902 - TEMPORARY EROSION AND POLLUTION CONTROL

902.1 DESCRIPTION

At the locations shown on the plans or as directed by the Engineer, temporary erosion and pollution control Best Management Practices (BMPs) shall be installed, maintained and removed in accordance with Sections 901 and 902 of the Standard Specifications except as otherwise modified herein.

Temporary Erosion and Pollution Control Bid Item	Units
Compost Cover	Cubic Yard
Erosion Control Blankets (Class & Type)	Square Yard
Turf Reinforcement Mat (Class & Type)	Square Yard
Hydraulic Erosion Control (Type)	Pound
Temporary Slope Drain	Linear Foot
Biodegradable Log (Size)	Linear Foot
Construction Entrance	Square Yard
Temporary Ditch Check (Type)	Each
Temporary Diversion Berm	Linear Foot
Temporary Filter Berm	Linear Foot
Filter Sock (Size)	Linear Foot
Temporary Inlet Sediment Barrier (Type)	Each
Temporary Sediment Basin	Lump Sum
Temporary Sediment Trap	Each
Silt Fence	Linear Foot
Synthetic Sediment Barrier (Type)	Linear Foot
Temporary Stream Crossing	Each
Temporary Seeding	Acre

902.2 TEMPORARY EROSION CONTROL

a. Compost Cover

(1) Description: Organic material applied with or without seed to protect the soil surface from water and wind erosion.

(2) Materials: Shall meet the requirements of Section 910 of the Standard Specifications.

(3) Construction Requirements: Soil shall be prepared to eliminate compaction, gullies, depressions, and large clods. Compost shall be uniformly applied to a depth of 1.5 to 2 inches when alone or uniformly applied 1 to 1.5 inches when used in conjunction with seeding operations.

(4) Maintenance: Compost shall be replaced or repaired as needed. Bare spots shall be filled in, by hand if necessary. Vehicle and personnel traffic shall be minimized in areas covered.

b. Erosion Control Blankets (ECB) and Turf Reinforcement Mats (TRM)
(1) Description: Manufactured product placed on bare soil including slopes, channels, ditches, or areas of concentrated flow for short-term, long-term, or permanent protection.
(2) Materials: Shall meet the requirements of Section 2113 of the Standard Specifications.
(3) Construction Requirements: Install according to the manufacturer's recommendations for trenching, splice and longitudinal overlaps, staple size and staple pattern. In no instance shall the overlaps be less than the minimum shown on the standard details. Installation areas shall be free of erosion rills, rocks, clods or other debris that may cause "tenting" or otherwise inhibit uniform soil contact. To avoid jointing in the center of the channel, install single width of erosion control material in direction of flow. Do not cover erosion control materials with soil or mulch unless recommended by the manufacturer and approved by the Engineer.
(4) Maintenance: Torn or degraded product shall be repaired or replaced, unless such degradation is within the functional longevity specified by the manufacturer. Edges or seams which are loose or frayed shall be secured.

c. Hydraulic Erosion Control
(1) Description: A manufactured product composed of fibrous material mixed with water and hydraulically broadcast as a slurry designed to reduce soil erosion and/or assist in the establishment and growth of vegetation.
(2) Materials: Shall meet the performance standard of the type specified on the plans. The hydraulic erosion control type and performance standard are categorized as shown in Table A below. Manufacturer's product certification for performance and packaging requirements shall be submitted to the Engineer for approval.

Table A - Hydraulic Erosion Control

Type	Estimated Longevity (months)	Typical Application Rate (lb/acre)	Typical Maximum Slope Gradient	Maximum Uninterrupted Slope Length
1	1	1500 - 2500	≤ 5:1	20
2	2	2000 - 3000	≤ 4:1	25
3	3	2000 - 3500	≤ 3:1	50
4	6	2500 - 4000	≤ 2:1	75
5	12	3000 - 4500	≤ 2:1	100

Deliver, store and handle in strict compliance with manufacturer's instructions and recommendations. Protect product from damage due to weather conditions and construction operations.

Water used in this work shall be furnished by the Contractor and will be suitable for irrigation and free from ingredients harmful to plant life. All watering equipment required for the work shall be furnished by the Contractor. Under no circumstances shall the Contractor use water except that metered from adjacent fire hydrants or public water lines.

Temporary seed may be sown prior to Hydraulic Erosion Control application for extended temporary stabilization.
(3) Construction Requirements: Shall conform to the manufacturer's application rates and installation requirements, or as approved by the Engineer. The soil shall be prepared to eliminate compaction, gullies, depressions, and large clods. Apply from opposing directions to achieve

best soil coverage. It is not intended to be applied in channels, swales or other areas where concentrated flows are anticipated.

The Contractor shall schedule the application of the hydraulic erosion control slurry in conjunction with suitable weather on unsaturated soils and allowed to dry 24 hours prior to a rain event in order to ensure the adequacy of the cure.

When specified in the plans or as directed by the Engineer, the Contractor shall apply temporary or permanent seeding to all areas to where hydraulic erosion control will be applied before application occurs. Seeding shall be in accordance with the requirements set forth in the "Seeding" section of this special provision.

The Contractor shall notify the Engineer prior to commencing hydraulic erosion control application operations. If stages of construction have been established by the Engineer, the Contractor shall notify the Engineer upon completing a stage of construction and obtain approval prior to commencing with subsequent stages of construction.

Upon completion of the application operations, the Contractor shall immediately remove all debris and excess materials from the site.

The performance of the hydraulic erosion control product must proceed unabated until the designated area is completed. Areas shall be protected from disturbance including but not limited to foot and vehicle traffic. Any erosion of the area prior to drying shall be repaired by the Contractor at no additional cost to the City. Severe damage to any area caused by the Contractor's activities shall be repaired by the Contractor at no additional cost to the City.

(4) Maintenance: Any damaged areas shall be repaired utilizing the exact blend and application procedure as specified above or as directed by the Engineer.

d. Temporary Slope Drain

(1) Description: Flexible tubing or conduit used to convey concentrated water from the top of a slope down to the toe and thereby preventing erosion over the slope face.

(2) Materials: Shall be metal, plastic, or flexible rubber pipe having a minimum 6 inch diameter. Pipe walls shall be impermeable and not slotted. Standard flared end sections shall be provided at both the inlet and outlet. Energy dissipation shall be provided at the outlet to provide stabilization and prevent scour. The Engineer will accept the material based on the condition of the pipe and visual inspection of the installed drain.

(3) Construction Requirements: Install as shown on the plans. Water shall be directed towards the inlets by the use of temporary berms, silt fence, gravel bags, or other barrier systems shown on the plans or approved by the Engineer.

(4) Maintenance: Accumulation of any visible sediment at the inlet and outlet shall be removed promptly. Outlet conditions shall be repaired if scour is observed. Leaking or damaged sections of pipe shall be repaired immediately. Barriers directing water to the inlet shall be monitored for continuity and effectiveness.

e. Temporary Seeding

(1) Description: Temporary seeding shall only be used for periods not to exceed 12 months unless approved by the city. During final stabilization, temporary seeding shall only be used to establish vegetation outside of the permanent seeding or sodding dates as specified in the Standard Specifications.

(2) Materials: The following seed mixtures and planting rates shall be used:

Seed Type	Minimum Pure Live Seed (%)	Rate of Pure Live Seed (lbs/acre)	Seeding Dates
Annual Ryegrass	83	90	Anytime

Millet	77	65	May 1 – Aug 15 Heat Tolerance
Winter Wheat	83	120	Sept 15 – Nov 30 Cold Tolerance

(3) Construction Requirements:
Preparation, planting and all other construction requirements for temporary seeding shall be as specified for permanent seeding, except as modified herein.
Temporary seeding shall be drilled. Prior to application, the soil shall be tilled to a depth of at least 2 inches and gullies, depressions, and large clods eliminated. Roller compaction of the seedbed is not required.
Within 24 hours of seeding, mulch or erosion control blankets shall be applied. When mulch is used, it shall be applied in accordance with the same requirements given for permanent seeding. Fertilizer is not required.
Contractor shall schedule work so as to provide temporary seeding as early as practical in the construction process. Contractor shall maintain a readiness to perform temporary seeding frequently during the progress of the project. No more than 7 calendar days shall elapse between the Engineer's request for temporary seeding and its application. Multiple mobilizations to seed areas as construction progresses shall be expected.
(4) Maintenance: Mulch shall be replaced or repaired as needed during germination and early growth. Bare spots shall be patched, by hand seeding if necessary. Vehicle and personnel traffic shall be minimized in areas seeded.

902.3 TEMPORARY POLLUTION CONTROL

a. Biodegradable Log

(1) Description: Commercially manufactured biodegradable sediment barrier of material bound with a containment netting.
(2) Materials: Filler consists of straw, excelsior wood fiber, coconut fiber, jute or other biodegradable material. Containment netting includes open mesh fabric made of jute or light weight plastic. Stakes are per manufacturer's requirements.
(3) Construction Requirements: Install as shown on the plans. Individual units shall be installed in accordance with manufacturer's recommendations. Do not use biodegradable logs for curb inlet sediment barriers.
(4) Maintenance: Remove and dispose of sediment deposits when the deposit approaches 1/2 the height of the biodegradable log. Avoid driving over logs and replace segments damaged by vehicles. Replace as necessary to maintain function and integrity of installation.

b. Construction Entrance

(1) Description: Stabilized access point intended to remove mud from vehicle tires to prevent offsite tracking.
(2) Materials: Aggregate shall be clean 2" to 3" coarse aggregate. Geotextile fabric shall be non-woven.
(3) Construction Requirements: Install as shown on the plans or as approved by the Engineer. Remove all vegetation and other unsuitable material from the foundation area, grade and crown for positive drainage. Divert all surface runoff and drainage from the entrance to a sediment control BMP. If conditions warrant, install geotextile fabric under aggregate. Rumble strips, track pads, wash racks, or similar track out prevention BMPs may be needed in conjunction with construction entrance.
(4) Maintenance: Reshape entrance as needed to maintain function and integrity of installation. Top dress with clean aggregate as needed.

c. Temporary Ditch Check
(1) Description: Barriers used to impede concentrated flow to allow settlement of soil particles.
(2) Materials: Rock shall consist of clean aggregate free of deleterious material. Refer to "Ditch Check" Standard Detail for sizing. Synthetic Sediment Barriers and Biodegradable Logs shall meet the material requirements given by other items of this special provision
(3) Construction Requirements: Install as shown on the plans and refer to "Ditch Check" Standard Detail for spacing. Rock shall be keyed into the bottom and sides of slope a minimum of 6 inches. Synthetic Sediment Barriers and Biodegradable Logs shall meet the material requirements given by other items of this special provision
(4) Maintenance: Remove and dispose of sediment deposits when the deposit approaches 1/2 the height of the ditch checks. Replace and reshape as necessary to maintain function and integrity of installation.

d. Temporary Diversion Berm
(1) Description: Earthen berm generally installed along the contour to divert storm runoff or to trap small areas of overland flow. A furrow is typically excavated adjacent to the berm on the upstream side, so as to further establish the drainageway.
(2) Materials: Shall consist of soil material that is capable of being compacted.
(3) Construction Requirements: Install as shown on the plans. Berm shall be compacted until no further consolidation is observed, using a dozer track, grader wheel or other equipment. Berm shall be temporarily stabilized immediately after installation. A stable outlet may be needed in order to release water onto a stable terrain.
(4) Maintenance: Berm shall be reshaped, compacted, and stabilized as necessary to maintain their function. Breaches in the berm shall be repaired immediately.

e. Temporary Filter Berm
(1) Description: Berm or dike of compost or wood mulch to contain and filter storm runoff from small areas of overland flow.
(2) Materials: Compost shall meet the requirements of Section 910 of the Standard Specifications. Wood mulch shall consist of tree and shrub debris ground by mechanical means. Mulch sizing may vary with a maximum width of 2 inches and a maximum length of 10 inches.
(3) Construction Requirements: Place in un-compacted windrows as shown on the plans. The berm shall be of uniform height and width. (Refer to "Filter Berm" Standard Detail). Do not use filter berms in concentrated flow paths.
(4) Maintenance: Berm shall be reshaped and material added as necessary to maintain function and dimensions. Breaches in the berm shall be repaired promptly.

f. Filter Sock
(1) Description: Commercially manufactured mesh bags containing permeable material to slow and filter stormwater runoff, with a minimum flow rate of 35 gpm/sq ft.
(2) Materials: Filler shall consist of clean coarse aggregate ½" to 1" diameter, or other permeable filler material. Mesh Bag shall consist of pervious non-biodegradable material having a minimum unit weight of 4 ounces per square yard. The Mullen burst strength shall exceed 300 pounds per square inch per ASTM D3786 and shall have ultraviolet stability exceeding 70% per ASTM D4355.
(3) Construction Requirements: Shall be located as shown on the plans and installed in accordance with manufacturer's recommendations.
(4) Maintenance: Remove any visible accumulation of sediment. Replace as necessary to maintain function and integrity of installation.

g. Temporary Inlet Sediment Barrier

(1) Description: A variety of BMPs or procedures used to allow water to enter a stormwater inlet while filtering or temporarily impeding the flow sufficiently to reduce the quantity of sediment carried.

(2) Materials: Filter sock, synthetic sediment barriers, silt fence, and rock ditch checks shall meet the material requirements given by other items of this special provision. Prefabricated BMPs or alternative systems may be used with the Engineer's approval.

(3) Construction Requirements: Install as shown on the plans. Filter sock, synthetic sediment barriers, silt fence, and rock ditch checks shall meet the construction requirements given by the respective items of this special provision. Placement shall not increase the risk of flooding or other hazards. Existing or completed curb inlets require a Filter Sock.

Inlets under construction may block or impede flow and shall provide an excavated area around inlet to allow settling of soil particles. Completed and existing inlets shall allow runoff to enter the inlet and be protected with stabilization and filter sock or similar.

(4) Maintenance: Remove deposited sediment from excavated storage areas when available storage has been reduced by 20%. Remove deposited sediment from filter socks or similar when any accumulation of sediment is visible. Repair or replace as necessary to maintain function and integrity of installation.

h. Temporary Sediment Basin

(1) Description: Reservoir and embankment with engineered spillways and surface dewatering that is constructed to intercept sediment-laden runoff from large areas and provide retention to settle out soil particles.

(2) Materials: Refer to "Temporary Sediment Basin" Standard Detail for material requirements.

(3) Construction Requirements: Embankment, reservoir, spillway and appurtenances shall be constructed as shown on the plans and "Temporary Sediment Basin" Standard Detail. Surface dewatering shall be achieved by use of skimmer or other approved equivalent. Baffles are required. Basin shall be stabilized immediately following installation.

Construction warning fence shall be installed around the perimeter of the pond and warning signs erected when directed by the Engineer.

Construction of the sediment basin shall be carried out in a manner such that it does not result in sediment problems downstream.

(4) Maintenance: Check sediment basins after periods of significant runoff. Remove sediment and restore the basin to its original dimensions when sediment accumulates to 20% of the storage capacity. Immediately repair any erosion damage to the embankment and outlets. Repair and/or replace baffles as necessary to maintain function and integrity of installation. Keep outlet, skimmer, and pool area free of all trash and other debris.

i. Temporary Sediment Trap

(1) Description: Reservoir and embankment with a stone outlet that is constructed to intercept sediment-laden runoff and provide retention to settle out soil particles.

(2) Materials: As shown on the plans and "Temporary Sediment Trap" Standard Detail.

(3) Construction Requirements: Install as shown on the plans and "Temporary Sediment Trap" Standard Detail. Trap shall be stabilized immediately following installation.

(4) Maintenance: Check sediment traps after periods of significant runoff. Remove sediment and restore the trap to its original dimensions when sediment accumulates to 20% of the storage capacity. Immediately repair any erosion damage to the embankment and outlet. Keep outlet and pool area free of all trash and other debris.

j. Silt Fence

(1) Description: Barrier of geotextile fabric generally installed along the contour to divert and/or contain storm runoff to allow settlement of soil particles.

(2) Materials: Geotextile Fabric shall consist of material that complies with AASHTO M 288 for unsupported silt fence, with 4 ft. maximum post spacing.

Provide wood, steel, or synthetic posts of sufficient strength to resist damage during installation and to support the applied loads. Length is to be a minimum of 4 feet.

When conditions warrant, supplement the silt fence with woven-wire fencing with a minimum wire gage between 9 and 14 and a maximum mesh spacing of 6 inches in all directions. Wire-supported fence requires steel posts.

(3) Construction Requirements: Install as shown on the plans and "Silt Fence" Standard Detail. Installation shall be made by a specialized machine capable of inserting the fence securely into the ground with a slicing method and firmly compacting the slice closed. Trenching will only be allowed for small or difficult areas where slicing cannot be reasonably used. Silt fence shall be firmly embedded and anchored to the ground such that runoff cannot undermine the fence. Joints in silt fence shall overlap to prevent leakage. Securely attach the fabric to the upstream side of post with staples or plastic zip ties.

(4) Maintenance: Remove and dispose of sediment deposits when the deposit approaches ⅓ the height of the silt fence. Repair as necessary to maintain function and structure.

k. Synthetic Sediment Barrier

(1) Description: Commercially manufactured BMP such as Geo-Ridge Permeable Berm™, Triangular Silt Dike™ or equivalent used for slope barriers or ditch checks. The synthetic sediment barrier shall be accepted based on the City's Approved Materials List or as approved by the Engineer.

(2) Materials: Shall conform to the manufacturer's specifications.

(3) Construction Requirements: Shall be located as shown on the plans. Individual units shall be installed in accordance with manufacturer's recommendations.

(4) Maintenance: Remove and dispose of sediment deposits when the deposit approaches 1/2 the height of the barrier. Replace as necessary to maintain function and integrity of installation.

l. Temporary Stream Crossing

(1) Description: Culvert crossing, stream ford, or temporary bridge constructed in a water body to allow construction access and crossing.

(2) Materials: As shown on the plans and Temporary Stream Crossing Detail.

(3) Construction Requirements: Construct as shown on the plans. When the Contractor's operations require a temporary stream crossing, and one is not shown on the plans, the Contractor shall notify the Engineer and comply with all applicable rules and regulations, obtain all required permits and provide copies of all permits to the Engineer.

Before beginning work in the streambed, record existing stream channel elevations.

Place 1 pipe buried 6 inches into the stream bottom, in the lowest point of the channel to allow the passage of aquatic organisms, with additional pipes placed along the remainder of the stream channel bottom such that ordinary high water (OHW) flows designated on the plans shall flow through the pipes without overtopping the crossing. If the OHW is not designated on the plans, the Engineer will determine the OHW.

Submit to the Engineer for review and approval, the design flow calculations to determine the number and diameter of pipes required. A minimum 12 inch diameter pipe is required, place pipes parallel to flow, and cover pipes with a minimum of 12 inches of clean aggregate fill.

(4) Maintenance: Repair stream bank erosion by stabilizing with erosion control BMPs such as erosion control blankets. For in-stream degradation, armor the culvert outlet(s) with riprap to dissipate energy. If sediment or debris is accumulating upstream of the crossing, remove as needed to maintain the functionality of the crossing.

If a temporary crossing is requiring excessive maintenance, replacement with a larger culvert or alternate design may be necessary. Remove the temporary crossing as soon as no longer needed. Restore the disturbed bed and bank area of the stream channel to its pre-existing elevation and stabilize immediately. Take care to minimize the amount of sediment lost into the stream upon removal.

902.4 MEASUREMENT AND PAYMENT

(1) "Compost Cover" will be measured per cubic yard at the contract unit price. No direct payment shall be made for the maintenance and removal as they are considered subsidiary. When Compost Cover is used in conjunction with permanent or temporary seeding operations, seeding shall be paid separately.

(2) "Erosion Control Blanket (Class & Type)" will be measured per square yard of surface area covered and paid for at the contract unit price for the class and type specified. No direct payment shall be made for the maintenance and removal as they are considered subsidiary. When Erosion Control Blanket is used in conjunction with permanent or temporary seeding operations, seeding shall be paid separately.

(3) "Turf Reinforcement Mat (Class & Type)" will be measured per square yard of surface area covered and paid for at the contract unit price for the class and type specified. No direct payment shall be made for the maintenance and removal as they are considered subsidiary. When Turf Reinforcement Mat is used in conjunction with permanent or temporary seeding operations, seeding shall be paid separately.

(4) "Hydraulic Erosion Control (Type)" will be measured per pound of dry material and paid for at the contract unit price for the type specified. No direct payment shall be made for the maintenance as it is considered subsidiary. When Hydraulic Erosion Control is used in conjunction with permanent or temporary seeding operations, seeding shall be paid separately.

(5) "Temporary Slope Drain" will be measured per linear foot and paid for at the contract unit price. No direct payment shall be made for end sections, outlet protection, barriers, maintenance, and removal as they are considered subsidiary.

(6) "Biodegradable Log (Size)" of specified diameter will be measured per linear foot and paid for at the contract unit price for the size specified. No direct payment shall be made for maintenance and removal as they are considered subsidiary.

(7) "Construction Entrance" will be measured by the square yard of aggregate placed and paid for at the contract unit price. No direct payment shall be made for geotextile fabric, track out prevention BMPs, and maintenance, including additional aggregate and removal as they are considered subsidiary.

(8) "Temporary Ditch Check (Type)" will be measured per each and paid for at the contract unit price for the type specified. No direct payment shall be made for maintenance and removal as they are considered subsidiary.

(9) "Temporary Diversion Berm" will be measured per linear foot and paid for at the contract unit price. No direct payment shall be made for stabilization, maintenance, and removal as they are considered subsidiary.

(10) "Temporary Filter Berm" will be measured per linear foot and paid for at the contract unit price. No direct payment shall be made for maintenance and removal as they are considered subsidiary.

(11) "Filter Sock (Size)" will be measured per linear foot and paid for at the contract unit price of the size specified. No direct payment shall be made for maintenance and removal as they are considered subsidiary.
(12) "Temporary Inlet Sediment Barrier (Type)" will be measured per each and paid for at the contract unit price for the type specified. Each inlet will be measured only one time for the duration of the project and no direct payment shall be made for maintenance and removal as they are considered subsidiary.
(13) "Temporary Sediment Basin" will be measured by the lump sum and paid for at the contract unit price. No direct payment shall be made for rock, stabilization, baffles, skimmer, maintenance, and removal as they are considered subsidiary.
(14) "Temporary Sediment Trap" will be measured per each and paid for at the contract unit price. No direct payment shall be made for rock, stabilization, maintenance, and removal as they are considered subsidiary.
(15) "Silt Fence" or "Silt Fence (Wire-Supported)" as applicable will be measured per linear foot and paid for at the contract unit price. No direct payment shall be made for maintenance and removal as they are considered subsidiary.
(16) "Synthetic Sediment Barrier (Type)" will be measured per linear foot and paid for at the contract unit price for the type specified. No direct payment shall be made for maintenance and removal as they are considered subsidiary.
(17) "Temporary Stream Crossings" will be measured per each and paid for at the contract unit price. No direct payment shall be made for rock, pipe, stabilization, maintenance, and removal as they are considered subsidiary. No payment will be made for installation of temporary stream crossings not shown the on the plans.
(18) "Temporary Seeding" will be measured per acre and paid for at the contract unit price. No direct payment shall be made for soil preparation, seed, drilling and mulch as they are considered subsidiary.
(19) No payment will be made for replacing BMPs that become ineffective because of improper installation, lack of maintenance or the Contractor's failure to pursue timely installation of additional BMPs, including permanent erosion control BMPs, as shown on the plans. When BMPs are installed as shown on the plans or as approved by the Engineer and such BMPs are no longer effective because of deterioration or functional incapacity, payment will be made for replacement of these BMPs, as approved by the Engineer.
(20) No measurement or payment will be made for sediment removal as it shall be subsidiary to other bid items.
(21) No measurement or payment will be made for dewatering as the use of such BMPs shall be subsidiary to other bid items.