NEW YORK

Guidelines for Urban Erosion and Sediment Control

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GUIDELINES FOR URBAN EROSION & SEDIMENT CONTROL

Fourth Printing - April 1997

PREFACE

The parent document "Guidelines for Erosion and Sediment Control in Urban Areas of New York State" was originally published by the USDA-Soil Conservation Service in 1972 to provide information on minimizing erosion and sediment problems on land undergoing urban development. These guidelines were used by soil and water conservation districts, planning boards, property owners, land developers, contractors and consultants.

Based upon the experience gained in the use of this document, a committee was formed in 1978 to update this guide. This committee contained specialists and representatives from:

New York State Soil & Water Conservation Committee

Agronomy Department, Cornell University

Agricultural Engineering Department, Cornell University

New York State Department of Environmental Conservation

New York State Department of Transportation

New York Chapter of Land Improvement Contractors of America

O'Brien and Gere Engineers, Inc.

USDA - Natural Resources Conservation Service

This committee completed their draft document "Sediment and Erosion Control for Developing Areas" in May 1980. Before this document could be finalized, technological advances and increased demand for natural resource planning due to increased urban pressure on rural areas, caused an additional need for revision and expansion of the technical chapters.

In March 1985, work resumed on the guide to expand the standards and specifications to include temporary and permanent structural measures for erosion and water control, update the discipline vocabulary, incorporate the most recent methods and procedures available, and provide local planners and legislators examples of public administration. The guide was again revised in mid-1991 to incorporate general updates, a chapter on calculating runoff, a chapter on bio-engineering, the addition of temporary and permanent practices and a site specific example demonstrating the planning and design process.

A general State Pollution Discharge Elimination System (SPDES) permit for construction activities was approved for New York State by the Environmental Protection Agency on August 1, 1993. This permit is necessary for any construction site that disturbs five or more acres. It requires a stormwater pollution prevention plan to be prepared for the specific site. This plan must address erosion and sediment control and stormwater management. This guide has been adopted by the New York State Department of Environmental Conservation as criteria for the erosion and sediment control component of this plan. The 1997 revisions to this guide incorporate recent developments in this discipline.

Although the initial publication was written for internal Service and Soil and Water Conservation District use, the need and demand for this information has expanded throughout the State to other public service agencies and the general public. This document aims to help improve water quality, reduce sediment damage and associated maintenance costs of road ditches, storms sewers, streams, lakes, flood control structures, and improve the value of on-site detention basins for recreational use. It is distributed by the Empire State Chapter of the Soil and Water Conservation Society.

This guide can be used to assist local units of government in preparing and implementing their soil erosion and sediment control programs and in reviewing proposed site development plans; establish or encourage uniformity through standards in applying erosion control techniques; and help developers and planners to make maximum use of potential development sites by proper management of their natural resources. It is to this end the document was created.

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INTRODUCTION

Purpose

These guidelines provide information on minimizing erosion and sediment problems on land undergoing urban development. They show how to use soil, water and plants to improve the quality of our environment. These guidelines were developed by the Natural Resources Conservation Service (NRCS) formerly the Soil Conservation Service (SCS) in cooperation with state and local agencies for use by soil and water conservation districts (hereafter referred to as districts). These guidelines also may be helpful to planning boards and other government bodies, property owners, land developers, contractors, consultants, and others.

Scope and Authority

The guidelines apply to urban lands where housing, industrial, institutional, recreational and highway developments are occurring or are imminent. They are statewide in scope and 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. Alternative methods can be used to solve a problem. Final decisions on measures to be used are made by local officials.

The Environmental Protection Agency delegated responsibility for the National Pollutant Discharge Elimination System Permit to New York on October 1, 1992. New York State issued its State Pollutant Discharge Elimination System, General Permit GP-93-06 on August 1, 1993. This was issued pursuant to Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law. The permit requires a stormwater pollution preparation plan be prepared for any construction activity that disturbs five or more acres.

The NRCS, working through districts, has broad authority to help people solve problems of soil, water, and related resources. There may be times, however, when these problems or related conditions are referred to outside groups for advice or assistance. Any technical assistance given by NRCS personnel must conform with local policies and procedures as well as standards established by the agency.

If authorized by districts, NRCS can:

1. assist local groups or communities in reviewing and developing resource plans and evaluating benefits and costs of treatment measures;
2. provide technical assistance to install soil, water and plant conservation measures before or during construction;
3. give advice on maintenance programs for installed measures.

Erosion and Sediment Hazards Associated with Urban Developments

In the urbanizing process, 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 urban developments 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;
   - F. prolonged exposure of unprotected sites and service 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 streamflow with new buildings, dikes and land fills;
6. improper timing and sequence of construction and development activities;
7. abandonment of sites before completion of construction.

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. It is necessary to formulate and implement erosion and sediment control plans with urban land development because such development can increase erosion and sediment problems. 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. A 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.