechanical methods,

augmented by hand placing where necessary to prevent damage to permanent works, provided that when the riprap is completed it forms a properly graded, dense, neat layer of stone.

The completed riprap shall be at least the thickness indicated on the plans. Toe walls and other construction details shall be as indicated on the plans.

5. MAINTENANCE OF EROSION CONTROL MEASURES. The Contractor shall be responsible for maintaining all erosion control measures. Maintenance items shall include, but not be limited to, the following:

a. Check for points of scour or bank failure and deposition, rubbish or channel obstructions, rodent holes, and excessive wear.

b. Remove deposition and undesirable plant growth. Repair damages from scour, rodents, and loss of freeboard.

c. Correct unauthorized modifications, tampering, or vandalism.

The Contractor shall inspect the erosion control measures frequently and after each rain.

End of Section