SECTION 1—INTRODUCTION

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SECTION 1—INTRODUCTION

Purpose & Scope

The purpose of this document 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.

Authority

These 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 permit 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 and, in some special watersheds, 5,000 square feet.

Note: Performing activities within or adjacent to wetlands, streams and waterbodies may require permits from the New York State Department of Environmental Conservation (NYSDEC) pursuant to Article 15 (Protection of Waters), Article 24 (Freshwater Wetlands) and Article 25 (Tidal Wetlands) of the Environmental Conservation Law (ECL). Project owners should contact NYSDEC's Regional Division of Environmental Permits early in the site planning process to discuss the requirements for meeting permit issuance standards. Following the New York State Standards and Specifications for Erosion and Sediment Control may not ensure compliance with the above referenced sections of the ECL.

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 and topsoil;

    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 landfills;

6. Improper timing and sequencing of construction and development activities; and,

7. Abandonment of sites before completion of construction.

How to Use This Book of Standards

This book of standards is organized in a manner to emphasize good planning and environmental site design at the onset of a project, followed by the design process noting the differences with different types of construction operations. Standards are presented in the order of proper site management in the beginning followed by erosion control, using runoff control and soil stabilization, and then sediment control practices.

The standards and specifications listed in this book have been developed over time to reduce the impact of soil loss from construction sites to receiving water bodies and adjacent properties. This book 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 book 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. Site Planning, Preparation, and Management

This section discusses the objectives of the erosion and sediment control plan. Site and off-site resources are identified and incorporated into a seven step design process. In addition, special considerations for different types of project development and their needs for erosion and sediment control planning are discussed. Typical site management standards are located in this section.

Section 3. Erosion Control Part 1- Runoff Control

This section provides a number of specific runoff control standards to meet a variety of project needs. Both temporary and permanent practices are presented to manage stormwater runoff to and within the site. The design of some of these practices can be completed by selecting dimensions based on tributary drainage areas; while others require more detailed design analysis

Section 4. Erosion Control Part 2- Soil Stabilization

This section presents detailed standards and specifications for soil stabilization, the second part of erosion control. It includes standards for grading activities, stabilization with seeding and mulching, use of stabilization matting, application of loose stabilization blankets and addresses special applications. Standards for lime and fertilizer application are also included. Bio-technical standards for live fascines, brush mattress and others, are presented for stabilizing steep slopes, road banks, and stream banks. Structural components are also included to aid where vegetative applications alone are inadequate to stabilize an area.

Section 5. Sediment Control

This section addresses the capture, retention and control of sediment within the boundaries of the disturbed construction site. Standards and specifications are included for perimeter controls, storm drain inlet protection, buffer filter strips, temporary sediment traps, tanks, tubes, bags and sediment basins and dewatering devices. A standard for polymer flocculation of dispersive soils is also included in this section.

Appendices

Appendix A. Revised Universal Soil Loss Equation

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 calculate potential soil loss and provide a measure of reduction depending on slope, area, and protective cover.

Appendix B. Design Process for Erosion & Sediment Control Practices

This appendix demonstrates the design processes for a number of standard practices presented in this book. Specific site examples are used to show step by step procedures to complete detailed designs of the practices, including the appropriate construction specifications, maintenance, and inspection requirements. These processes will allow a designer to evaluate an existing condition or design to a specific level of performance higher than the minimum level presented in these standards.

Appendix C. Cost Analysis of Erosion & 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, national periodicals, and erosion and sediment control cost data from other states. This information will assist a designer in preparing cost estimates for specific

erosion and sediment control plans.

Appendix D. Erosion Control for Small Residential Sites

Within New York State SPDES requirements, many small residential sites have to file for permit coverage. For those sites that require the preparation of a SWPPP which only requires erosion and sediment control plans, this appendix presents example 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 E. 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 F. 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.

Appendix G. Tree Species for New York State

This appendix identifies tress suitable for landscape and conservation plantings in New York State.

Appendix H. Glossary

This appendix presents a list of terms commonly used in site planning, design, erosion and sediment control, soil science, construction activities, streambank stabilization and corridor restoration, vegetation, engineering, hydrology and water quality.

Appendix I. Directories

This appendix presents listings of contact information and locations of federal, state, regional and local agencies, who may be involved with environmental and technical review of erosion and sediment control plans. These agencies may also provide data important to the development of stormwater management plans.

BASIC PRINCIPLES OF EROSION AND SEDIMENT CONTROL

The Erosion and Sedimentation Processes

The standards, specifications, and planning procedures 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 accelerated due to soil disturbance. 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 re-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 (except for dispersive 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.

Predicting Soil Losses

Prediction of soil loss is a planning tool. The predictions guide planners on the degree of erosion and sediment control at specific sites. Predicted soil losses also creates awareness among developers, local governments and others of the urgent need to install erosion and sediment control measures before, during and after construction activity.

Soil losses can be predicted for a whole year, part of a year or on the basis of rainfall amounts. The Revised Universal Soil Loss Equation (RUSLE) is used to estimate soil losses on construction sites from sheet and rill erosion. The equation uses site-specific rainfall intensity, soil erodibility and slope factors (see Appendix A). Other soil losses, such as gully erosion or wind erosion, are calculated separately.

There are over 440 different soils in New York State. These soils are made up of different percentages of gravel, sand, silt, clay and organic material. Thus, they erode at different rates. Table 2.5 in Section 2 provides a general characterization of erosion risk based on slope and associated physical factors.

Estimating Sediment Yield

Sediment yield involves both soil erosion on the site and the transport mechanism acting to carry the eroded material off the site.

Where sediment yields from a developing area are needed for estimating sediment basin design volumes, the method in Appendix A can be used for determining the amount of the eroded material that will leave the site as sediment.

Determining Stormwater Runoff

Stormwater hydrology should be calculated using the hydrologic data and rainfall distributions published by the Northeast Regional Climate Center (NRCC) on their website **http://precip.eas.cornell.edu/**. These data can be imported into HydroCAD, USDA NRCS TR20, and other computer models for use in watershed evaluations and stormwater management practice design. Detailed soils information, such as the appropriate Hydrologic Soil Group for drainage analysis, should be obtained from the USDA NRCS Web Soil Survey at their website **http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm**

Professional Certification

It is important that erosion and sediment control plans be prepared by qualified individuals. State licensed engineers, registered landscape architects and Certified Professional in Erosion and Sediment Control (CPESC) provide the technical skills required to design erosion and sediment control plans and inspect construction sites. EnviroCert International, Inc. administers a program to evaluate individuals as a CPESC. Such individuals have acquired specific training and passed an examination in erosion and sediment control (ESC). These individuals are generally available for site design and/or implementation oversight. Their website is **http://www.envirocertintl.org/cpesc**.

ESC Ordinances and Subdivision Regulations

Local ESC Laws and land use regulations protect the public welfare by saving money on public infrastructure and maintenance, increasing public safety, protecting water supplies (including groundwater), providing flood control protection and preserving aquatic and riparian wildlife habitat. All ESC plans shall meet or exceed all local and state laws, ordinances and regulations.

Supplemental Standards

The standards set forth in this manual should be appropriately incorporated into all ESC plans unless the designer shows that alteration of these standards or inclusion of practices not included in this document will perform to or exceed the level of performance of the current practices. Proposed supplemental standards or procedures must be submitted to the regional NYSDEC office and include the following information:

1. The name of the product and type of control if a brand name is used.
2. The proposed use (e.g. runoff control), reason for use, calculated level of performance (e.g. impact at the 1 year 24 hour storm), field test performance results, and specifications conforming to any manufacturer's recommendations.
3. The definition of product failure should be clearly stated.
4. Sufficient installation information should be provided to ensure its proper use. This shall include a clear, concise sequence and a typical detail(s) showing all critical dimensions and elevations.
5. The plan maps shall show all locations where the proposed new product or procedure will be used. All receiving waters shall be identified.
6. A suitable maintenance program shall be provided which shall include instructions for remedy of potential problems. An alternative conventional erosion control practice should be specified for immediate installation should the innovative product or procedure fail.

Proposed standards, products or procedures which meet the above criteria will be reviewed on a case-by-case basis until their effectiveness has been sufficiently demonstrated by successful use in the field.