B-3 STANDARDS AND SPECIFICATIONS FOR LAND GRADING

Definition

Reshaping the existing land surface to provide suitable topography for building facilities and other site improvements.

Purpose

To provide erosion control and vegetative establishment for extreme changes in grade.

Conditions Where Practice Applies

Earth disturbances or extreme grade modifications on steep or long slopes.

Design Criteria

The grading plan should be based on the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surroundings to avoid extreme grade modifications. Information submitted must provide sufficient topographic surveys and soil investigations to determine limitations that must be imposed on the grading operation related to slope stability, adjacent properties, drainage patterns, measures for water removal, and vegetative treatment, etc.

Many jurisdictions have regulations and design procedures already established for land grading that must be followed. The plan must show existing and proposed contours for the area(s) to be graded including practices for erosion control, slope stabilization, and safe conveyance of runoff (e.g., waterways, lined channels, reverse benches, grade stabilization structures). The grading/construction plans are to include the phasing of these practices and consideration of the following:

1. Provisions to safely convey surface runoff to storm drains, protected outlets or stable water courses to ensure that surface runoff will not damage slopes or other graded areas.
2. Cut and fill slopes, stabilized with grasses, no steeper than 2:1. (Where the slope is to be mowed, the slope should be no steeper than 3:1, but 4:1 is preferred because of safety factors related to mowing steep slopes.) Slopes steeper than 2:1 require special design and stabilization considerations to be shown on the plans.
3. Benching per Detail B-3-1 whenever the vertical interval (height) of any 2:1 slope exceeds 20 feet; for 3:1 slopes, when it exceeds 30 feet; and for 4:1 slopes, when it exceeds 40 feet. Locate benches to divide the slope face as equally as possible and to convey the water to a stable outlet. Soils, seeps, rock outcrops, etc. are to be taken into consideration when designing benches.
   A. Provide benches with a minimum width of six feet for ease of maintenance.
   B. Design benches with a reverse slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. Grade the longitudinal slope of the bench between 2 percent and 3 percent, unless accompanied by appropriate design and computations.
   C. The maximum allowable flow length within a bench is 800 feet unless accompanied by appropriate design and computations.
4. Diversion of surface water from the face of all cut and fill slopes using earth dikes or swales. Convey surface water down slope using a designed structure, and:
   A. Protect the face of all graded slopes from surface runoff until they are stabilized.
   B. Do not subject the slope's face to any concentrated flow of surface water such as from natural drainage ways, graded swales, downspouts, etc.
   C. Protect the face of the slope by special erosion control materials to include, but not be limited to, approved vegetative stabilization practices, riprap or other approved stabilization methods.
5. Serrated slope as shown in Detail B-3-2. The steepest allowable slope for ripable rock is 1.5:1. For non rock surfaces, the slopes are to be 2:1 or flatter. These steps will weather and act to hold moisture, lime, fertilizer and seed thus producing a much quicker and longer lived vegetative cover and better slope stabilization.
6. Subsurface drainage provisions. Provide subsurface drainage where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.
7. Proximity to adjacent property. Slopes must not be created close to property lines without adequate protection against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.
8. Quality of fill material. Fill material must be free of brush, rubbish, logs, stumps, building debris, and other objectionable material. Do not place frozen materials in the fill nor place the fill material on a frozen foundation.
9. Stabilization. Stabilize all disturbed areas structurally or vegetatively in compliance with Section B4 Standards and Specifications for Stabilization Practices.

Maintenance

The line, grade, and cross section of benching and serrated slopes must be maintained. Benches and serrated slopes must continuously meet the requirements for Adequate Vegetative Establishment in accordance with Section B-4 Vegetative Stabilization.

B-4 STANDARDS AND SPECIFICATIONS FOR VEGETATIVE STABILIZATION

Definition

Using vegetation as cover to protect exposed soil from erosion.

Purpose

To promote the establishment of vegetation on exposed soil.

Conditions Where Practice Applies

On all disturbed areas not stabilized by other methods. This specification is divided into sections on incremental stabilization; soil preparation, soil amendments and topsoiling; seeding and mulching; temporary stabilization; and permanent stabilization.

Effects on Water Quality and Quantity

Stabilization practices are used to promote the establishment of vegetation on exposed soil. When soil is stabilized with vegetation, the soil is less likely to erode and more likely to allow infiltration of rainfall, thereby reducing sediment loads and runoff to downstream areas.

Planting vegetation in disturbed areas will have an effect on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, percolation, and groundwater recharge. Over time, vegetation will increase organic matter content and improve the water holding capacity of the soil and subsequent plant growth.

Vegetation will help reduce the movement of sediment, nutrients, and other chemicals carried by runoff to receiving waters. Plants will also help protect groundwater supplies by assimilating those substances present within the root zone.

Sediment control practices must remain in place during grading, seedbed preparation, seeding, mulching, and vegetative establishment.

Adequate Vegetative Establishment

Inspect seeded areas for vegetative establishment and make necessary repairs, replacements, and reseeding within the planting season.

1. Adequate vegetative stabilization requires 95 percent groundcover.
2. If an area has less than 40 percent groundcover, restabilize following the original recommendations for lime, fertilizer, seedbed preparation, and seeding.
3. If an area has between 40 and 94 percent groundcover, over-seed and fertilize using half of the rates originally specified.
4. Maintenance fertilizer rates for permanent seeding are shown in Table B.6.

B-4-1 STANDARDS AND SPECIFICATIONS FOR INCREMENTAL STABILIZATION

Definition

Establishment of vegetative cover on cut and fill slopes.

Purpose

To provide timely vegetative cover on cut and fill slopes as work progresses.

Conditions Where Practice Applies

Any cut or fill slope greater than 15 feet in height. This practice also applies to stockpiles.

Criteria

A. Incremental Stabilization - Cut Slopes
   1. Excavate and stabilize cut slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all cut slopes as the work progresses.
   2. Construction sequence example (Refer to Figure B.1):
      a. Construct and stabilize all temporary swales or dikes that will be used to convey runoff around the excavation.
      b. Perform Phase 1 excavation, prepare seedbed, and stabilize.
      c. Perform Phase 2 excavation, prepare seedbed, and stabilize. Overseed Phase 1 areas as necessary.
      d. Perform final phase excavation, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.

Note: Once excavation has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.

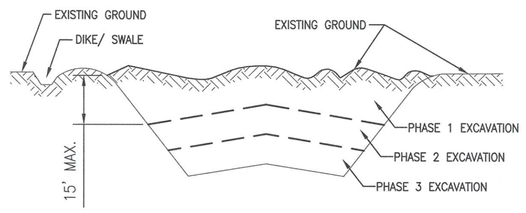

Figure B.1: Incremental Stabilization – Cut

B. Incremental Stabilization - Fill Slopes
   1. Construct and stabilize fill slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all slopes as the work progresses.
   2. Stabilize slopes immediately when the vertical height of a lift reaches 15 feet, or when the grading operation ceases as prescribed in the plans.
   3. At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.
   4. Construction sequence example (Refer to Figure B.2):
      a. Construct and stabilize all temporary swales or dikes that will be used to divert runoff around the fill. Construct silt fence on low side of fill unless other methods shown on the plans address this area.
      b. At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.
      c. Place Phase 1 fill, prepare seedbed, and stabilize.
      d. Place Phase 2 fill, prepare seedbed, and stabilize.
      e. Place final phase fill, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.

Note: Once the placement of fill has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.

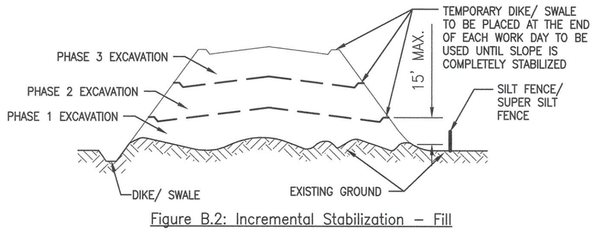

Figure B.2: Incremental Stabilization – Fill

B-4-2 STANDARDS AND SPECIFICATIONS FOR SOIL PREPARATION, TOPSOILING, AND SOIL AMENDMENTS

Definition

The process of preparing the soils to sustain adequate vegetative stabilization.

Purpose

To provide a suitable soil medium for vegetative growth.

Conditions Where Practice Applies

Where vegetative stabilization is to be established.

Criteria

A. Soil Preparation
   1. Temporary Stabilization
      a. Seedbed preparation consists of loosening soil to a depth of 3 to 5 inches by means of suitable agricultural or construction equipment, such as disc harrows or chisel plows or rippers mounted on construction equipment. After the soil is loosened, it must not be rolled or dragged smooth but left in the roughened condition. Slopes 3:1 or flatter are to be tracked with ridges running parallel to the contour of the slope.
      b. Apply fertilizer and lime as prescribed on the plans.
      c. Incorporate lime and fertilizer into the top 3 to 5 inches of soil by disking or other suitable means.
   2. Permanent Stabilization
      a. A soil test is required for any earth disturbance of 5 acres or more. The minimum soil conditions required for permanent vegetative establishment are:
      i. Soil pH between 6.0 and 7.0.
      ii. Soluble salts less than 500 parts per million (ppm).
      iii. Soil contains less than 40 percent clay but enough fine grained material (greater than 30 percent silt plus clay) to provide the capacity to hold a moderate amount of moisture. An exception: if lovegrass will be planted, then a sandy soil (less than 30 percent silt plus clay) would be acceptable.
      iv. Soil contains 1.5 percent minimum organic matter by weight.
      v. Soil contains sufficient pore space to permit adequate root penetration.
      b. Application of amendments or topsoil is required if on-site soils do not meet the above conditions.
      c. Graded areas must be maintained in a true and even grade as specified on the approved plan, then scarified or otherwise loosened to a depth of 3 to 5 inches.
      d. Apply soil amendments as specified on the approved plan or as indicated by the results of a soil test.
      e. Mix soil amendments into the top 3 to 5 inches of soil by disking or other suitable means. Rake lawn areas to smooth the surface, remove large objects like stones and branches, and ready the area for seed application. Loosen surface soil by dragging with a heavy chain or other equipment to roughen the surface where site conditions will not permit normal seedbed preparation. Track slopes 3:1 or flatter with tracked equipment leaving the soil in an irregular condition with ridges running parallel to the contour of the slope. Leave the top 1 to 3 inches of soil loose and friable. Seedbed loosening may be necessary on newly disturbed areas.

B. Topsoiling
   1. Topsoil is placed over prepared subsoil prior to establishment of permanent vegetation. The purpose is to provide a suitable soil medium for vegetative growth. Soils of concern have low moisture content, low nutrient levels, low pH, materials toxic to plants, and/or unacceptable soil gradation.
   2. Topsoil salvaged from an existing site may be used provided it meets the standards as set forth in these specifications. Typically, the depth of topsoil to be salvaged for a given soil type can be found in the representative soil profile section in the Soil Survey published by USDA-NRCS.
   3. Topsoiling is limited to areas having 2:1 or flatter slopes where:
      a. The texture of the exposed subsoil/parent material is not adequate to produce vegetative growth.
      b. The soil material is so shallow that the rooting zone is not deep enough to support plants or furnish continuing supplies of moisture and plant nutrients.
      c. The original soil to be vegetated contains material toxic to plant growth.
      d. The soil is so acidic that treatment with limestone is not feasible.
   4. Areas having slopes steeper than 2:1 require special consideration and design.
   5. Topsoil Specifications: Soil to be used as topsoil must meet the following criteria:
      a. Topsoil must be a loam, sandy loam, clay loam, silt loam, sandy clay loam, or loamy sand. Other soils may be used if recommended by an agronomist or soil scientist and approved by the appropriate approval authority. Topsoil must not be a mixture of contrasting textured subsoils and must contain less than 5 percent by volume of cinders, stones, slag, coarse fragments, gravel, sticks, roots, trash, or other materials larger than 1½ inches in diameter.
      b. Topsoil must be free of noxious plants or plant parts such as Bermuda grass, quack grass, Johnson grass, nut sedge, poison ivy, thistle, or others as specified.
      c. Topsoil substitutes or amendments, as recommended by a qualified agronomist or soil scientist and approved by the appropriate approval authority, may be used in lieu of natural topsoil.
   6. Topsoil Application
      a. Erosion and sediment control practices must be maintained when applying topsoil.
      b. Uniformly distribute topsoil in a 5 to 8 inch layer and lightly compact to a minimum thickness of 4 inches. Spreading is to be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations must be corrected in order to prevent the formation of depressions or water pockets.
      c. Topsoil must not be placed if the topsoil or subsoil is in a frozen or muddy condition, when the subsoil is excessively wet or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

C. Soil Amendments (Fertilizer and Lime Specifications)
   1. Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas of 5 acres or more. Soil analysis may be performed by a recognized private or commercial laboratory. Soil samples taken for engineering purposes may also be used for chemical analyses.
   2. Fertilizers must be uniform in composition, free flowing and suitable for accurate application by appropriate equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers must all be delivered to the site fully labeled according to the applicable laws and must bear the name, trade name or trademark and warranty of the producer.
   3. Lime materials must be ground limestone (hydrated or burnt lime may be substituted except when hydroseeding) which contains at least 50 percent total oxides (calcium oxide plus magnesium oxide). Limestone must be ground to such fineness that at least 50 percent will pass through a #100 mesh sieve and 98 to 100 percent will pass through a #20 mesh sieve.
   4. Lime and fertilizer are to be evenly distributed and incorporated into the top 3 to 5 inches of soil by disking or other suitable means.
   5. Where the subsoil is either highly acidic or composed of heavy clays, spread ground limestone at the rate of 4 to 8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of topsoil.

B-4-5 STANDARDS AND SPECIFICATIONS FOR PERMANENT STABILIZATION

Definition

To stabilize disturbed soils with permanent vegetation.

Purpose

To use long-lived perennial grasses and legumes to establish permanent ground cover on disturbed soils.

Conditions Where Practice Applies

Exposed soils where ground cover is needed for 6 months or more.

Criteria

A. Seed Mixtures
   1. General Use
      a. Select one or more of the species or mixtures listed in Table B.3 for the appropriate Plant Hardiness Zone (from Figure B.3) and based on the site condition or purpose found on Table B.2. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The Summary is to be placed on the plan.
      b. Additional planting specifications for exceptional sites such as shorelines, stream banks, or dunes or for special purposes such as wildlife or aesthetic treatment may be found in USDA-NRCS Technical Field Office Guide, Section 342 - Critical Area Planting.
      c. For sites having disturbed area over 5 acres, use and show the rates recommended by the soil testing agency.
      d. For areas receiving low maintenance, apply urea form fertilizer (46-0-0) at 3 ½ pounds per 1000 square feet (150 pounds per acre) at the time of seeding in addition to the soil amendments shown in the Permanent Seeding Summary.

TEMPORARY SEEDING SUMMARY

	No.	Seed Mixture (For Hardiness Zone 7A) (From Table B.1) Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths	Fertilizer Rate (10-20-20)	Lime Rate
Cool-Season Grasses	1	ANNUAL RYEGRASS (Lolium perenne ssp. multiflorum)	40	2/15 -4/30 8/15 - 11/30	½"	436 lb/ac (10 lb/ 1000 sf)	2 tons/ac (90 lb/ 1000 sf)
	2	BARLEY (Hordeum vulgare)	96	2/15 -4/30 8/15 - 11/30	1"		
	3	OATS (Avena sativa)	72	2/15 -4/30 8/15 - 11/30	1"		
	4	WHEAT (Triticum aestivum)	120	2/15 -4/30 8/15 - 11/30	1"		
	5	CEREAL RYE (Secale cereale)	112	2/15 -4/30 8/15 - 11/30	1"		
	1	FOXTAIL MILLET (Setaria italica)	30	5/1 - 8/14	½"	436 lb/ac (10 lb/ 1000 sf)	2 tons/ac (90 lb/ 1000 sf)
	2	PEARL MILLET (Pennisetum glaucum)	20	5/1 - 8/14	½"		

NOTES:

1. Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates must be adjusted to reflect percent seed germination and purity, as tested. Adjustments are usually not needed for the cool-season grasses.
2. Seeding rates listed above are for temporary seedings, when planted alone. When planted as a nurse crop with permanent seed mixes, use ⅓ of the seeding rated listed above for barley, oats, and wheat. For smaller-seeded grasses, (annual ryegrass, pearl millet, and foxtail millet), do not exceed more than 5% (by weight) of the overall permanent seeding mix. Cereal rye generally should not be used as a nurse crop unless planting will occur in very late fall beyond the seeding dates for other temporary seedings. Cereal rye has allelopathic properties that inhibit germination and growth of other plants. If it must be used as a nurse crop, seed at ⅓ of the rate listed above.
3. Oats are the recommended nurse crop for warm-season grasses.
4. For sandy soils, plant seeds at twice the depth listed above.
5. The planting dates listed above are averages and may require adjustment to reflect local conditions, especially near the boundaries of the Plant Hardiness Zones.
6. All seeds must comply with the Maryland State Seed Law. Seed must be free of prohibited or restricted noxious weeds, as currently listed by the Maryland Department of Agriculture, Turf and Seed Section.

PERMANENT SEEDING SUMMARY

	No.	Seed Mixture (For Hardiness Zone 7A) (From Table B) Species	Application Rate (lb/ac)	Seeding Dates	Seeding Depths	Fertilizer Rate (10-20-20) N	P_2O_5	K_2O	Urea (46-0-0)	Lime Rate
Warm-Season Grasses	9	HARD FESCUE (Festuca trachyphylla)	40	3/1 - 5/15 8/15 - 10/15	½" - ½"	45 lb/ac (1 lb/ 1000 sf)	90 lb/ac (2 lb/ 1000 sf)	90 lb/ac (2 lb/1000 sf)	150 lb/ac (3.5 lb/1000 sf)	2 tons/ac (90 lb/ 1000 sf)
		Kentucky Bluegrass (Poa pratensis)	40							
		Perennial Ryegrass (Lolium perenne)	20							
		From Table B-4								
		PEARL MILLET (Pennisetum glaucum)	20	5/1 - 8/14	½"					2 tons/ac (90 lb/ 1000 sf)

Turfgrass Mixtures
   a. Areas where turfgrass may be desired include lawns, parks, playgrounds, and commercial sites which will receive a medium to high level of maintenance.
   b. Select one or more of the species or mixtures listed below based on the site conditions or purpose. Enter selected mixture(s), application rates, and seeding dates in the Permanent Seeding Summary. The summary is to be placed on the plan.

   i. Tall Fescue/Kentucky Bluegrass: Full Sun Mixture: For use in drought prone areas and/or for areas receiving low to medium management in full sun to medium shade. Recommended mixture includes; Certified Tall Fescue Cultivars 95 to 100 percent, Certified Kentucky Bluegrass Cultivars 0 to 5 percent. Seeding Rate: 5 to 8 pounds per 1000 square feet. One or more cultivars may be blended.
   iv. Kentucky Bluegrass/Fine Fescue: Shade Mixture: For use in areas with shade in Bluegrass lawns. For establishment in high quality, intensively managed turf area. Mixture includes; Certified Kentucky Bluegrass Cultivars 30 to 40 percent and Certified Fine Fescue and 60 to 70 percent. Seeding Rate: 1½ to 3 pounds per 1000 square feet.

   c. Ideal Times of Seeding for Turf Grass Mixtures
   Western MD: March 1 to June 1, August 1 to October 1 (Hardiness Zone: 5b, 6a)
   Central MD: March 1 to May 15, August 15 to October 15 (Hardiness Zone: 6b)
   Southern MD, Eastern Shore: March 1 to May 15, August 15 to October 15 (Hardiness Zone: 7a, 7b)
   d. Till areas to receive seed by disking or other approved methods to a depth of 2 to 4 inches, level and rake the areas to prepare a proper seedbed. Remove stones and debris over 1½ inches in diameter. The resulting seedbed must be in such condition that future mowing of grasses will pose no difficulty
   e. If soil moisture is deficient, supply new seedings with adequate water for plant growth (⅓ to 1 inch every 3 to 4 days depending on soil texture) until they are firmly established. This is especially true when seedings are made late in the planting season, in abnormally dry or hot seasons, or on adverse sites.

NOTES:

1. Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates must be adjusted to reflect percent seed germination and purity, as tested. Adjustments are usually not needed for the cool-season grasses.
2. For sandy soils, plant seeds at twice the depth listed above.
3. The planting dates listed above are averages and may require adjustment to reflect local conditions, especially near the boundaries of the Plant Hardiness Zones. When seeding toward the end of the listed planting dates, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table B.1 and plant together with the permanent seeding mix.
4. When planted during the growing season, most of these materials must be purchased and kept in a dormant condition until planting. Bare-root grasses are the exception - they may be supplied as growing (non-dormant) plants.
5. Warm-season grasses need a soil temperature of at least 50°F in order to germinate.
6. All seeds must comply with the Maryland State Seed Law. Seed must be free of prohibited or restricted noxious weeds, as currently listed by the Maryland Department of Agriculture, Turf and Seed Section.

OWNER'S / DEVELOPER'S CERTIFICATION

I/We hereby certify that all clearing, grading, construction, and/or development will be pursuant to this plan and that any responsible personnel involved in the construction project will have a certificate of attendance at a Maryland Department of the Environment approved training program for the control of erosion and sediment before beginning the project. I hereby authorize the right for periodic on-site evaluation by State of Maryland, Department of the Environment, Compliance Inspectors.

6-14-2016 — Date

Marc Dallaire P.E. — Owner / Developer Signature

26489 — Card No.

Marc Dallaire, P.E. Project Section Supervisor — Printed Name and Title

DESIGN CERTIFICATION

I hereby certify that this plan has been design in accordance with the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control, the 2009 Maryland Stormwater Design Manual, Volumes I & II and the Maryland Department of the Environment erosion and sediment control and stormwater management regulations.

6-14-2016 — Date

Designer's Signature

Md. registration No. No. 19708 (P.E.) R.L.S., RLA, or R.A. (circle one)

KIRK D. GRAU — Printed Name and Title

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. No. 19708, Expiration Date: 7-13-16

MDE PROJECT #
MDE 16-SF-0134
CONTRACTORS NOTE:
EROSION AND SEDIMENT CONTROL WILL BE STRICTLY ENFORCED

Fully Sprinklered

100% Bid Documents, September 1, 2015

Additions:	Date:
Revisions:	
ADDENDUM #1	6-14-16

DCS Infrastructure, LLC
3249 route 112, building 4 suite 1B
Medford, N.Y. 11763
631-320-1706
Hatch Mott MacDonald

STATE OF MARYLAND — No. 12788 — PROFESSIONAL ENGINEER

Approved:	Approved: Chief, Facilities and Engineering:
	Approved: Associate Chief for Maintenance And Operations, Perry Point:
	Approved: Engineering Projects Supervisor
	Approved: Infection Control Officer

Drawing Title: SOIL EROSION AND SEDIMENT CONTROL NOTES

Approved: Associate Director for Operations:

Approved: Director, Medical Center:

Project Title: POTABLE WATER SYSTEM IMPROVEMENTS - TIER 1
PERRY POINT MD
VAMC

Scale:

Building No:

Checked: KDG

Drawn: PB

Location: VAMC PERRY POINT, MD 21902

Date: 9/1/2015

Project No: 512A5-13-329

DRAWING NO: E&SC-003

16.2 OF

DEPARTMENT OF VETERANS AFFAIRS