# SECTION 02370 – EROSION AND SEDIMENTATION CONTROL

## PART 1 - GENERAL

### 1.01 DESCRIPTION OF WORK:

A. Provide and maintain devices to control erosion, siltation, sedimentation and dust that occur during construction operations. Undertake every reasonable precaution and do whatever is necessary to avoid erosion of soil and to prevent silting of wetland areas, drainage ditches, streams, and lakes.

B. Provide measures to control dust caused whether on or off the Project site.

C. Deficiencies in erosion control measures indicated by failures or erosion shall be immediately corrected by providing additional measures or different techniques to correct the situation and prevent subsequent erosion.

D. Exposure of soils on embankments, excavations, and graded areas shall be kept as short as possible. Initiate seeding and other erosion control practices as soon as reasonably possible.

E. Provide erosion control measures in any ditch, swale or channel before water is allowed to flow in the waterway.

F. Mechanized Equipment will not be permitted in water courses unless specifically required in the Contract Documents.

### 1.02 QUALITY ASSURANCE:

A. Conform to all requirements of applicable federal, state and local permits, and Contract Documents, and conform to the recommendations of the Standards (see Part D below) whether the measures are specifically noted herein, or not.

B. Meet with the ENGINEER to discuss erosion control requirements prior to the start of construction.

D. Standards: "Maine Erosion and Sedimentation Control BMPs" prepared by the Maine Department of Environmental Protection, current revision.

### 1.03 SUBMITTALS:

A. Erosion Control Program: Prepare and submit to ENGINEER for approval prior to construction startup.

## PART 2 - PRODUCTS

### 2.01 MATERIALS:

A. General: Use the following materials in construction of sediment traps, erosion control devices, and slope protection as specified on the DRAWINGS. Other materials require approval of the ENGINEER.

B. Heavy Rip-Rap: Sound, durable rock which will not disintegrate due to exposure to water or weather; angular in shape such as rough, unhewn quarry stone or fragments obtained by blasting, breaking or crushing natural rock.

Round boulders or cobbles will not be permitted.

Stone Weight: Minimum weight of 500 pounds each and at least 50 percent of the stones, by volume, shall exceed 1,000 pounds each.

C. Rip-Rap Stone: Sound, durable rock which will not disintegrate due to exposure to water or weather; angular in shape such as rough, unhewn quarry stone or fragments obtained by blasting, breaking or crushing natural rock.

Rounded boulders or cobbles will not be permitted.

Stone Weight: 10 pounds to 200 pounds, with approximately 50% of the stones weighing at least 50 pounds. Stones weighing more than 200 pounds may be used where practicable.

D. Stone Ditch Protection: Sound, durable rock, which will not disintegrate due to exposure to water or weather; angular in shape such as rough, unhewn quarry stone or fragments obtained by blasting, breaking or crushing natural rock.

Rounded boulders or cobbles will not be permitted.

Stone size shall conform to a grain diameter of $D_{50}$ = 6-inch, with a maximum stone size of 9-inch.

E. Gravel Blanket: 6 inches of 1-1/2-inch crushed gravel blanket placed under and over filter fabric as shown on DRAWINGS. Sieve analysis by weight:

| Sieve Size* | Max % Passing by Weight |
|---|---|
| 2" | 100 |
| No. 4 | 30-55 |
| No. 200 | 0-10 |

F. Revegetation Mat: Provide Mirafi Miramat, or equal.

G. Mats and Nettings:

1. Wood Excelsior Blanket: Machine produced blanket of curled wood excelsior with 80% of the fibers being 6 inches or longer. The wood fibers shall be evenly distributed throughout the blanket and a covered with a photodegradable plastic mesh. Typical weight of 0.9 pounds per square yard. Curlex by American Excelsior, or approved equal.

2. Straw Blanket: A machine produced blanket consisting of 100% straw, with a polypropylene net on the top and bottom surfaces and sewn together with biodegradable thread. Typical weight of 0.5 pounds per square yard. S150 by North American Green, or approved equal.

3. Erosion Control Blanket Anchors: Wooden pegs or metal staples as recommended by the manufacturer for the installation of the erosion control blanket. The fasteners shall not be longer than 9 inches.

H. Mulches:

1. Long fibered hay or straw in dry condition and which are relatively free of weeds and foreign matter detrimental to plant life.

2. Mulch binder: An asphalt emulsion mulch binder of type acceptable to the ENGINEER.

3. Mulch netting: Plastic or nylon mesh netting with approximate openings of 1/4- to 1-inch; or other netting approved by the ENGINEER.

I. Temporary Seed: Seed variety and applied rate are selected based upon the date of application, and as determined by the following table. Equivalent seed mixture based on its suitability for use in controlling erosion of the various soil types and slopes may be used as approved by the ENGINEER.

| Dates | Seed | Applied Rate |
|---|---|---|
| 4-1 to 7-1<br>8-15 to 9-15 | Annual Ryegrass | 0.9 lb/1000 $ft^2$ |
| 5-15 to 8-15 | Sudangrass | 0.9 lb/1000 $ft^2$ |
| 9-15 to 10-15 | Winter Rye | 3.0 lb/1000 $ft^2$ |

J. Sod:

1. Grown from certified seed of adapted varieties to produce high quality sod free of any serious thatch, weeds, insects, diseases and other pest problems.

2. At least one year old and not older than three years. Cut with a 1/2- to 1-inch layer of soil.

K. Drains:

1. Flexible drains consisting of collapsible neoprene pipe, minimum 8-inch diameter.

2. Corrugated metal pipe and inlet of a gauge consistent with the loading conditions, minimum 12-inch diameter.

L. Polyethylene Liner: U.V. Resistant, minimum thickness 6 mils.

M. Woven Filter Fabric: Provide Mirafi 600X woven textile or equal.

N. Non-Woven Fabric: Equal to Mirafi 160N, or approved equal.

O. Siltation Fence: MIRAFI Environfence, Amoco 1380 Silt Stop, or approved equal.

P. Hay Bale Barrier: Rectangular shaped bales of hay or straw weighting at least 40 pounds per bale; free from noxious weed seeds and rough or woody materials.

Q. Catch Basin Inlet Sediment Barrier: ACF Environmental, Inc. High Flow Siltsack® or approved equal.

PART 3 - EXECUTION

3.01 TEMPORARY EROSION DEVICES:

A. General: Provide the following devices to control erosion. Other devices require approval of the ENGINEER.

B. Hay Bale Barrier: Provide temporary hay bale fence as shown on DRAWINGS, and in ditches at 100-foot minimum intervals or where designated by the ENGINEER for erosion checks.

1. Bales shall be placed in a row with ends tightly abutting the adjacent bales.
2. Each bale shall be embedded in the soil a minimum of 4 inches.
3. Bales shall be securely anchored in place by stakes or re-bars driven through the bales. The first stake in each bale shall be angled toward previously laid bale to force bales together.
4. Inspection shall be frequent and repair or replacement shall be made promptly as needed.
5. Bales shall be removed when they have served their usefulness so as not to block or impede storm flow or drainage.

C. Silt Fence:

1. Install silt fence prior to any earthwork including grubbing.
2. Place where shown on Drawings or as directed by the ENGINEER. Install parallel to contours where possible, prior to site clearing and grading activities.
3. Bury lower edge of fabric at least 8 inches below ground surface to prevent underflow.
4. Curve ends of fence uphill to prevent flow around ends.
5. Inspect frequently; repair or replace any damaged sections.
6. Remove fence only when adequate grass catch has been established as determined by the ENGINEER.

D. Mulch:

1. Undertake immediately after each area has been properly prepared.
2. When seed for erosion control is sown prior to placing the mulch, place mulch on the seeded areas within 48 hours after seeding.
3. Apply mulch at 1.5 to 2.0 tons per acre. Mulch applied between the dates of December 1 through March 31 for winter stabilization shall be applied at 3.0 to 4.0 tons per acre.
4. Blowing chopped mulch will be permitted.

5. Hay mulch should cover the ground enough to shade it, but the mulch should not be so thick that a person standing cannot see ground through the mulch.

6. Remove matted mulch or bunches.

E. Temporary Erosion Control Matting:

1. Surface Preparation:

a. Conform to grades and cross sections for slopes and ditches shown on the Drawings.
b. Finish to a smooth and even condition with all debris, roots, stones, and lumps raked out and removed.
c. Loosen soil surface to permit bedding of the matting.
d. Unless otherwise directed, apply seed prior to placement.

2. Installation:

a. Place strips lengthwise in the direction of the flow of water.
b. Where strips are laid parallel or meet as in a tee, overlap at least 4 inches.
c. Overlap ends at least 6 inches in a shingle fashion.
d. The up-slope end of each strip of the matting shall be turned down and buried to a depth of not less than 6 inches with the soil firmly tamped against it.
e. The ENGINEER may require that any other edge exposed to more than normal flow of water be buried in a similar manner.
f. Build check slots at right angles to the direction of the flow of water. Space so that one check slot or one end occurs within each 50 feet of slope length. Construct by placing a tight fold of the matting at least 6 inches vertically into the ground, and tamp the same as up-slope ends.
g. Bury edges of matting around the edges of catch basins and other structures.
h. When ordered, additional seed shall be spread over matting, particularly at those locations disturbed by building the slots. Matting shall then be pressed onto the ground with a light lawn roller or by other satisfactory means.
i. Drive staples vertically into the ground flush with the surface.
j. On slopes flatter than 4:1, space staples not more than 3 feet and one row, alternately spaced, down the center.
k. On grades 4:1 or steeper, place staples in the same three rows, but spaced 2 feet apart.
l. On all overlapping or butting edges, double the number of staples, with the spacing halved; all ends of the matting and all required check slots shall likewise have staples spaced every foot.

F. Temporary Seeding:

1. Seed with appropriate seeds and application rates from the table in paragraph 2.01I of this Section. Seed shall be sown at the rate indicated, on the pure live seed basis.

2. Mulch areas where temporary seeding has been applied. Do not mulch seeded areas where matting will be immediately installed.

3. If temporary seeding does not achieve adequate growth by December 1, an additional layer of mulch shall be applied at that time.

G. Topsoil Storage:

1. Topsoil which is stockpiled on the site for use in loam applications shall be placed out of natural drainages, in piles not more than 8 feet in height, which have side slopes of 2:1 to 1.5:1.

2. A trench, depth as required, shall be constructed around the base of the pile to prevent eroding soil from washing into drainages.

3. Any topsoil piles shall be covered with temporary seed and mulch immediately following stockpiling.

H. Temporary berms: Construct temporary barriers along the toe of embankments using side drains as required.

I. Temporary slope drains: Collapsible pipe with corrugated metal pipe inlet.

J. Sedimentation basins: Construct sedimentation basins adequate to avoid siltation of streams and rivers.

K. Sediment Traps: Construct sediment traps in runoff ditches, using hay bale fence, at a minimum of 100-foot intervals or as required.

L. Catch Basin Inlet Sediment Barrier: Install, check, and clean or replace per manufacturer's recommendations.

3.02 REMOVAL OF TEMPORARY EROSION CONTROL:

A. Remove temporary materials and devices when permanent soil stabilization has been achieved. Re-use materials in good condition if approved by the ENGINEER.

B. Remove unsuitable materials from site and dispose of in a legal manner.

3.03 SUBGRADE PREPARATION:

A. Grade and compact, where possible, areas to receive protection to a uniform slope. Allow for depth of protection stone layer.

B. Footing trench: Excavate trench across toe of slope as shown on the DRAWINGS for rip-rap.

3.04 FILTER FABRIC PLACEMENT:

A. General: Place filter fabric under the rip-rap, or stone ditch protection as shown on the DRAWINGS. Filter fabric is to be placed in one continuous piece. Sew all seams as per manufacturer's recommendation.

3.05 RIP-RAP PLACEMENT:

A. General: Place required rip-rap to full depth shown on DRAWINGS in one operation without special handwork, measured perpendicular to the face of the slope to obtain a uniform appearance true to line and grade. Place larger stones at bottom of slope. Place stones in close

contact, with interlocking of face stones and backing stones. Fill openings between stones with smaller rocks or coarse gravel.

3.06 MAINTENANCE:

A. Inspect erosion control practices immediately after each rainfall and at least daily during prolonged rainfall or snowmelt for damage. Provide maintenance and make appropriate repairs or replacement at no additional cost to the OWNER, until Project acceptance or as required to comply with maintenance requirements if longer.

B. Remove silt from silt fence when it has reached one foot above grade or prior to expected heavy runoff or siltation.

C. Repair matting if any staples become loosened or raised, or if any matting becomes loose, torn, or undermined, make satisfactory repairs immediately.

D. Following temporary and/or final seeding, the contractor shall inspect the work area semimonthly until the seedlings have vegetated 85% - 90% of the area. Reseeding shall be carried our by the CONTRACTOR with follow-up inspections in the event of any failures until vegetation is adequately established.

**End of Section**