

PART 1 - GENERAL

1.1 OBJECTIVES

- .1 Prevent the loss of soil from construction site resulting from storm water runoff, wind erosion and construction activities.
- .2 Prevent the sedimentation of storm sewers and receiving waters.
- .3 Prevent air pollution caused by dust and particulate matter.
- .4 Meet or exceed the requirements of LEED 2009 for Neighbourhood Development (with Canadian Alternate Compliance) Green Infrastructure and Buildings (GIB) Prerequisite 4: Construction Activity Pollution Prevention in accordance with the CaGBC Credit Interpretation Request 889.

1.2 DESCRIPTION OF WORK

- .1 Requirements for erosion and sedimentation control ESC shown on plans indicate in a general way some of the measurements to be employed. Work method and equipment engaged in the work may require additional measures to be taken. Contractor shall develop a detailed ESC plan in accordance with the specifications and in particular selected BMPs from the Stormwater Management Manual for Western Washington, Volume II, Construction Pollution Prevention (2005).
- .2 Install ESC products in accordance with manufacturer instructions and the prescribed installation procedures in the referenced Washington State Department of Ecology document.
- .3 Inspect ESC measures on a weekly basis and following all significant storm events. If deficiencies are found, make repairs within 24 hours of detection.
- .4 Maintain an ESC inspection log to document observations, deficiencies and corrective actions.

1.3 REFERENCES

- .1 Washington State Department of Ecology.
.1 Stormwater Management Manual for Western Washington, Volume II, Construction Pollution Prevention (2015 edition).
- .2 Chapter 13 Environmental Guidelines for General Construction Practices. Government of Newfoundland and Labrador Department of Environment and Labour.
- .3 Canada Green Building Council.
.1 LEED 2009 for Neighbourhood Development (with Canadian Alternate Compliance Paths) Green Infrastructure and Buildings (GIB) Prequisite 4: Construction Activity Pollution Prevention.

1.4 LEED CONSTRUCTION COORDINATOR

- .1 .1 Designate an individual to be responsible for all aspects of LEEDr coordination during construction (including erosion and sedimentation control).
- .2 The LEED Construction Coordinator shall be responsible for:
 - .1 Supervising on-site ESC activities on a daily basis.
 - .2 Conducting ESC inspections.
 - .3 Coordinating ESC tasks with subcontractors to ensure timely and orderly progress of the work.
 - .4 Preparing ESC documentation and submittals.
 - .5 Reporting ESC progress to Departmental Representative.
- .3 The LEED Construction Coordinator is to be regularly on-site during construction.

1.5 LEED KICK-OFF MEETING

- .1 Prior to start of construction, the LEED Construction Coordinator shall hold a kick-off meeting with the Departmental Representative to review the Erosion and Sedimentation Control requirements. This meeting shall include a review of:
 - .1 Erosion and Sedimentation Control Objectives.

- 1.5 LEED KICK-OFF MEETING
(Cont'd)
- .1 (Cont'd)
 - .2 Erosion and Sedimentation Control Requirements and Procedures.
 - .3 Erosion and Sedimentation Control Postings and Submittals.

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- 1.6 SUBMITTALS
- .1 Inspection Checklist - Schedule A.
 - .1 Prepare the checklist to include all measures shown on the drawings and described in the specifications.
 - .2 Complete a new checklist with each inspection and keep completed checklists with the weekly inspection log documentation.
 - .2 Weekly Inspection Log - Schedule B.
 - .1 Complete the log on a weekly basis and keep all documentation on-site and available for review by the Departmental Representative.
 - .2 The inspection log shall be completed for each inspection, and must document deficiencies for all measures indicated as "Not OK" on the inspection checklist.
 - .3 Each deficiency must be initialed and each log signed, only after all corrective measures have been completed and documented.
 - .4 Submit all ESC documentation (e.g.: inspection checklists and inspection log) to the Departmental Representative after final landscaping is completely installed.
 - .3 Photographs:
 - .1 A minimum of three (3) digital photographs shall be taken (from various viewpoints) of each ESC measure implemented on-site immediately following installation.
 - .2 A minimum of three (3) digital photographs shall be taken (from various viewpoints) of ESC measure implemented on-site at the end of construction or prior to dismantling, whichever comes first.
 - .3 Submit all digital photographs to Departmental Representative for documentation within seven (7) days of being taken.
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PART 2 - PRODUCTS

- 2.1 EROSION AND SEDIMENTATION CONTROL PLAN .1 The Contractor shall develop and erosion and sediment control plan in accordance with the drawings and specifications and in particular the recommendations of the referenced documents.

PART 3 - EXECUTION

- 3.1 PROCEDURES .1 General Practices:
- .1 Stabilized Construction Entrance (SCE).
 - .1 Construct an SCE before construction begins at every point where traffic leaves the site and enters onto a public road and/or any unpaved entrance/exit location where there is a risk of transporting mud or sediment onto paved roads.
 - .2 The SCE must be at least 10 m wide, and 30 m long, and constructed from 50 mm diameter clear stone, 150 mm diameter rip rap, and filter fabric with the following characteristics:
 - .1 Grab Tensile Strength: 100 kgs
 - .2 Elongation Failure: 60%
 - .3 Mullen Burst Strength: 195 kgs
 - .4 Puncture Strength: 57 kgs
 - .5 Equivalent Opening: Size 40-80 (US std sieve)
 - .2 Site Arrangement.
 - .1 All construction trailers and equipment shall be positioned to reduce the disturbance of site. They shall be located close to the current phase of construction to minimize traffic damage to the site.
 - .3 Material Stockpiling
 - .1 If material in stockpile will not be used within 14 days, it must be stabilized using one of the following measures:
 - .1 Temporary Seeding
 - .2 Tarps
 - .3 Compaction

- 3.1 PROCEDURES .1 (Cont'd)
- (Cont'd) .3 (Cont'd)
- .4 Surface Roughening
- .4 Install ESC products in accordance with manufacturer instructions and the prescribed installation procedures in the referenced Washington State Department of Ecology document.
- .2 Stabilization Practices:
- .1 Preservation of Natural Vegetation.
- .1 Establish construction boundaries to limit site disturbance to 40 feet beyond the building perimeter, 1.5 m beyond primary roadway curbs, walkways and main utility branches and 7.6 m beyond parking areas.
- .2 Stakes shall be used to indicate limits of construction, grading and disturbance. Trees shall be clearly marked to be preserved and protected from the ground disturbances around the base.
- .2 Buffer Zones
- .1 Incorporate vegetated strips of land on floodplains, next to wetlands, along stream banks and on steep, unstable slopes to decrease the velocity of storm water runoff, preventing soil erosion.
- .2 May be an area of vegetation left undisturbed during construction, or it can be newly planted. New strips require establishment of permanent seeding and planting.
- .3 Soil Retaining Measures
- .1 Use skeleton sheeting, continuous sheeting or permanent retaining walls to hold in place loose or unstable soil where other soil retaining methods are not practical.
- .4 Permanent Seeding
- .1 Shall be applied to any graded or cleared area as specified on landscaping plan.
- .2 Plant native species of grass, trees and shrubs during favourable growth conditions; for areas outside of construction activity preferably within 3 weeks of construction start.

3.1 PROCEDURES
(Cont'd)

.2 Stabilization Practices: (Cont'd)

.4 (Cont'd)

.3 Species shall not require permanent irrigation after the first two years or fertilizers containing phosphorus. Species must not be invasive.

.4 Use topsoil on areas where topsoil has been removed, where soil is dense or impermeable, or where mulching and fertilizers alone cannot improve soil quality. Make topsoil layers at least 150 mm deep or similar to the existing topsoil depth.

.3 Structural Practices:

.1 Silt Fence:

.1 Construct posts with filter fabric media to remove sediment from storm water volumes flowing through the fence.

.2 The lower edge of the fence is to be vertically trenched and covered by backfill.

.3 Filter fabric should be a pervious sheet of polypropylene, nylon, polyester, polyethylene or equivalent and have the following characteristics:

.1 Filtering Efficiency: 75%-85% (minimum).

.2 Tensile Strength at 20%, (max)
Elongation: Standard Strength - 0.54 kg/mm, (max) Elongation, Extra Strength - 0.89 kg/mm.

.3 Slurry Flow Rate: 15.0 L/m²/min (min).

.2 Outlet Protection:

.1 Install stone, riprap, concrete aprons, paved sections or settling basins at all pipe, interceptor dike, swale or channel outlets where the velocity of flow may cause erosion or pools at the outlets of an ESC measure.

.3 Inlet Protection:

.1 Install stone, concrete masonry units and stone, filter fabric or slit fences around catch basins and manhole covers to prevent silting of inlets, storm drainage systems or receiving channels.

3.1 PROCEDURES
(Cont'd)

.3 Structural Practices:(Cont'd)

.4 Check Dams:

.1 Install check dams in steeply sloped swales or in swales where adequate vegetation cannot be established, and only in small open channels which will not overflow once dams are constructed.

.2 Construct small, temporary or permanent dam of stone, straw bales, logs or pea gravel-filled sandbags across a drainage ditch, swale or channel to slow water flow and allow suspended sediment to settle.

.5 Drainage Swale:

.1 Construct a channel with a lining of vegetation, riprap, asphalt, concrete or other material to convey runoff from the bottom or top of a slope.

.2 Intercepted runoff shall be diverted to an appropriate outlet with sediment trap if required; swale shall have a positive grade with no dips to collect water.

.3 Swale shall be lined using geotextiles, grass, sod, riprap, asphalt or concrete - based on the volume and velocity of the runoff.

.6 Gravel or Stone Filter Berm:

.1 Construct a temporary ridge of loose gravel, stone or crushed rock to slow filter flow and divert it from exposed traffic in areas with gentle slopes and traffic.

.7 Sediment Trap:

.1 Excavate a pond area or construct earthen embankments to allow for settling of sediment from storm water volumes.

.2 Incorporate temporary seeding, mulching and/or earth dike per installation procedures to reduce erosion of banks.

.3 Use a sediment trap for small drainage areas, no more than 2 hectares (5 acres).

.8 Temporary Sediment Basin:

.1 Use sediment basins for areas larger than 2 hectares (5 acres).

.2 Construct a pond with a controlled water release structure to allow for settling of sediment from water volumes.

3.1 PROCEDURES
(Cont'd)

- .3 Structural Practices:(Cont'd)
- .8 Temporary Sediment Basin:(Cont'd)
- .3 Construction shall occur before any clearing and grading occurs, and must not be built on an embankment in an active stream.
- .4 Incorporate temporary seeding, mulching and/or earth dike per installation procedures to reduce erosion of banks.
- .5 Outlet pipe and spill way shall be designed by Departmental Representative based on an analysis of the expected runoff flow rates from the site.
- .9 Subsurface Drains:
- .1 Place a perforated pipe or conduit beneath the surface of the ground at a designed depth and grade to drain an area with high water table.
- .2 Use relief drains in a gridiron, herringbone or random pattern to dewater an area where the water table is high.
- .3 Place interceptor drains, as single pipes, to remove water where sloping soils are excessively wet or subject to slippage.
- .4 Backfill with open granular, highly permeable soil immediately after pipe is placed.
- .5 Stabilize outlet and ensure sediment-laden storm water runoff is directed to a sediment trapping measure.

3.2 INSPECTIONS
AND MAINTENANCE

- .1 Inspection procedures specified below shall be followed in conjunction with details, drawings and manufacturer requirements.
- .2 Inspect all control measures at least once each week (unless otherwise noted) and following any significant storm (13 mm of precipitation or greater). Complete the inspection log for each inspection, and keep in an accessible location on site until all corrective measures have been documented. Submit each completed log to the Departmental Representative for review.

3.2 INSPECTIONS
AND MAINTENANCE
(Cont'd)

- .3 Maintain all measures in good working order. If a repair is necessary, initiate within 24 hours of report.
- .4 Stabilized Construction Entrance: Apply additional gravel as required, remove sediments and other materials from all areas to minimize clogging. Keep adjacent public roadway(s) free from sediment.
- .5 Site Arrangement: Verify that movement of construction equipment to appropriate area occurs at the same time as movement of construction activities.
- .6 Material Stockpile: Inspect for effective prevention of runoff and erosion. Remove built up sediment from silt fence when it has reached 1/3 the height of the filter fabric.
- .7 Preservation of Natural Vegetation: Routine maintenance shall include mowing, fertilizing, liming, irrigating, pruning and weed and pest control, depending on the specific species and environmental conditions. Remove any debris and ensure area is protected from traffic.
- .8 Buffer Zones: Routine maintenance shall include mowing, fertilizing, liming, irrigating, pruning and weed and pest control, depending on the specific species and environmental conditions. Remove any debris and ensure area is protected from traffic.
- .9 Soil Retaining Measures: Inspect for structural damage and repair as required.
- .10 Permanent Seeding: Inspect for sufficient growth and water conditions. Replant areas if cover does not provide erosion control.
- .11 Silt Fence: Silt fence to be inspected for depth of sediment, tears, loose fabric attachment at fence posts, channel erosion beneath fence, sagging or collapse, and to ensure the fence posts are firmly in the ground. Built-up sediment is to be removed from silt fence when it has reached 1/3 the height of the fence. Repair such that fence is in original installation condition.

3.2 INSPECTIONS
AND MAINTENANCE
(Cont'd)

- .12 Outlet Protection: Inspect for erosion and pooling of water. Necessary repairs to be made as required to reduce exit velocity of runoff. If a riprap apron is used, inspect for riprap displacement and damage to filter fabric.
- .13 Inlet Protection: Inspect that measures are in original installed condition. Ensure measures are effectively trapping sediment. Remove accumulated sediment and debris when it reaches $\frac{1}{2}$ the design depth of the trap. Repair protection measures as required.
- .14 Check Dams: Inspect for sediment and debris accumulation and erosion of sides. Sediment should be removed when it reaches $\frac{1}{2}$ the original dam height. Repair dam as required.
- .15 Drainage Swale: Inspect for dips or low points along the swale where water is pooling and ensure that runoff is being directed to sediment-trapping measure used onsite.
- .16 Gravel or Stone Filter Berm: Inspect for breach in structure caused by vehicles, and accumulated sediment. Replace filter material if needed and remove and properly dispose of accumulated sediment.
- .17 Temporary Sediment Basin/ Sediment Trap: Remove sediment when it reaches 300 mm in depth. If outlet becomes clogged with sediment it must be cleaned to restore flow capacity. Maintain until site area is permanently stabilized and/or permanent structures are in place. Ensure bank is sufficiently compacted and stabilized such that erosion into basin does not occur.
- .18 Subsurface Drains: Inspect pipe for breaks or clogging by sediment or debris. Remove blockage immediately, replace any broken sections and restabilize the surface. Check inlets and outlets for sediment or debris, and remove and dispose of these materials properly.

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3.3 REMOVAL OF .1 ESC measures shall not be removed and shall
PRODUCTS be fully inspected and maintained until final
landscaping is complete.