

SECTION 1—INTRODUCTION

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INTRODUCTION

Purpose

The purpose of this manual is to provide minimum standards and specifications for meeting criteria set forth by the New York State Department of Environmental Conservation (NYS DEC) for stormwater discharges associated with construction activity. The standards and specifications provide criteria on minimizing erosion and sediment impacts from construction activity involving soil disturbance. They show how to use soil, water, plants, and products to protect the quality of our environment. These standards and specifications were developed in cooperation with the USDA Natural Resources Conservation Service, New York State Soil and Water Conservation Committee (NYSSWCC), NYS DEC and other state and local agencies for use by planners, design engineers, developers, contractors, landscape architects, property owners, and resource managers. Proper use of these standards will protect the waters of the state from sediment loads during runoff events.

Scope and Authority

The standards and specifications apply to lands within New York State where housing, industrial, institutional, recreational, or highway construction, and other land disturbances are occurring or imminent. They are statewide in scope and, in some cases, are somewhat generalized due to variations in climate, topography, geology, soils, and plant requirements. Feasible ways to minimize erosion and sedimentation are varied and complex. Following these standards and specifications is presumed to be in compliance with the SPDES general permit for construction activities. Alternative methods may be explored on a case specific basis and shall be discussed with NYS DEC regional staff.

The Environmental Protection Agency delegated stormwater responsibility for the National Pollutant Discharge Elimination System (NPDES) Permit to New York on October 1, 1992. New York State issued its first General Permit for stormwater discharges from construction activities on August 1, 1993. This was issued pursuant to Article 17, Titles 7, 8 and Article 70 of Environmental Conservation Law. At a minimum, an erosion and sediment control plan must be prepared for any construction activity that disturbs one or more acres.

Erosion and Sediment Hazards Associated with Development

Many people may be adversely affected by development on relatively small areas of land. Uncontrolled erosion and sediment from these areas may cause considerable economic damage to individuals and society in general.

Stream pollution and damages to public facilities and private homes are examples. Hazards associated with land disturbance include:

1. A large increase of soil exposed to erosion from wind and water;
2. Increased water runoff, soil movement, sediment accumulation and peak flows caused by:
 - a. Removal of plant cover;
 - b. A decrease in the area of soil which can absorb water because of construction of streets, buildings, sidewalks, and parking lots;
 - c. Changes in drainage areas caused by grading operations, diversions, and streets;
 - d. Changes in volume and duration of water concentrations caused by altering steepness, distance, and surface roughness;
 - e. Soil compaction by heavy equipment, which can reduce the water intake of soils as much as 90 percent of the original rate; and,
 - f. Prolonged exposure of unprotected sites and disturbed areas to poor weather conditions.
3. Altering the groundwater regime that may adversely affect drainage systems, slope stability, survival of existing vegetation and establishment of new plants;
4. Exposing subsurface materials that are too rocky, too acid, or otherwise unfavorable for establishing plants;
5. Obstructing stream flow with new buildings, dikes, and land fills;
6. Improper timing and sequencing of construction and development activities; and,
7. Abandonment of sites before completion of construction.

How to Use This Manual

The standards and specifications listed in this manual have been developed over time to reduce the impact of soil loss from construction sites to receiving water bodies and adjacent properties. This manual provides designers with details on how to plan a site for erosion and sediment control and how to select, size, and design specific practices to meet these resource protection objectives. The appendices at the end of this manual contain additional information as guidance for site plan design and review, construction implementation, and site inspection. Review and inspection checklists are provided to aid planners and designers in meeting the standards requirements.

Section 2. Erosion Control Planning and Site Management

This section discusses the objectives of the erosion and sediment control plan. Site and off-site resources are identified and incorporated into a six step planning process. In addition, special considerations for project development and their relationship to the erosion and sediment control plan are discussed.

Section 3. Vegetative Measures for Erosion and Sediment Control

This section provides a number of specific vegetative standards to meet a variety of project needs. These measures are generally looked at first for their low cost and high performance capability in reducing erosion.

Section 4. Bio-Technical Measures for Erosion and Sediment Control

This section describes bio-technical standards that use plant materials to stabilize slopes, road banks, and streambanks. These standards provide environmentally friendly stabilization measures that may be implemented either alone, or in combination with structural components.

Section 5. Structural Measures for Erosion and Sediment Control

This section is subdivided into temporary and permanent practices. The temporary practices are generally designed based on the site's drainage area. The permanent practices have detailed design procedures included in the text of the standard. Standards and specifications are included for controlling runoff and sediment.

Appendices

Appendix A. The Impact of Soil Loss

Soil types at construction sites play a predominant role in how the site should be constructed to control erosion. Knowledge of soil properties, particularly when soils are highly erosive, is essential. This appendix discusses soil properties and provides a method to compute potential soil loss and reduction control depending on slope, area, and protective cover.

Appendix B. Performance Evaluation for Temporary Erosion and Sediment Control Practices

This appendix offers a method of evaluating the performance of a practice and is applicable to most of the temporary practices found in this manual. This will allow a designer to evaluate an existing condition, or to select a specific level of protection higher than that which may be provided by the standard details.

Appendix C. Cost Analysis of Erosion and Sediment Control Practices

This appendix provides historical bid information for most of the practices contained in the manual. Sources included the NYS Department of Transportation, Monroe County SWCD, and other county soil and water conservation districts. This information will allow a designer to prepare cost estimates for specific erosion and sediment control plans.

Appendix D. Fertilizer Labels and Pure Live Seed

This appendix contains a review on how to read fertilizer labels and compute pure live seed with an example for site application.

Appendix E. Erosion Control for Small Residential Sites

Within New York State SPDES requirements, many small residential sites have to file for permit coverage. All of these sites will need erosion and sediment control plans. This appendix presents plans for scenarios that can be used by the local authorities and site owners. Attaching the appropriate plan to the building permit assists the owner with compliance with the provisions of the permit.

Appendix F. Soil Erosion and Sediment Control Plan—Site Example

This appendix illustrates the development of the erosion and sediment control plan from the proposed grading changes to final stabilization. Details of the construction sequence and practices utilized are described.

Appendix G. Sample Checklist for Reviewing Erosion and Sediment Control Plans

This appendix includes a comprehensive checklist for use by all site plan reviewers (including planning board members, conservation board members, conservation district personnel, engineers, consultants, approval authorities, and others) when reviewing erosion and sediment control plans for completeness and proper management.

Appendix H. Construction Site Inspection & Maintenance Site Log Book

A proper site inspection, whether conducted by local authorities or project staff, is necessary to assess the site conditions and the practices implemented. This appendix includes a detailed checklist to assist inspectors in conducting a thorough evaluation of the site when judging the effectiveness of the erosion and sediment control measures.

BASIC PRINCIPLES OF EROSION AND SEDIMENT CONTROL

The Erosion and Sedimentation Processes

The standards, specifications, and planning guidelines presented in this document are intended to be utilized when development activities change the natural topography and vegetative cover of an area. Erosion and sediment control plans must be designed and constructed to minimize erosion and sediment problems associated with soil disturbance. To understand how erosion and sediment rates are increased requires an understanding of the processes themselves.

Soil erosion is the removal of soil by water, wind, ice, or gravity. This document deals primarily with the types of soil erosion caused by rainfall and surface runoff. Raindrops strike the soil surface at a velocity of approximately 25-30 feet per second and can cause splash erosion. Raindrop erosion causes particles of soil to be detached from the soil mass and splash into the air. After the soil particles are dislodged, they can be transported by surface runoff, which results when the soil becomes too saturated to absorb falling rain or when the rain falls at an intensity greater than the rate at which the water can enter the soil. Scouring of the exposed soil surface by runoff can cause further erosion. Runoff can become concentrated into rivulets or well-defined channels up to several inches deep. This advanced stage is called rill erosion. If rills and grooves remain unrepaired, they may develop into gullies when more concentrated runoff flows downslope.

Sediment deposition occurs when the rate of surface flow is insufficient for the transport of soil particles. The heavier particles, such as sand and gravel, transport less readily than the lighter silt and clay particles. Previously deposited sediment may be suspended by runoff from another storm and transported farther downslope. In this way, sediment is carried intermittently downstream from its upland point of origin.

Factors That Influence Erosion

The erosion potential of a site is determined by five factors; soil erodibility, vegetative cover, topography, climate, and season. Although the factors are interrelated as determinants of erosion potential, they are discussed separately for easy understanding.

1. **Soil Erodibility** – The vulnerability of a soil to erosion is known as erodibility. The soil structure, texture, and percentage of organic matter influence its erodibility. The most erodible soils generally contain high proportions of silt and very fine sand. The presence of clay or organic matter tends to decrease soil erodibility. Clays are sticky and tend to bind soil particles together. Organic matter helps to maintain stable soil structure (aggregates).

2. **Vegetative Cover** – Vegetation protects soil from the erosive forces of raindrop impact and runoff scour in several ways. Vegetation (top growth) shields the soil surface from raindrop impact while the root mass holds soil particles in place. Grass buffer strips can be used to filter sediment from the surface runoff. Grasses also slow the velocity of runoff, and help maintain the infiltration capacity of a soil. The establishment and maintenance of vegetation are the most important factors in minimizing erosion during development.

3. **Topography** – Slope length and steepness greatly influence both the volume and velocity of surface runoff. Long slopes deliver more runoff to the base of slopes and steep slopes increase runoff velocity. Both conditions enhance the potential for erosion to occur.

4. **Climate** – Climate also affects erosion potential in an area. Rainfall characteristics such as frequency, intensity, and duration directly influence the amount of runoff that is generated. As the frequency of rainfall increases, water has less chance to drain through the soil between storms. The soil will remain saturated for longer periods of time and stormwater runoff volume may be potentially greater. Therefore, erosion risks are high where rainfall is frequent, intense, or lengthy.

5. **Season** – Seasonal variation in temperature and rainfall defines periods of high erosion potential during the year. High erosion potential may exist in the spring when the surface soil first thaws and the ground underneath remains frozen. A low intensity rainfall may cause substantial erosion because the frozen subsoil prevents water infiltration. In addition, the erosion potential increases during the summer months due to more frequent, high intensity rainfall.