

Module 4: Minimum Standards

Learning Objectives	2
Minimum Standards	3
MS-1: Stabilization	4
MS-2: Stockpiles, Waste, and Borrow Areas.....	5
MS-3: Permanent Vegetation.....	6
MS-4: First-Step Measures	7
MS-5: Earthen Structure Stabilization	8
MS-6: Traps and Basins.....	9
MS-7: Cut and Fill Slopes	10
MS-8: Concentrated Runoff	11
MS-9: Water Seeps.....	12
MS-10: Inlet Protection	13
MS-11: Outlet Protection	14
MS-12: Watercourse Construction.....	15
MS-13: Temporary Vehicular Stream Crossing	16
MS-14: Other Watercourse Regulations	17
MS-15: Bed and Bank Stabilization	18
MS-16: Utility Construction	19
MS-17: Vehicular Tracking and Construction Entrances.....	20
MS-18: Temporary Control Removal.....	21
Summary	22

Learning Objectives

At the end of this module, you will be able to:

- Explain the importance for each of Minimum Standards 1-18.

Minimum Standards

(9VAC25-875-560)

The Minimum Standards (MS) are listed in Part V (Criteria and Requirements for Regulated Land-Disturbing Activities), Article 2 (Soil Erosion Requirements) of the Virginia Erosion and Stormwater Management (VESM) Regulation. The MSs state when and where Construction Best Management Practices-(C-BMPs) must be used for the effective control of soil erosion and sediment deposition. Every VESCP or VESMP authority must require compliance with the Minimum Standards, and an ESC plan consistent with the following criteria, techniques, and methods must be submitted to the VESMP or VESCP authority for review and approval.

The Minimum Standards should be mutually understood by the plan preparer, plan reviewer, developer (operator), and inspector. As such, they allow for consistent enforcement and compliance throughout the state.

The Minimum Standards can be divided into distinct groups:

- Erosion control and soil stabilization (MS-1, 2, 3, and 5)
- Sediment control (MS-4 and 6)
- Slope protection (MS-7, 8, and 9)
- Channels, culverts, and outlets (MS-10 and 11)
- Watercourses (MS-12, 13, 14, and 15)
- Underground utilities (MS-16)
- Construction entrances (MS-17)
- Project completion (MS-18)
- Water quantity stormwater management (MS-19)- Covered in Module 5

Text in *italics* on the following pages indicates the language of the MS copied from the regulation.

MS-1: STABILIZATION

Permanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 14 days. Permanent stabilization shall be applied to areas that are to be left dormant for more than one year.

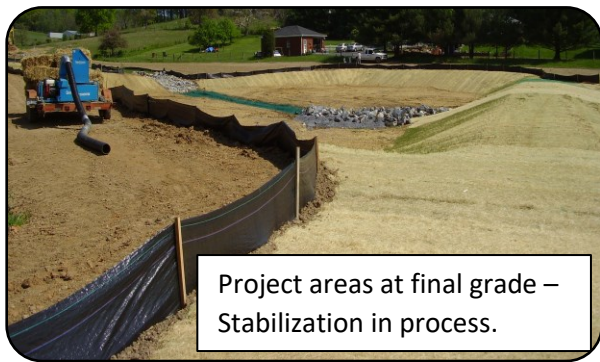
If final grade is reached on any portion of the site, vegetation must be established to prevent erosion. Temporary stabilization must be applied if any portion of the site will remain dormant for more than 14 days.

Remember, groundcover can reduce the erosion potential of an area by 90% to 99%.



Not at Final Grade

- Stabilize within 7 days if dormant >14 days
- Temporarily seed
- Mulch
- Permanently stabilize if dormant >1 year



At Final Grade

- Stabilize within 7 days
- Permanent seeding
- Mulch

MS-2: STOCKPILES, WASTE, AND BORROW AREAS

During construction of the project, soil stockpiles and borrow areas shall be stabilized or protected with sediment trapping measures. The applicant is responsible for the temporary protection and permanent stabilization of all soil stockpiles on site as well as borrow areas and soil intentionally transported from the project site.

Per MS-1, apply temporary soil stabilization (i.e. mulch or annual vegetation) to a stockpile within seven days if it will remain dormant for more than 14 days. If the stockpile will remain on-site for more than one year, stabilize it using permanent vegetation. This also applies to off-site borrow and spoil areas.



Mulch on stockpile and protected with silt fence

Purpose: Mulch prevents erosion by protecting the surface from raindrop impact, and silt fence intercepts and detains sediment from disturbed areas.

MS-3: PERMANENT VEGETATION

A permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered established until a ground cover is achieved that is uniform, mature enough to survive, and will inhibit erosion.

The inspector from the VESCP or VESMP authority may have the final say on when a site has reached final stabilization.

MS-3 is what the authority should use to verify that a site is ready for release of bonds or surety.



Permanent vegetation

Purpose: Reduce erosion and decrease sediment yield from disturbed areas

MS-4: FIRST-STEP MEASURES

Sediment basins and traps, perimeter dikes, sediment barriers, and other measures intended to trap sediment shall be constructed as a first step in any land-disturbing activity and shall be made functional before upslope land disturbance takes place.

This MS is meant to ensure that sediment does not leave the perimeter of the land-disturbing activity (LDA) once site clearing, grading, and construction commences.

Phasing of an LDA should include this Minimum Standard.

A certain amount of initial land disturbance may be required to provide access for equipment to install the initial C-BMPs required under MS-4, but site clearing and grading should be kept to a minimum until these practices are in place.

C-BMPs applicable to MS-4 include certain:

- Construction Erosion Control Measures (C-ECMs), like types of diversions
- Construction Perimeter Control Measures (C-PCMs), like silt fences
- Construction Sediment Control Measures (C-SCMs), like construction entrances, sediment traps, and sediment basins



**Stabilized perimeter diversion dike
(C-ECM-04)**



**Silt fence with wooden stakes
(C-PCM-04)**

Purpose: Intercept and detain small amounts of sediment from disturbed areas during construction operations to prevent sediment from leaving the site and decrease velocity of sheet flows and low-to-moderate level channel flow

MS-5: EARTHEN STRUCTURE STABILIZATION

Stabilization measures shall be applied to earthen structures such as dams, dikes, and diversions immediately after installation.

In this case, immediate stabilization is required, so the C-BMPs made of earthen materials do not become a source of sediment. Earthen practices are generally intended to impound, convey, or divert water, so immediate stabilization is needed to prevent damage or failure of earthen structures.



Earthen C-BMPs seeded and mulched immediately after construction

Purpose: Reduce erosion and sedimentation and reduce damage from sediment and runoff to downstream or off-site areas

MS-6: TRAPS AND BASINS

Sediment traps and sediment basins shall be designed and constructed based upon the total drainage area to be served by the trap or basin.

- a) The minimum storage capacity of a sediment trap shall be 134 cubic yards per acre of drainage area (134 cubic yards per acre is equivalent to one inch of runoff) and the trap shall only control drainage areas less than three acres.*
- b) Surface runoff from disturbed areas that is comprised of flow from drainage areas greater than or equal to three acres shall be controlled by a sediment basin. The minimum storage capacity of a sediment basin shall be 134 cubic yards per acre of drainage area. The outfall system shall, at a minimum, maintain the structural integrity of the basin during a 25-year storm of 24-hour duration. Runoff coefficients used in runoff calculations shall correspond to a bare earth condition or those conditions expected to exist while the sediment basin is utilized.*

Sediment trapping devices:

- Place near the lowest drainage points of a project
- Install as a first-step measure (MS-4)
- Stabilize immediately (MS-5)
- Must include outlet protection for basins (MS-11)
- VSWHB clearly requires MS-19 compliance as well



Sediment Trap
Drainage areas < 3 acres



Sediment Basin
Drainage areas \geq 3 acres

MS-7: CUT AND FILL SLOPES

Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion. Slopes that are found to be eroding excessively within one year of permanent stabilization shall be provided with additional slope stabilizing measures until the problem is corrected.

It is important that slopes are properly seeded and mulched to establish permanent vegetation, so erosion by concentrated flow does not occur.

Remember in Module 2, talking about critical slopes, this minimum standard is reflexive of avoiding those being constructed if possible, and where not possible, ensuring they are appropriately addressed on a plan.

While plants on a slope need water for germination and establishment, cut and fill slopes are inherently unstable, and any runoff from up-gradient areas must be conveyed down the slope in a non-erodible manner.

Roughening the surface of the slope decreases runoff by lowering the velocity and increasing water retention, which leads to better seed germination. This practice should generally be implemented unless the slope will require a high degree of maintenance mowing after vegetative establishment.



MS-8: CONCENTRATED RUNOFF

Concentrated runoff shall not flow down cut or fill slopes unless contained within an adequate temporary or permanent channel, flume, or slope drain structure.

Concentrated runoff flowing down a cut or fill slope will cause erosion, so concentrated flow must be adequately controlled at the outlet and down the slope through a temporary or permanent channel, flume, or slope drain.

The ends of these slope drains need **outlet protection** to prevent erosion from concentrated flows.



Temporary slope drains

Purpose: Temporarily convey concentrated stormwater runoff safely down the face of a cut or fill slope without causing erosion on or below the slope

MS-9: WATER SEEPS

Whenever water seeps from a slope face, adequate drainage or other protection shall be provided.

Cut and fill operations may expose shallow aquifers, perched aquifers, or groundwater tables from which water may seep through the side of a slope. The water seeps can cause slopes to erode, or slough, from the soil's weight. When water seeps are known or discovered on sites, protections must be used to prevent erosion.



Slope failure from a water seep



Riprap installed to prevent further slope failure

MS-10: INLET PROTECTION

All storm sewer inlets that are made operable during construction shall be protected so that sediment-laden water cannot enter the conveyance system without first being filtered or otherwise treated to remove sediment.

The cost to clean out a site's stormwater infrastructure can be reduced with proper C-BMP control design, installation, and maintenance.

Storm sewers are designed to efficiently transport stormwater away from the site, so when sediment enters the storm sewer system, two negative effects can occur:

- When the velocity of flow is high, much of the sediment will be quickly transported to the nearest receiving channel **or**
- When the velocity of the flow is low, the sediment will deposit in the pipes, resulting in clogging and potential flooding of a site during storm events.



Silt fence drop inlet protection



Block and gravel drop inlet sediment filter

Purpose: Prevent sediment from entering storm drainage systems prior to permanent stabilization of the disturbed area

MS-11: OUTLET PROTECTION

Before newly constructed stormwater conveyance channels or pipes are made operational, adequate outlet protection and any required temporary or permanent channel lining shall be installed in both the conveyance channel and receiving channel.

Outlet protection provides energy dissipation of the concentrated discharge from a pipe or channel, in order to prevent erosion and provide a stable transition. Temporary or permanent channel lining helps to ensure that the channel itself will not erode once water is flowing through it.



Outlet protection

Purpose: Prevent scour at stormwater outlets, protect outlet structures, and minimize potential for downstream erosion by reducing the velocity and energy of concentrated stormwater flows

MS-12: WATERCOURSE CONSTRUCTION

When work in a live watercourse is performed, precautions shall be taken to minimize encroachment, control sediment transport, and stabilize the work area to the greatest extent possible during construction. Nonerodible material shall be used for the construction of causeways and cofferdams. Earthen fill may be used for these structures if armored by nonerodible cover materials.

Note that the placing of fill in a wetland or stream as a work pad, as shown in the picture below, needs to be permitted by the U.S. Army Corp of Engineers, Virginia Marine Resource Commission (VMRC), and/or DEQ prior to the commencement of work (see MS-14).



In stream work

Purpose: Use of non-erodible materials prevents damage to the stream bed and sedimentation

MS-13: TEMPORARY VEHICULAR STREAM CROSSING

When a live watercourse must be crossed by construction vehicles more than twice in any six-month period, a temporary vehicular stream crossing constructed of nonerodible material shall be provided.

When two different construction vehicles cross a stream one right after the other, the stream has now been crossed twice and can no longer be crossed within the next six months without violating this MS.

This minimum standard allows one construction vehicle to cross a stream then return within any six-month period.



Temporary stream crossing

Purpose: Provide a means for construction traffic to cross flowing streams without damaging the channel or banks and keep sediment generated by construction traffic out of the stream

MS-14: OTHER WATERCOURSE REGULATIONS

All applicable federal, state, and local requirements pertaining to working in or crossing live watercourses shall be met.

Activities in live watercourses usually fall under the jurisdiction of other agencies and/or regulations, including:

- U.S. Army Corps of Engineers (404 Permit)
- DEQ's Virginia Water Protection (VWP - 401 permitting regulations)
- Virginia Marine Resources Commission (VMRC)
- Virginia Department of Wildlife Resources (DWR) or
- Local wetland board time of year restrictions.

All applicable permits need to be obtained and need to be available on site before construction in live watercourses may start.

Water bodies may be identified through wetland delineation, followed by a jurisdictional determination by the U.S. Army Corps of Engineers. Wetlands, streams, and other water bodies and the impact on these water bodies are usually indicated on plans and sometimes include permit numbers.

NOTE

Jurisdiction of wetlands and shorelines in coastal areas and areas under the Chesapeake Bay Preservation Act may have complicated jurisdictional divisions.

MS-15: BED AND BANK STABILIZATION

The bed and banks of a watercourse shall be stabilized immediately after work in the watercourse is completed.

Stabilization at the end of each day or immediately after work is completed will ensure that sediment is not impacting other parts of the watercourse. Protective measures will be needed when work cannot be completed in a day.

When working in water, the safety of the workers and equipment is important. The weather also factors in heavily when deciding to continue working in a watercourse or not due to potentially high flows of water.



Vegetative streambank stabilization

Purpose: Protect streambanks from erosive forces of flowing water

MS-16: UTILITY CONSTRUCTION

Underground utility lines shall be installed in accordance with the following standards in addition to other applicable criteria:

- a) No more than 500 linear feet of trench may be opened at one time.*
- b) Excavated material shall be placed on the uphill side of trenches.*
- c) Effluent from dewatering operations shall be filtered or passed through an approved sediment trapping device, or both and discharged in a manner that does not adversely affect flowing streams or off-site property.*
- d) Material used for backfilling trenches shall be properly compacted in order to minimize erosion and promote stabilization.*
- e) Re-stabilization shall be accomplished in accordance with this chapter (9VAC25-875-560).*
- f) Applicable safety requirements shall be complied with.*

The basic principle of controlling erosion and sedimentation on utility projects is to get the trench backfilled and stabilized as soon as possible.

Section (f) refers to the safety requirements set forth by OSHA, an example of which is trench depth and the requirement for shoring or trench boxes when workers are in the trench.



Backfilling a utility trench

MS-17: VEHICULAR TRACKING AND CONSTRUCTION ENTRANCES

Where construction vehicle access routes intersect paved or public roads, provisions shall be made to minimize the transport of sediment by vehicular tracking onto the paved surface. Where sediment is transported onto a paved or public road surface, the road surface shall be cleaned thoroughly at the end of each day. Sediment shall be removed from the roads by shoveling or sweeping and transported to a sediment control disposal area. Street washing shall be allowed only after sediment is removed in this manner. This provision shall apply to individual development lots as well as to larger land-disturbing activities.

During wet weather, construction traffic can transport a significant amount of sediment (i.e. mud) onto paved public roads, creating not only a sedimentation problem but also a safety hazard and public nuisance.

The operator is responsible for keeping public roads adjacent to their project clean.

Mud should be swept or shoveled off the road and deposited on areas where it will not cause another sedimentation problem.



Sweeping and washing

Washing is only permitted after shoveling and sweeping of sediment



Temporary stone construction entrance (C-SCM-02)

Purpose: Reduce amount of mud transported onto paved public roads by motor vehicles or runoff

MS-18: TEMPORARY CONTROL REMOVAL

All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization or after the temporary measures are no longer needed, unless otherwise authorized by the VESCP or VESMP authority. Trapped sediment and the disturbed soil areas resulting from the disposition of temporary measures shall be permanently stabilized to prevent further erosion and sedimentation.

Temporary C-BMPs can become a problem if left in place beyond their useful life.

- Sediment fences can trap wildlife and small animals.
- Sediment basins can become drowning hazards or sources of sediment in cases of failure, and they become unsightly.

ESC to SWM Practice?

Some sediment basins are designed to be converted to stormwater basins at the end of a project. This should only be done once final stabilization of the contributing drainage area has been achieved.

Temporary C-BMPs should be removed as soon as their function has been completed, and the area should be stabilized.



Silt fence must be removed at end of project.

Summary

As a plan reviewer, it is important to be able to:

- Recall the Minimum Standards.
- Identify which minimum standard applies to different parts of a site or site plan.
- Discuss why complying with the minimum standards is important across different sites and portions of those sites.

Minimum Standard #	Summary Description & Purpose of Minimum Standards
MS 1	Addresses permanent and temporary soil stabilization within 7 days when site is at final grade and on sites that are not at final grade, but will remain dormant for more than 14 days.
MS 2	Soil Stockpiles and borrow areas must be stabilized or protected with sediment trapping measures. This includes off site/remote areas. According to MS-1, piles dormant more than 14 days should be temporary seeded.
MS 3	Permanent Stabilization must be applied to areas not otherwise permanently stabilized. Ground cover needs to be uniform, mature enough to survive and inhibit erosion.
MS 4	Perimeter controls (sediment barriers, sediment basins, traps, perimeter dikes, etc.) must be installed as first measures and shall be made functional before upslope activity occurs.
MS 5	Stabilization practice shall be applied immediately to earthen structures (i.e. dams, dikes & diversions) after installation.
MS 6	Sediment traps and basins shall be designed and constructed based on the total drainage area they serve.
MS 7	Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion.
MS 8	Concentrated runoff shall not flow down a cut or fill slope unless contained in an adequate temporary or permanent channel, flume or slope drain structure.
MS 9	Where water seeps from a slope face, adequate drainage or other protection shall be provided.

MS 10	All storm sewer inlets made operable during construction must be protected so sediment laden water cannot enter without first being filtered.
MS 11	Before any newly constructed stormwater conveyance channel can be made operational, adequate outlet protection and any required temporary or permanent channel lining shall be installed in both the conveyance channel and receiving channel.
MS 12	Minimize encroachment to live water course. Non-erodible materials shall be used for constructing causeways and coffer dams; earthen material may be used if armored by non-erodible material.
MS 13	When construction vehicles must cross a live water course more than twice in a 6 month period, a temporary stream crossing of non-erodible material must be provided.
MS 14	When working in a live water course, all applicable Federal, State and local regulations pertaining to the activity must be met.
MS 15	The bed and banks of a watercourse shall be stabilized immediately after work in the watercourse has been completed.
MS 16	Underground utility lines can have no more than 500 feet open trench and need to be stabilized as soon as possible. All dewatering operations shall be filtered before water leaves the site.
MS 17	Provisions shall be made to minimize the transport of sediment from the site onto paved surfaces.
MS 18	All temporary ESC measures shall be removed within 30 days of achieving final stabilization or when the measures are no longer needed.
MS 19	Stormwater standard: Protect properties and waterways downstream of a land disturbing activity from erosion and sediment deposition due to increases in peak stormwater runoff.