SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide and maintain devices to control erosion, siltation, sedimentation, and dust that occur during construction operations in accordance with this Section, applicable reference standards listed in Article 1.03, as may be shown on the Drawings and as required by Laws and Regulations.

2. Attendance at Preconstruction On-Site Conference with the Conservation Agent and/or a member of the Conservation Commission.

B. Related Requirements

1. Division 31 Earthwork, all sections

1.02 PRICE AND PAYMENT PROCEDURES

A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. Order of Conditions

2. U.S. Composting Council (USCC)

3. Massachusetts Executive Office of Environmental Affairs, Massachusetts Erosion & Sedimentation Control Guidelines for Urban and Suburban Areas

4. MassDOT Standard Specifications and Supplements and Construction Details

a. M6.04.2 Straw Mulch

b. 767 Mulching; Seed for Erosion Control

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1. Prior to the commencement of any activity on Site, arrange and attend Preconstruction On-Site Conference with the Conservation Agent and/or a member of the Conservation Commission in accordance with Section 01 15 30.

1.05 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

B. Product Data

1. Siltation fence
2. Erosion control mulch sock/tube
3. Temporary erosion control matting
4. Siltation control devices

C. Erosion and sediment control plan prior to the start of construction

D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

A. Provide in accordance with Division 01 General Requirements.

B. Conform to all requirements of applicable federal, state and local permits, including the "Erosion and Sedimentation Control Details," and the local Conservation Commission.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

B. Composting materials: provided with a Certificate of Compliance from an USCC's Seal of Testing Assurance (STA) Program Certified Laboratory, verifying that the compost meets the parameters listed herein and certification not older than 90 days.

1.08 SITE CONDITIONS

A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Siltation Fence: Mirafi Environfence or Amoco 1380 Silt Stop.

B. Mulch Sock/Compost Filter Tube

1. Type and use: as specified by the Massachusetts Erosion & Sedimentation Control Guidelines for Urban and Suburban Areas.

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

3. Mulch binder: asphalt emulsion mulch binder of type acceptable to the Engineer.

4. Mulch netting: plastic or nylon mesh netting with approximate openings of 1/8 inch; or other netting approved by the Engineer.

5. Color: orange or orange striped for visibility.

6. Tensile strength: minimum 202 psi per ASTM D5035 with ultra-violet exposure resistance of 100 percent at 1,000 hours per ASTM G155.

7. Stakes for installing compost filter tubes: 1-1/2 inches square hard wood stakes, trimmed to a blunt end.

8. Compost fill material for the compost filter tube: certified though the USCC's STA Program and not derived from agricultural, food, or industrial residues; bio-solids (treated sewerage sludge); yard clippings; source-separated or mixed solid waste, free from man-made foreign matter, and without objectionable odors.

C. Seeding

1. Select seed variety and applied rates based upon the date of application per the following table. Equivalent seed mixture based on 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 (pounds per 1,000 feet^2)**
4/1 to 7/1 8/15 to 9/15	Oats	1.8
4/1 to 7/1	Annual Ryegrass	0.9
5/15 to 8/15	Sundangrass	0.9
9/15 to 10/15	Winter Ryegrass	2.6

D. Sod: grown from certified seed of adapted varieties to produce high quality sod free of any serious thatch, weeds, insects, diseases and other pest problem, be at least 1 year old and not older than 3 years, and cut with a 1/2 inch to 1 inch layer of soil.

E. Drains: Flexible drains consisting of collapsible neoprene pipe, minimum 8 inch diameter.

F. Stone check dam: aggregate consisting of hard, durable rock, sieve analysis by weight.

Sieve Size	Percent Passing by Weight
6 inch	90 - 100
1.5 inch	0 - 40
No. 4	0 - 5

G. Hay Bales: rectangular shaped bales of hay or straw weighing at least 40 pounds per bale, free from noxious weed seeds and rough or woody materials.

H. Siltation Control Devices

1. Dirtbag or equivalent, to be used on the discharge of any excavation dewatering setup.

2. Inlet Protection (Silt Sack) Acceptable Manufacturers

   a. ACF Environmental, Wilmington, MA

   b. Atlantic Construction Fabrics, Inc, Richmond VA

   c. ESS Brothers & Sons Inc, Loretto, MN

   d. Bowhead Manufacturing Company, Seattle, WA

3. Material: woven polypropylene geotextile material with built-in high-flow relief systems (overflow weirs). Manufacture for a 24 inch by 24 inch opening under regular flow conditions and to fit the catch basin or drop inlet to which it is to be installed with capability of being removed, emptied and reinstalled.

I. Silt Curtain: manufactured for regular flow conditions and to fit the brook section which it is to be installed.

Parameters	Values
Floatation Element	Cylindrical, internal closed cell foam
Floatation Cover	PVC coated polyester
Ballast	5/16 in galvanized chain 1.1 lbs/ft
End Connectors	Grommeted end/tow plates and lacing grommets
Skirt Material	
Weight	6.2 oz/yd2
Tensile Strength	390-280 lb
Elongation Break	25 %
Mullen Burst	530 psi
Puncture Strength	140 lb
Tear Strength	100-80 lb
Eos US Std Sieve	210 µ 70 µ

J. Erosion Control Blanket

1. Provide erosion control blanket for slope stabilization or as directed by the Engineer in accordance with this Specification and in compliance with the Order of Conditions.
2. Provide with soft pine wood wedges and stakes of entirely of biodegradable materials as recommended by the manufacturer.
3. Erosion control blanket (coir log): coconut fiber mats woven into a matrix complying with the following.

PROPERTY	Test Method	Parameter
Weight	ASTM D3776	17.8 oz/SY (600 g/m2)
Wide width tensile strength **Wet** Machine direction Cross direction	ASTM D4595	910 lbs/ft (13.3 kN/m) 870 lbs/foot (12.7 kN/m)
Wide width tensile strength **Dry** Machine direction Cross direction	ASTM D4595	1130 lbs/foot (16.5 kN/m) 1040 lbs/foot (15.2 kN/m)
Elongation at failure **Wet** Machine direction Cross direction	ASTM D4595	32 percent 26 percent
Open area	Calculated	58 percent
Thickness	ASTM D177	0.35 inch (9 mm)
Recommended shear stress		4 lbs./sq. ft. (192 N/sq.m.)
Recommended flow		10 fps (3 m/s)
Recommend slope		2:1

K. Straw mulch: MassDOT M6.04.2, long fibered straw, 100 percent certified weed free, free from foreign matter detrimental to plant life, and in dry condition.

L. Tackifier: biodegradable and non-toxic bonding adhesive agent during hydraulic seeding or straw mulching to minimize wind and water effects.

M. Catch Basin Silt Sacks

1. Style: Silt Sack Regular Flow.

2. Test Method: ASTM D-4884 165.0 lbs./inch.

3. Silt sack seams: certified average wide width strength.

4. Meet the following ASTM D-4884 standards. Properties are Minimum Average Roll Values (MARV).

Property	Test Method	Units	Test Results
Grab Tensile	ASTM D4632	lbs.	315x300
Grab Elongation	ASTM D4632	%	15x15
Puncture	ASTM D4833	lbs.	125
Mullen Burst	ASTM D3786	psi	650
Trapezoid Tear	ASTM D4533	lbs	120x150
UV Resistance	ASTM D4355	%	90
Apparent Opening	ASTM D4751	US Sieve	40
Flow Rate	ASTM D4491	gal/min/ft ^{2}	40
Permittivity	ASTM D4491	sec -1	0.55

PART 3 – EXECUTION

3.01 GENERAL

A. Undertake reasonable precaution to avoid erosion of soil and to prevent silting of drainage ditches, storm sewers, rivers, streams, and lakes.

B. Plan and execute construction using methods to control surface drainage from cuts and fills, from borrow and waste disposal areas and prevent erosion and sedimentation. Coordinate temporary erosion controls with permanent erosion controls to the extent practical.

C. Employ pollution prevention measures, erosion and sedimentation control, before, during and after soils are exposed. Prior to soil disturbance or soil storage, ensure measures are in place before activity occurs. Employ additional measures as the Work progresses. Implement and maintain erosion and sedimentation control measures as necessary until the Site is permanently stabilized.

D. Provide measures to control dust caused whether on or off the Project Site.

E. Keep exposure of soils on embankments, excavations, and graded areas to as short a duration as possible. Initiate mulching, seeding and other temporary erosion control practices as specified.

F. Install erosion control measures in any ditch, swale or channel before runoff is allowed to flow to the waterway.

G. Dewater trench to install materials in the dry.

H. Contain water pumped from trenches and excavations. Do not discharge trench dewatering and pipe dewatering to the waterway.

I. Employ the use of siltation control devices at all times to prevent runoff from entering waterway.

J. Stabilize disturbed areas with temporary and permanent erosion control practices as soon as practicable, but no more than 14 days after construction activity on a particular portion of the Site has temporarily or permanently ceased except where construction activities will resume on the particular portion of the Site within 21 days; and where snow cover precludes initiation of stabilization measures.

K. Perform inspections of disturbed soil areas, material storage areas exposed to precipitation, and erosion control measures with Engineer a minimum of once every 14 days and also within 24 hours after any storm event greater than 0.5-inches of rainfall. Immediately correct deficiencies in the erosion control measures identified or indicated by failures or erosion by implementing additional measures or different techniques to correct and prevent subsequent erosion at no additional cost to Owner.

L. Control dust in accordance with Division 01 General Requirements. Utilize the application of sprinkled water and calcium chloride to reduce the emission of air-borne soil particulates from the Site.

3.02 PREPARATION

A. Temporary Erosion Control Blanket

1. Conform to grades and cross sections for slopes and ditches shown on the Drawings.

2. Finish to a smooth and even condition with all debris, roots, stones, and lumps raked out and removed.

3. Apply seed prior to placement unless otherwise directed.

4. Dewater trenches and swales to install materials in the dry.

3.03 INSTALLATION

A. Siltation Fence

1. Construct as shown on Drawings. Install parallel to contours where possible, prior to site clearing and grading activities.

2. Bury lower edge of fabric at least 6 inches below ground surface to prevent underflow.

3. Curve ends of fence uphill to prevent flow around ends.

4. Inspect frequently; repair or replace any damaged sections.

5. Remove fence only when adequate grass catch has been established.

B. Mulch Sock/Tube

1. Install compost filter tubes, also referred to as sedimentation barriers consisting of a 9 inch diameter filter tube filled with approved mulch and compost materials.

2. Undertake immediately after each area has been properly prepared.

3. Fill sedimentation barriers by truck mounted blowers with an adequate volume of material to provide a firm barrier that slumps not more than 20 percent of the height measured in place. Fill tubes of compost on or off Site. Place, fill and stake tubes in place to ensure stability against water flows and tamp to ensure good contact with soil.

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

5. Remove matted mulch or bunches.

6. Install sedimentation barriers in the locations shown on Drawings and as directed by Engineer. Install in continuous lengths not to exceed 100 feet. Shorter lengths may be used as needed to finish a line of barrier, but not be shorter than 10 feet.

7. Overlap barrier sections not less than 2 feet at section ends, with the ends pressed firmly together. Stake section ends with the fabric ends tied off.

8. Drive stakes into the existing grade not less than 1 foo, spaced at a minimum of 8 feet on center. Provide additional stakes as needed for the ends of each section and for overlapping sections.

C. Erosion Control Blanket (Matting)

1. Install erosion control blanket and straw mulch in accordance with manufacturer's instructions and the following where shown on Drawings or as directed by Engineer. Submit manufacturer's instructions to Engineer prior to installation. Place immediately following seeding.

2. Install an erosion control blanket onto slopes that have been graded, seeded, completed to required line and where grades are steeper than or equal to 3:1 as shown on the Drawings and directed by Engineer.

3. Place strips lengthwise in the direction of the flow of water.

4. Overlap ends at least 6 inches in a shingle fashion.

5. Turn down up-slope end of each strip of the matting and bury to a depth of not less than 6 inches with the soil firmly tamped against it.

6. Engineer may require that any other edge exposed to more than normal flow of water be buried in a similar manner.

7. 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.

8. When ordered, spread additional seed over matting, particularly at those locations disturbed by building the slots. Press matting onto the ground with a light lawn roller or by other satisfactory means.

9. Use pine wedges to fasten coir to ground. Do not use metal staples. Pound vertically flush to the surrounding surface and shall not protrude above finished grade. Place pine wedges in the same locations as manufacturer recommended staple locations.

10. On grades 4:1 or steeper, place pine wedges in the same 3 rows, but spaced 2 feet apart.

11. On overlapping or butting edges, double the number of pine wedges, with the spacing halved; secure ends of matting and required check slots spaced every foot.

12. In combination with the erosion control blanket, apply weed free straw mulch on side slopes steeper than 3:1.

13. Place mulch according to MassDOT 767. Do not use short fibered material or material which is so wet or decayed that it cannot be properly spread. Apply tackifier as needed.

D. Sod

1. Lay sod strips on the prepared soil, perpendicular to the slope or direction of water flow, starting at the lowest elevation. Butt the edges and ends of the sod strips together and tamp or roll. Stagger joints.

2. Staple sod strips at ends and at 3-foot intervals along the center of the strip.

3. Irrigate sodded area immediately after installation.

E. Temporary Seeding

1. Seed with appropriate seeds and application rates specified in the table in Part 2 of this Section. Sow seed 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. If temporary seeding does not achieve adequate growth by November 1, apply an additional layer of mulch at that time.

3. Mulch temporarily or permanently seeded areas, areas which cannot be seeded within the recommended seeding dates, and any soil stockpile areas, immediately following seeding. Straw or hay mulch, wood fiber mulch, and hydromulch are recommended.

F. Topsoil Storage

1. Place topsoil which is stockpiled on the site for use in loam applications out of natural drainages, in 8 foot high piles which have side slopes of 50 percent to 70 percent.

2. Install siltation fence around the base of the pile to prevent eroding soil from washing into drainages.

3. Cover any topsoil piles which are to remain for a period of 21 days or more with temporary seed and mulch immediately following stockpiling.

G. Store Check Dam

1. Place in locations indicated on Drawings or as ordered to provide for temporary control of erosion and sedimentation.

2. Install as directed by the local Conservation Commission and Engineer.

H. Hay Bales

1. Place as ordered to provide for temporary control of erosion, and in ditches at 100 foot minimum intervals.

2. Install as shown on Drawings, and stake with required stakes.

I. Siltation Control Devices – Silt Sacks

1. Install in accordance with the Drawings and manufacturer's instructions. Install Inlet Protection (Silt Sacks) in catch basins and as required by the Engineer.

2. Keep silt sacks in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth.

3. Install prior to commencement of any excavation including but not limited to, cold planning, pavement reclamation, or unclassified excavation.

J. Silt Curtain

1. Install silt curtain filter material in accordance with the Drawings and prior to commencement of any excavation including but not limited to, cold planning, pavement reclamation, or unclassified excavation.

2. Keep silt curtain in place until removal is approved by the Engineer in accordance with water quality monitoring.

K. Other Temporary Measures

1. Provide and maintain temporary slope drains as required.

2. Employ other temporary erosion control measures as directed by the Engineer or local Conservation Commission.

3.04 FIELD QUALITY CONTROL

A. Site/Field Tests and Inspections

1. Inspect erosion control practices immediately after each rainfall and at least daily during prolonged rainfall or snowmelt for damage. Make appropriate repairs or replacement at no additional cost to the Owner, until acceptance by Engineer.

3.01 MAINTENANCE

A. Maintain areas mulched or matted, at no additional cost to the Owner, until Project acceptance.

B. Maintain detention basins by removing silt that reaches a depth of over 1 foot, at no additional cost to the Owner, until Project acceptance.

C. Maintain sedimentation barrier and periodically inspect barrier lines during construction. Remove accumulated sediment higher than 1/2 the height of the barrier, or before a major storm event and as directed by the Engineer.

D. Remove silt from siltation fence when it has reached one-half the fence height, or prior to expected heavy runoff or siltation.

E. Repair matting if any pine anchors become loosened or raised, or if any matting becomes loose, torn, or undermined, make satisfactory repairs immediately.

F. Inspect filter tubes after each rainfall and at least daily during prolonged rainfall. Immediately correct deficiencies, including, but not limited, to washout, overtopping, clogging due to sediment, and erosion. Review location of tubes in areas where construction activity causes drainage runoff to ensure that the tubes are properly located for effectiveness. Maintain the functional integrity of filter tubes in sound condition at all times. Where deficiencies exist, such as overtopping or wash-out, install additional staking or compost material as directed by the Engineer. Remove sediment deposits as necessary to maintain the filters in working condition. Repair or replace filter tubes that are decomposing, cut, or otherwise compromised.

G. Inspect condition of silt sacks after each rainstorm and during major rain events and clean periodically to remove accumulated sediment and debris. Handle and dispose of debris accumulated in silt sacks. Repair or replace damaged silt sacks.

H. Periodically inspect and empty the silt curtain and as directed. Dispose of removed material off Site. Inspect the condition of silt curtain after each rainstorm and during major rain events. Repair and replace damaged silt curtain at no additional cost to Owner.

3.02 CLOSEOUT ACTIVITIES

A. Provide in accordance with Division 01 General Requirements.

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

C. Remove filter fabric from the Site at completion of the Project.

D. Remove sedimentation barrier including removal of sediment accumulated at the barrier line, stakes and the barrier and the compost fill. Do not remove before a major storm event or as directed by Engineer. Finish final grade below and around the sedimentation barrier to the match the existing grade.

E. Level and grade to the extent required to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

F. Remove and legally dispose of unsuitable materials from Site.

END OF SECTION

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