

## SECTION 18

### EROSION, SEDIMENT, AND WATER POLLUTION CONTROL

#### 18.1 DESCRIPTION

**A. General:** This work consists of measures necessary to control erosion, sedimentation, and water pollution during the life of the contract. Measures to be used shall be included in the contract.

**B. Related Work:**

Section 10	Clearing and Grubbing
Section 11	Utility Excavation and Backfill
Section 12	Roadway and Drainage Excavation and Embankment
Section 17	Salvaging, Stockpiling, and Placing Topsoil
Section 65	Riprap
Section 66	Gabions
Section 70	Seeding
Section 71	Fertilizing
Section 72	Mulching
Section 73	Sodding
Section 202	Geosynthetics for Roadways
Section 203	Submittals

**C. Definitions:**

- 1. Final Stabilization:** Either (1) perennial vegetative cover with a density of 70 percent of the natural background vegetative cover, or (2) permanent non-vegetative stabilization (i.e. rip-rap, etc.) has been implemented to provide effective cover for exposed portions of the site.
- 2. Perimeter Control:** Sediment Control devices installed at or near the perimeter of the site to capture sediment and prevent it from leaving the site.
- 3. Permanent Stabilization:** Practices that result in permanent cover of bare soil. This includes seeding, mulching, installing erosion control blankets (over the top of seeding), turf reinforcement mats, transition mats, channel liners, geotextiles or drainage fabrics covered with rip rap or gabions, and other practices considered long term erosion control. It also includes completion of buildings, wall, drainage structures, and pavement on roads, paths, and sidewalks.
- 4. Temporary Stabilization:** Short-term cover of bare soil during construction. This includes surface roughening or applying mulches, soil stabilizers, and other practices considered temporary erosion control.

## 18.2 MATERIALS

- A. General:** All materials shall be free of invasive species, noxious weeds, and other contaminants. Material containing any of the aforementioned will be rejected and the Contractor will be required to remove the material from the project.

Materials listed on the SDDOT approved products list meeting the requirements of this specification shall be acceptable.

- B. Water Pollution Control:** The Engineer may require some or all of the items below.

**1. Concrete Washout Area:** Shall be constructed with an impermeable barrier.

**2. Dewatering and Sediment Collecting:**

- a) Small scale testing using water samples and various flocculants will be required to select a flocculant due to the varying physical and chemical properties of the sediments to be flocculated out of suspension.
- b) Materials used for filtering floc shall be approved by the Engineer.
- c) Ponds and containers used to hold water that is being treated shall not further contribute to water pollution and shall not leak.
- d) Pumps used to collect sediment laden water shall be floating pumps or shall incorporate a device that siphons clearer water off the surface to reduce the amount of sediment that needs to be removed from the discharge.

**3. Temporary Diversion Channel:**

- a) Diversion channels must be lined with plastic sheeting or Class 1 non-woven separation fabric and lined with Class A Riprap or shot rock.
- b) The original channel shall be blocked during diversion with Engineer approved sheet piling, sandbags, or an approved Temporary Water Barrier.
- c) Culverts can be used in place of diversion channels.
- d) Pumping water around the site is allowed in place of diversion channels given the diversion is not needed longer than forecasted dry weather and the Engineer approves.

**4. Temporary Water Barrier:** Shall be from the list in the plans or an approved equal.

**C. Sediment Control:**

**1. Bale Barrier:**

- a) Bales shall consist of certified weed free straw.
  - b) Bales shall be approximately 15 inch x 18 inch x 3.5 feet.
  - c) Each bale shall be held in place with two 2"x2"x4' wooden stakes.
- 2. Rock Check Dams:** Shall be constructed using 4" to 6" angular rock.
- 3. Floating Silt Curtain:** Shall be as specified in the plans or an approved equal. The Contractor will determine the water depth and other waterway characteristics such as stream flow velocity and seek technical advice from the manufacturer before ordering the floating silt curtain to make sure it is the correct type for the site.
- 4. Gravel Filter Sock:**
- a) The geotextile sock material shall be from the list in the plans.
  - b) The sock shall be filled with 3/4" rock, 3/8" lime stone chips, clean 1/4" pea gravel, clean sand or material approved by the Engineer.
- 5. Inlet Protection Device:**
- a) The Inlet Protection Device shall be from the list in the plans, or an approved equal. Installation shall be per standard details.
  - b) The device selected shall fit the curb inlet properly and be recommended for that type of inlet by the manufacturer.
  - c) Inlet protection devices can be reused from previous projects, but devices that no longer appear to be functional will be rejected.
  - d) Inlet protection devices shall be replaced when they are beyond repair.
  - e) The Contractor shall provide welded wire support for devices used on curb inlets without grates if the device has no other structural support to ensure devices do not fall into the inlet.
- 6. Interim Sediment Control at Inlets, Manholes, and Junction Boxes:**
- a) Refer to the standard detail for details of installation of high flow silt fence at drop inlets, manholes, and junction boxes.
  - b) The high flow silt fence product provided shall be from the list in the plans.
  - c) The gravel filter socks provided shall be from the list in the plans.
- 7. Silt Fence:**

- a) Silt fence shall consist of a temporary vertical barrier of fabric attached to wood or steel posts and entrenched into the ground. Low flow silt fence shall be supported by woven wire backing.
- b) Woven wire shall be 26 inch wide, 14 ½ gauge and have six horizontal wires with 6 inch or 12 inch spacing of vertical stay wires. Woven wire is not required for high flow silt fence installations unless specified in the plans or ordered by the Engineer.
- c) Posts shall be steel T line posts with 5 foot minimum length or wood posts with 5 foot minimum length and 3 inch diameter.
- d) Silt fence fabric may be selected from the SD DOT approved products list and shall be the type specified in plans, or approved equal.

Silt Fence Fabric Material Specifications

Property and Test Method	Low Flow Silt Fence	High Flow Silt Fence
Material Composition	Woven Monofilament	
Water Flow Rate ASTM D 4491	20-70 gpm/ft <sup>2</sup>	71-145 gpm/ft <sup>2</sup>
Minimum Ultra-Violet Stability ASTM D 4355 <sup>1</sup>	70%	70%

**8. Stabilized Construction Entrance:**

- a) The entrance, at a minimum, shall be 15' wide by 50' long.
- b) A drainage pipe and stabilized embankment shall be provided if necessary.
- c) The material options are:
  - 1) Wood options include slash mulches and timber pads
  - 2) Winter options include frost penetrated pad, snow or ice roads.
  - 3) Wash rack option as shown on Standard Detail.
  - 4) Manufactured options shall be selected from the list in the plans, or as approved by the Engineer.
  - 5) Other products or processes as approved during the preconstruction meeting.
  - 6) Aggregate Option as shown on Standard Detail shall be constructed with the following materials:

## Stabilized Construction Entrance: Aggregate Option

Granular Materials*	Sieve Size	Percent Passing
Granular Material-- 12" thick over Reinforcement Fabric (MSE)	3"	100%
	2 ½"	50%
	1 ½"	0%

\*The granular material will be placed in 6" maximum lifts

Reinforcement Fabric (MSE)**	Test Method	Requirement
AASHTO Class	AASHTO M 288	1 Woven
AOS, US Standard Sieve	ASTM D4751	40-100
Permittivity, Sec-1	ASTM D4491	0.005 Min
Grab Strength, lbs	ASTM D4632	315
Grab Elongation, %	ASTM D4632	35 Max
Trapezoid Tear Strength, lbs	ASTM D4533	110
Puncture Strength, lbs	ASTM D6241	620
UV Strength Retention, %	ASTM D4355	50
Wide Width Strip Tensile Strength, lbs/in	ASTM D4595	200

\*\* The fabric shall be kept as taut as possible prior to placing. Equipment will not be allowed on the fabric until the first lift of granular material is in place. All seams of the fabric will be overlapped at least 2' and shingled.

**9. Street Sweeping:**

- a) The Contractor shall use a pickup broom having integral self-contained storage to clean the roadway.
- b) The pickup broom used shall be a minimum of 6 feet wide and have working gutter brooms.

**10. Triangular Silt Barrier:** Shall be from the list in the plans or an approved equal.**11. Wattles:**

- a) Wattles shall consist of compost or excelsior encased in ultraviolet degradable or biodegradable netting.
- b) Wattles must be from the list provided in the plans.
- c) Anchors for wattles shall be wooden or biodegradable stakes.

**12. Sediment Basins:** Shall be constructed using materials provided in the plans, or as directed by the Engineer.

- D. Erosion Control:** Placing topsoil, seeding, mulching, sodding, rip rap, gabions, rock filled wire baskets, slope protection, fabric formed concrete mats, and engineering fabric are also materials used for erosion control. Please refer to their respective sections for material requirements.

**1. Dust Control:**

- a) Dust control on areas to be vegetated shall be the temporary or permanent stabilization practice provided in the plans.
- b) Dust control on haul routes shall be water, calcium chloride, biopolymers, or other product or practice approved by the Engineer.
- c) Refer to street sweeping for dust control on paved surfaces.

**2. Erosion Control Blanket:**

- a) Blanket may be selected from the SD DOT approved products list and shall be the type specified in plans, or an approved equal.
- b) Approved equals must meet the following criteria:

Erosion Control Blanket Material Specifications

PROPERTY AND TEST METHOD	Type 1	Type 2	Type 3	Type 4
Material Composition Manufacturer's Data	Processed degradable natural and/or polymer fibers either mechanically interlocked, chemically adhered, or bound by netting to form a continuous matrix.		Processed slow degrading natural or polymer fibers mechanically bound between two slow degrading synthetic or natural fiber nettings to form a continuous matrix.	
Functional Longevity Manufacturer's Data	3 to 6 month Typical	6 to 12 month Typical	12 to 24 month typical	24 to 36 month typical
Minimum Mass Per Unit Area ASTM D 6475	8 oz/yd <sup>2</sup>	8 oz/yd <sup>2</sup>	8 oz/yd <sup>2</sup>	8 oz/yd <sup>2</sup>
Minimum Thickness ASTM D 6525	0.2 in	0.2 in	0.2 in	0.2 in
Minimum Tensile Strength ASTM D 6818 Machine Direction	60 lbs/ft	75 lbs/ft	100 lbs/ft	100 lbs/ft
Maximum Shear Stress ASTM D 6460*	1.5 lbs/ft <sup>2</sup>	1.75 lbs/ft <sup>2</sup>	2 lbs/ft <sup>2</sup>	2.25 lbs/ft <sup>2</sup>

\*(channel applications) blanket can sustain at least this shear stress without damage and without any more that 0.5" soil loss during a 30 minute flow event

3. **Interceptor Ditch:** The non-erodible material used shall be an erosion control blanket, turf reinforcement mat, or 2" thickness of shot rock, base course, or gravel cushion material.
4. **Surface Roughening:** Equipment for surface roughening shall be equipped with tracks that are capable of creating ridges in the soil that are perpendicular to the slope. Alternately, the Contractor could disc perpendicular to the slope to create ridges.
5. **Soil Stabilizers:**
  - a) Soil Stabilizers shall be selected from the list in the plans or an approved equal.
  - b) The Contractor shall apply soil stabilizer in accordance with the manufacturer's application instructions and at the rate specified in the list of approved soil stabilizers.
  - c) Wood fiber mulch that contains green dye will be mixed with the soil stabilizer to be used as a tracer when the soil stabilizer is applied hydraulically.
    - 1) Wood fiber mulch will be added at a rate of 300 pounds per acre or 1 ounce per square yard.
    - 2) Wood fiber mulch shall be used with all Soil Stabilizers unless otherwise noted.
    - 3) The wood fiber mulch shall be a 100% wood fiber product and does not need to contain a tackifier.
6. **Temporary Mulching:** Grass Hay/Straw Mulch as defined in Section 72 may be used as temporary mulching for erosion control.
7. **Temporary Slope Drain:**
  - a) Embankment material shall be free of roots or other woody vegetation, organic material, and other unsuitable material.
  - b) Steel T posts and 16 gauge wire shall be used to secure the pipe in place.
  - c) A minimum of 1 cubic yard of Class A rip rap shall be used at the outlet.
  - d) Corrugated pipe shall be used to convey drainage. The size of the pipe shall be selected based on the drainage area as shown in the table below.

Corrugated Pipe for Temporary Slope Drain

Drainage Area in Acres	Pipe Diameter in Inches
0.5	12
1.5	18
2.5	21
3.5	24
5.0	30

8. **Transition Mat:** Transition mat shall be from the list in the plans or an approved equal.

9. **Turf Reinforcement Mat:**

- a) Turf Reinforcement Mat may be selected from the SD DOT approved products list and shall be the class specified in plans, or an approved equal.
- b) Turf Reinforcement Mats on the list meet the following criteria:

Turf Reinforcement Mat Material Specifications

Property and Test Method	Class 1	Class 2	Class 3	Class 4
Material Composition Manufacturer's Data	A product composed of UV-stabilized, non-degradable, synthetic fibers, filaments, nets, wire mesh and/or other elements, processed into a permanent, three-dimensional matrix. Degradable components may be used within the permanent three-dimensional matrix.			
Unvegetated Shear Stress (psf) ASTM D6460	≥ 2	≥ 2.5	≥ 2.5	≥ 3
Vegetated Shear Stress (psf) ASTM D6460	≥ 6	≥ 10	≥ 12	≥ 14

18.3 CONSTRUCTION REQUIREMENTS

A. General:

1. Ordinances and Regulations:

- a) In the event of conflict between the requirements set forth in the contract and requirements of other Federal or State or local agencies, the more restrictive laws, rules or regulations shall apply.
- b) Local requirements: Rapid City's Municipal Code and Infrastructure Design Criteria Manual.



**2. Performance Objectives:**

- a) Construction activities shall be scheduled to minimize the total amount of soil exposed at any given time.
- b) Sediment and construction materials shall be kept on site or properly disposed.
- c) Construction fence or silt fence shall be utilized to limit traffic in areas with existing vegetation that do not require grading, excavation, or use for staging.
- d) All erosion and sediment controls shall be placed as directed in the plans or as approved by the Engineer.

**3. Preference of Erosion Control (Stabilization) Over Sediment Control:**

- a) Erosion control is the preferred method of sediment retention on-site and shall be completed as soon as possible to reduce sediment control maintenance costs.
- b) Disturbed areas that are not at final grade and soil stockpiles that will not be worked or spread within 21 days must be temporarily stabilized within 14 days.
- c) Final stabilization must begin within 14 days of an area reaching final grade.
  - 1) If final stabilization cannot begin due to seasonal limitations or conditions that make seeding or other final stabilization techniques impossible to complete, temporary stabilization must be utilized and sediment controls must be in place.
  - 2) Slopes 3:1 or steeper must be stabilized with erosion control blanket, turf reinforcement mat, bonded fiber matrix, or fiber reinforced matrix.
  - 3) The Contractor shall include multiple mobilizations in the bid for seeding, mulching, and other erosion control items.

**4. Storage of Construction Materials:**

- a) Soil, base course, and other materials containing soil shall not be placed directly on pavement for more than 24 hours without having the proper sediment controls.
- b) Contractor equipment yards and service areas shall be located or bermed so runoff and pollutants do not reach waterways or impoundments of water.
- c) Refer to plans for other requirements.

**5. Inspections:**

- a) Inspection reports shall include the inspector's name, the date, current weather and site conditions, sediment controls requiring maintenance, any temporary or final stabilization that is required, good housekeeping, and construction status.
- b) Based on the results of the inspection, the plan shall be revised and implemented, in no case later than seven days following the inspection.

**6. Maintenance:**

- a) Dirt, mud, and rock tracked into the right of way (includes—road, curb and gutter, sidewalks, and approaches) must be cleaned up by the end of each working day.
- b) Once discovered, washouts and scours shall be repaired before gullies form.
- c) Sediment control devices and rolled erosion control products that have been undercut shall be evaluated for replacement with another device or reinstallation with better trenching-in and staking or stapling.

**7. Winter Site Preparation and Management:** Engineer may require some or all of the provisions below as necessary.

- a) Do not spread frozen or saturated topsoil.
- b) If topsoil cannot be properly spread prior to freezing, the finished subgrade work should be significantly roughened and stabilized with mulch as directed below.
- c) Saturated soil may be removed on access drives and during trenching and excavation operations and stored above snow storage locations.
- d) Silt ditches shall be placed within soil stockpile areas to direct runoff to treatment BMPs for sediment control and to prevent mixing with surrounding runoff.
- e) Prepare a snow management plan for the site to account for adequate storage of cleared snow through the winter and control of meltwater.
- f) Snow mixed with significant amounts of soil should be stored in separate locations that are designed to handle larger volumes of sediment.
- g) Snow storage locations should be placed down slope of all disturbed areas, but not within natural wetlands or drainage easements.
- h) Keep all equipment travel areas as free of snow as possible to increase frost penetration to reduce track out problems.

- i) Keep drainage structures open. Check for and remove snow and ice dams to ensure drain function during construction.
- j) Snow berms may be used as perimeter control, but care must be taken not to cause offsite ponding of water.
- k) Snow shall not be piled against silt fence.

#### **8. Thawing Condition:**

- a) Keep vehicle travel areas free of snow at night and covered with snow during the day to maintain frost penetration and prevent muddy travel areas and track-out.
- b) Ensure that all areas of disturbed soil are adequately protected ahead of a forecasted melt event.
- c) Actively monitor and promptly maintain sediment controls during spring thaw.
- d) Construction activities may need to be suspended until soils are no longer saturated.

### **B. Water Pollution Control:**

#### **1. Concrete Washout Area:**

- a) The concrete washout area must be kept in a condition to maintain the capacity for all wasted concrete and washout water on the project.
- b) No washout area is necessary if all concrete trucks are going to wash out at approved site constructed by the concrete supplier.
- c) Concrete washout shall not be buried at the end of the project, it shall be removed and disposed.

#### **2. Dewatering and Sediment Collecting:**

- a) The need for Dewatering and Sediment Collecting depends on the Contractor's sequence of operations and execution of the erosion, sediment, and water pollution controls provided contract.
- b) The Contactor has the option to treat sediment laden water trapped within the project limits or to transport sediment laden water off the project.
- c) Water transported off the project limits shall not be disposed of in an area where it can enter a waterway. The disposal site must be approved by the Engineer.

- d) If dewatering into regulated water bodies, the Contractor is required to obtain a SDDANR General Surface Water Discharge Permit For Temporary Discharge.
- e) Flocculants are not to be released into regulated water bodies.
- f) Filtering materials shall be regularly maintained for optimal performance.
- g) Discharge of treated water shall not cause any erosion. The Contractor is encouraged to use drainage fabric and other materials already present on the project as erosion protection at discharge points.

### **3. Temporary Diversion Channel:**

- a) Channel alignment shall prevent scouring and downstream erosion.
- b) Compacted soil shall not be used in the natural channel to divert water due to the damage the removal will cause to the streambed.
- c) Pumping shall not be used if it will adversely affect aquatic species.
- d) Diversion channel construction shall be sequenced to provide the least amount of disturbance to the channel and pollution of the water.

### **4. Temporary Water Barriers:**

- a) Temporary water barriers shall be placed in a manner that creates the least amount of disturbance.
- b) Contaminated water within the work area collected by the water barriers shall be removed and treated.
- c) Properly designed sheet pile is an acceptable alternate temporary water barrier as approved by the Engineer.
- d) Floating silt curtains may be required.

## **C. Sediment Control:**

### **1. Bale Barrier:**

- a) Bale barriers shall be used as perimeter protection and not as ditch checks.
- b) Bale barriers shall be trenched in approximately 4 inches.
- c) Stakes shall be pounded in as far as possible, but no less than 2 inches and no more than 18 inches of the stake shall protrude through the top of the bale.

d) Bales shall tightly about each other.

**2. Floating Silt Curtain:**

a) Floating Silt Curtain shall not be placed across channels.

b) The Contractor shall install the floating silt curtain in accordance with the manufacturer's installation instructions or as directed by the Engineer.

c) Fish and other aquatic species shall be moved if trapped by the curtain.

**3. Gravel Filter Sock:**

a) Gravel filter socks shall be used to anchor silt fence around the bottom when it cannot be properly trenched in due to rocky soil.

b) Gravel filter sock shall be used as perimeter control when dirt and mud cannot be kept off paved or compacted surfaces.

**4. Inlet Protection Device:**

a) Inlet Protection Devices shall be installed prior to working in the vicinity of the drop inlets.

b) Maintenance shall be scheduled to prevent storm water from backing up into the driving lane. At a minimum, weekly maintenance shall be performed and includes sediment, snow, and ice removal and repairs or replacement to ensure the device is in working order.

c) Devices shall remain in place until vegetation of bare soils reaches 70% coverage or until the Engineer approves removal.

d) Utilize the device on Standard Detail for Type B Inlets in the winter.

e) Utilize Gravel Filter Socks in the gutter to protect Type E Inlets during winter snow melt. Remove prior to snow events that will require plowing.

**5. Remove Sediment:**

a) Sediment Removal shall be done as recommended by the manufacturer or when the device is 1/3 full, whichever happens first, on all sediment control devices.

b) Sediment shall be placed away from the perimeter of the site, waterbodies, water conveyances, drainage inlets and outlets on areas to be vegetated.

**6. Rock Check Dams:**

- a) The rock check dam shall be imbedded 6 inches.
- b) The bottom of the downhill side of the rock check dam shall be level with the top of the check dam downhill from it if there are multiple check dams installed.
- c) The embankment edges of the rock check dam shall be 6 inches higher than the middle of the check dam.

**7. Sediment Basins and Traps:**

- a) Outfalls and spillways shall be constructed first and stabilized immediately with the materials provided in the plans.
- b) Embankments shall be compacted in accordance with Section 12.
- c) When sediment fails to fall out of suspension during water storage, temporary sediment basins or traps shall be optimized by adding silt fence baffles, sandbag (gravel filter bag) weirs, flocculent, and/or basin skimmers.
- d) When approved by the Engineer, sediment basins installed as part of post-construction storm water management may be used during construction for sediment control given they are properly maintained, and excavated after construction.
- e) Sediment Traps shall be constructed as shown on Standard Detail.

**8. Silt Ditch:**

- a) Refer to Standard Detail.
- b) Shall only be used on flat sites where the ditch grade would be 2% or less.

**9. Silt Fence:**

- a) Low Flow Silt Fence shall be used along site perimeters and around stockpiles.
- b) High Flow Silt Fence shall be used for inlet protection and in ditches to capture sediment before it leaves the site.

**10. Stabilized Construction Entrance:**

- a) A functional stabilized construction entrance shall be in place until it is replaced by a roadway or until vehicular access is restricted from the site with barriers.
- b) If the Contractor elects to use one of the devices listed in the plans, then the Contractor shall install the product in accordance with the manufacturer's installation instructions or as directed by the Engineer.

- c) The Contractor is allowed to change materials used due to changes in weather, moisture, and temperature.
- d) The Stabilized Construction Entrance shall be maintained as often as necessary for it to prevent track out. Maintenance includes removal of sediment and replacement or addition of materials.

**11. Street Sweeping:**

- a) Vehicle tracking of sediment from the construction site shall be minimized.
- b) Street sweeping shall be used if erosion and sediment control best management practices are not adequate to prevent sediment from being tracked onto the street.
- c) Street Sweeping shall be performed by the end of the day if track-out occurs.

**12. Triangular Silt Barrier:**

- a) Triangular Silt Barriers shall be installed per manufacturer's instructions.
- b) Some or all of the triangular silt barriers may be left on the project until vegetation is established.
- c) Triangular silt barriers shall be removed when vegetation is established.

**13. Wattles:**

- a) Wattles shall be entrenched and staked per manufacturer recommendations and spaced as shown on the standard detail or in the plans.
- b) Wattles shall be removed and replaced while construction progresses if they are in a condition to be reused and they are no longer needed in the previous location.
- c) Wattles shall remain in place until vegetation is established unless they interfere with irrigation heads.
- d) Wattles may be left in place to disintegrate in natural areas that will not be mown.

**D. Erosion Control:****1. Dust Control:**

- a) Dust control shall be implemented any time dust is causing visibility or breathing issues for people on or off-site.

- b) Refer to Rapid City Municipal Code Chapter 8.34 Dirt/Dust Control for more information.
- 2. Interceptor Ditches:** Refer to Standard Detail.
- 3. Rolled Erosion Control Products (RECPs):**
- a) This category includes Erosion Control Blanket and Turf Reinforcement Mat
  - b) Installation shall be as shown on the standard detail and as described below.
  - c) Blankets and mats shall be installed like shingles where the uphill piece is on top of and overlaps the downhill piece.
  - d) Blankets and mats shall be installed parallel to the slope and not across slopes.
  - e) Blankets and mats shall be trenched in at the top of the slope (unless overlapping another blanket or mat) and at the toe of the slope.
- 4. Snow Installation:**
- a) Install practices over bare frozen ground or snow (no deeper than 2 inches) using appropriate anchors.
  - b) If necessary, remove snow before placing erosion control blanket.
  - c) RECP's are useful for conveyance systems and other areas where snow mulching practices are not applicable.
- 5. Soil Stabilizers:** Shall be used as a temporary stabilization measure when temporary mulching or surface roughening cannot be completed or isn't appropriate for addressing the issue.
- 6. Surface Roughening:**
- a) Surface roughening shall be done on slopes 3:1 and steeper as a temporary stabilization practice.
  - b) The final condition of the surface roughening shall be approved by the Engineer.
  - c) Surface Roughening shall be performed per Standard Detail.
- 7. Temporary Slope Drain:** Refer to Standard Detail.
- 8. Temporary Mulching:** The Contractor shall place mulch on areas that have reached final grade during the last month of seasonal seeding limitations. The



Contractor shall later seed into the mulch. Installation of the mulch shall be as stated in Section 72 - Mulching.

- 9. Transition Mat:** Installation of the transition mat shall be in accordance with the manufacturer's installation instructions. Turf reinforcement mat, sod, or geotextile shall be installed under the transition mat.

#### 18.4 METHOD OF MEASUREMENT

Measurements will only be made of items correctly installed or utilized.

- A. Bale Barrier:** Shall be measured per bale.
- B. Concrete Washout:** No measurement shall be made for Concrete Washout Area.
- C. Dewatering and Sediment Collecting:** Shall be measured per detailed plans and specifications.
- D. Dust Control:** Water and operations for dust control shall not be measured.
- E. Erosion Control Blanket:** Shall be measured to the nearest square yard. Measurement of the overlap and top and bottom folds shall not be made. Erosion control blanket damaged from causes beyond the control of the Contractor shall be replaced and the replacement quantity added to the original quantities used.
- F. Floating Silt Curtain:** Shall be measured to the nearest foot. Silt curtain damaged from causes beyond the control of the Contractor shall be replaced and the replacement quantity added to the original contract amount.
- G. Gravel Filter Sock:** Shall be measured to the nearest foot.
- H. Inlet Protection Device:** Shall be measured per each.
- I. Interceptor Ditch:** Shall be paid for per foot of ditch.
- J. Interim Sediment Control at Inlet:** Shall be measured per foot high flow silt fence and per foot gravel filter bag. Aggregate shall not be measured.
- K. Mulching:** Shall be measured as described in Section 72 – Mulching.
- L. Remove Sediment:** Unless specifically called for in detailed plans and specifications, field measurement for removal of sediment shall not be made. Sediment Removal shall be incidental to the BMP being maintained.
- M. Rock Check Dam:** Shall be measured per cubic yard of 4”-6” angular rock.
- N. Sediment Control Wattle, Remove and Reset Wattle, and Remove Wattle:** Shall be measured to the nearest foot.

- O. Seeding:** Shall be measured as described in Section 70 - Seeding.
- P. Silt Fence and Remove Silt Fence:** Shall be measured to the nearest foot. If removal of silt fence is not included in detailed plans and specifications, removal shall be incidental to the silt fence bid item.
- Q. Soil Stabilizer:** Shall be measured per acre or square yard covered with soil stabilizer.
- R. Sodding:** Shall be measured as described in Section 73 - Sodding.
- S. Stabilized Construction Entrance:** Shall be measured per each location.
- T. Street Sweeping:** Shall be measured per hour.
- U. Surface Roughening:** Shall be paid for to the nearest tenth of an acre.
- V. Temporary Diversion Channel:** Shall be measured per each.
- W. Temporary Mulching:** Shall be measured as described in Section 72 - Mulching.
- X. Temporary Slope Drain:** Shall be measured to the nearest foot.
- Y. Temporary Water Barrier:** Shall be measured for per foot.
- Z. Topsoil:** Shall be measured as described in Section 17 - Salvaging, Stockpiling, and Placing Topsoil.
- AA. Transition Mat:** Shall be measured per square yard.
- BB. Triangular Silt Barrier:** Shall be paid per foot.
- CC. Turf Reinforcement Mat:** Shall be measured to the nearest square yard. Measurement of the overlap and top and bottom folds shall not be made. Turf reinforcement mat damaged from causes beyond the control of the Contractor shall be replaced and the replacement quantity added to the original quantities used.
- DD. Wattle:** Shall be measured to nearest linear foot.

## 18.5 BASIS OF PAYMENT

Measures, which are required due to the Contractor's negligence, carelessness, or failure to implement as a part of the work as scheduled, shall be performed by the Contractor at no expense to the City.

- A. Bale Barrier:** Shall be paid for at the contract unit price for each bale. Payment shall be full compensation for furnishing, installing, all labor, equipment, and incidentals.

- B. Concrete Washout:** No additional payment shall be made for Concrete Washout Area. Concrete washout done on-site without a Concrete Washout Area shall result in a Stop Work Order and the Contractor shall bring the site into full compliance with all applicable permits before any work on the site can resume.
- C. Dewatering and Sediment Collecting:** Shall be paid per contract unit price.
- D. Dust Control:** Shall be incidental to the project.
- E. Erosion Control Blanket:** Shall be paid for at the contract unit price per square yard. Payment shall be full compensation for shaping and finishing ditches and channels, installing material and the furnishing of labor, equipment, staples, material, and incidentals necessary.
- F. Floating Silt Curtain:** Shall be paid for at the contract unit price per foot. Payment shall be full compensation for materials, labor and equipment necessary to install and remove the floating silt curtain.
- G. Gravel Filter Sock:** Shall be measured to the nearest foot.
- H. Inlet Protection Device:** Shall be paid for one time at each location, regardless of the number of times the sediment control devices are installed, inspected, cleaned, removed, repaired, or replaced. All costs associated with furnishing, installing, inspecting, maintaining, cleaning, sediment removal, and repairing the Inlet Protection Device shall be incidental to the contract unit price per each for "Inlet Protection Device".
- I. Interceptor Ditch:** All costs for constructing, inspecting, maintaining, and removing the interceptor ditch including labor, equipment, and materials shall be incidental to the contract unit price per foot.
- J. Interim Sediment Control at Inlets:** Shall be paid per foot high flow silt fence and per foot gravel filter bag. Aggregate shall be incidental to gravel filter bags.
- K. Mulching:** Shall be measured as described in Section 72 – Mulching.
- L. Remove Sediment:** Shall be paid for at the contract unit price per cubic yard if included in detailed plans and specifications. Payment shall be full compensation for labor, equipment, disposal, and incidentals. If not included in detailed plans and specifications, sediment removal shall be incidental to the BMP being maintained.
- M. Rock Check Dam:** All costs for constructing the Rock Check Dam including labor, equipment, excavation, and rock shall be incidental to the contract unit price per cubic yard for "Rock Check Dam".
- N. Sediment Control Wattle, Remove and Reset Wattle, and Remove Wattle:** Shall be paid at the contract unit price.

- O. Seeding:** Shall be paid as described in Section 70 - Seeding.
- P. Silt Fence and Remove Silt Fence:** Shall be paid for at the contract unit price per foot for the particular bid item. Payment shall be full compensation for furnishing, installing, repairing, labor, equipment, and incidentals. Remove Silt Fence shall include all labor for complete removal and shaping. If removal of silt fence is not included in detailed plans and specifications, removal shall be incidental to the silt fence bid item.
- Q. Sodding:** Shall be paid as described in Section 73 – Sodding.
- R. Soil Stabilizer:** All costs for furnishing and applying the soil stabilizer including wood fiber mulch, hauling, materials, equipment, labor, and incidentals necessary shall be paid for at the contract unit price per acre or square yard for “Soil Stabilizer”.
- S. Stabilized Construction Entrance:** All costs for furnishing, installing, maintaining, and removal of the construction entrance including equipment, labor, materials, and incidentals shall be included in the contract unit price per each for “Construction Entrance”.
- T. Street Sweeping:** All costs for cleaning the roadway with a pickup broom shall be incidental to the contract unit price per hour for “Sweeping”.
- U. Surface Roughening:** All costs associated with surface roughening including labor, equipment, and materials shall be incidental to the contract price per acre for “Surface Roughening”.
- V. Temporary Diversion:** All costs associated with installation and removal of Temporary Diversion Channels including labor, equipment, and materials shall be incidental to the contract price per acre for “Temporary Diversion Channel”.
- W. Temporary Mulching:** No additional payment shall be made for temporary mulching. Mulching shall be paid as stated in Section 72 – Mulching.
- X. Temporary Slope Drain:** All costs for constructing and removing the temporary slope drains including labor, equipment, and materials which include the class A riprap, corrugated pipe, steel T fence posts, wire, and necessary earthwork, shall be incidental to the contract unit price per foot for “Temporary Slope Drain”.
- Y. Temporary Water Barrier:** All costs for furnishing, installing, maintaining, and removal of the temporary water barrier including hauling, materials, equipment, labor, and incidentals necessary shall be paid for at the contract unit price per foot for “Temporary Water Barrier”.
- Z. Topsoil:** Shall be measured as described in Section 17 - Salvaging, Stockpiling, and Placing Topsoil.

- AA. Transition Mat:** All costs for furnishing and installing the transition mat including hauling, materials, equipment, labor, and incidentals necessary shall be paid for at the contract unit price per square yard for "Transition Mat". Sodding, geotextiles, or Turf Reinforcement Mat installed under the Transition Mat shall be paid for per corresponding bid item.
- BB. Triangular Silt Barrier:** All costs for furnishing, installing, and removing the triangular silt barrier including labor, equipment, and materials shall be incidental to the contract unit price per foot for "Triangular Silt Barrier".
- CC. Turf Reinforcement Mat:** Turf reinforcement mat shall be paid for at the contract unit price per square yard. Payment shall be full compensation for shaping and finishing ditches and channels, installing material and the furnishing of labor, equipment, staples, material, and incidentals necessary.
- DD. Wattle:** Wattles shall be paid for at the contract unit price per foot. Payment shall be full compensation for furnishing, installing, labor, equipment, and incidentals. Remove and reset wattle shall be paid for at the contract unit price per foot. Payment shall be full compensation for labor, equipment, and incidentals. Remove wattle shall be paid for at the contract unit price per foot. Payment shall be full compensation for labor, equipment, and incidentals.

**END OF SECTION**