Chapter 1: Introduction to the Manual

Section 1.1 Purpose of the Manual

The purpose of this manual is threefold:

1. To protect the waters of the State of New York from the adverse impacts of urban stormwater runoff
2. To provide design guidance on the most effective stormwater management practices (SMPs) for new development sites
3. To improve the quality of SMPs constructed in the State, specifically in regard to their performance, longevity, safety, ease of maintenance, community acceptance and environmental benefit

Section 1.2 How to Use the Manual

The *New York State Stormwater Management Design Manual* provides designers a general overview on how to size, design, select and locate SMPs at a development site to comply with State stormwater performance standards. The manual also contains appendices with more detailed information on landscaping, SMP construction specifications, step–by- step SMP design examples and other assorted design tools. The manual is organized as follows:

Chapter 2. Impacts of Stormwater Runoff

This chapter examines the physical, chemical, and biological effects of unmanaged stormwater runoff on the water quality of local streams and waterbodies. This brief overview provides the background for why the stormwater management manual is needed and how the new criteria will help local communities meet water quality standards.

Chapter 3. Permit Requirements

This chapter explains the permitting process for stormwater management facilities, and what permits may be necessary to construct these facilities.

Chapter 4. Sizing Criteria

This chapter explains sizing criteria for water quality, channel protection, overbank flood control, and extreme flood management in the State of New York. The chapter also outlines the basis for design calculations.

Chapter 5. List of Practices

This chapter briefly outlines the five groups of acceptable structural SMPs that can be used to meet water quality sizing criteria. The following are acceptable SMP groups:

- Stormwater Ponds
- Stormwater Wetlands
- Infiltration Practices
- Filtering Systems
- Open-Channel Practices

The chapter also explains the criteria for addition of a new practice to the list of acceptable SMPs, and provides fact sheets for some practices that are not on the list of practices, but can be used to provide supplemental treatment.

Chapter 6. Performance Criteria

This chapter presents specific performance criteria and guidelines for the design of the five groups of structural SMPs. The performance criteria for each group of SMPs are based on six factors:

- Feasibility
- Conveyance
- Pretreatment
- Treatment
- Landscaping
- Maintenance

In addition, the chapter provides guidance on design adjustments that may be required to ensure proper functioning in cold climates.

Chapter 7. Guide to SMP Selection and Location

This chapter presents guidance on how to select the best SMP or group of practices at a development site, as well as environmental and other factors to consider when actually locating each SMP. The chapter contains five comparative matrices that evaluate SMPs based on the following factors:

- Land Use
- Physical Feasibility
- Watershed /Regional Factors
- Stormwater Management Capability
- Community and Environmental Factors

Chapter 7 is designed so that the reader can use the matrices in a step-wise fashion to identify the most appropriate SMP or group of practices to use at a site.

Chapter 8. Design Examples

Design examples are provided to help designers and plan reviewers better understand the new criteria in this manual. The step-by-step design examples demonstrate how the new stormwater sizing criteria are applied, and some of the design procedures and performance criteria that should be considered when planning a new stormwater management practice.

Stormwater Design Appendices

The appendices contain the technical information needed to actually design, landscape and construct an SMP. There are a total of thirteen appendices:

Appendix A. The Simple Method to Calculate Urban Stormwater Loads

This appendix describes a fast and effective way to calculate stormwater runoff pollutant loads. Using impervious cover estimates based on land use, the Simple Method calculates annual runoff volume as a product of annual rainfall, and a runoff coefficient (Rv). Annual runoff can then be combined with readily available stormwater pollutant concentrations to provide a quick estimate of annual pollutant loads. The appendix also discusses the limitations of the Simple Method.

Appendix B. Design Tools

The accurate calculation of stormwater flows may require modifications to some methods to account for small storm hydrology. This appendix provides methodologies to calculate the storage requirements for the channel protection flow event, and a methodology to calculate the peak flow from the small water quality storm.

Appendix C. SMP Construction Specifications

Good designs only work if careful attention is paid to proper construction techniques and materials. Appendix C contains detailed specifications for constructing ponds, infiltration practices, filters, bioretention areas and open channels.

Appendix D. Infiltration Testing

This appendix describes methodologies to test soil infiltration rates, in order to determine if infiltration is an acceptable option on site.

Appendices E-G. Checklists

These three appendices provide example checklists that can be used to assist in the plan review, construction, and operation and maintenance of an SMP.

Appendix H. Landscaping Guidance

Good landscaping can often be an important factor in the performance and community acceptance of stormwater SMPs. Appendix H also includes tips on how to establish more functional landscapes within stormwater SMPs, and contains an extensive list of trees, shrubs, ground covers, and wetland plants that can be used to develop an effective and diverse planting plan.

Appendix I. Cold Climate Sizing Example

This appendix supplies guidance on sizing SMPs to account for cold climate conditions that might hamper performance. Example sizing designs that illustrate how to incorporate cold climate criteria into SMP design are also included.

Appendix J. Geomorphic Assessment

This appendix provides a description of the Distributed Runoff Control (DRC) methodology to size stormwater practices based on downstream geomorphic characteristics.

Appendix K. Miscellaneous Details

The designs of various structures previously discussed in the manual are presented in Appendix K. These structures help enhance the performance of stormwater management practices, especially in cold climates. Schematics of structures such as weirs, trash racks, and observation wells are included.

Appendix L. Critical Erosive Velocities

This appendix provides data on critical erosive velocities for soil and grasses.

Section 1.3 Symbols and Acronyms

As an aid to the reader, Table 1.1 outlines the symbols and acronyms that are used throughout the text. In addition, a glossary is provided at the end of this volume that defines the terminology used in the text.

Table 1.1 Key Symbols and Acronyms Cited in Manual

Symbol	Definition	Symbol	Definition
A	drainage area	**Qf**	extreme flood storage volume
A_f	filter bed area	**Qi**	peak inflow discharge
A_s	surface area, sedimentation basin	**Qo**	peak outflow discharge
cfs	cubic feet per second	**Qp**	overbank flood control storage volume
Cp_v	channel protection storage volume	**q_p**	water quality peak discharge
CMP	corrugated metal pipe	**qu**	unit peak discharge
CN	curve number	**SMP**	stormwater management practice
Cp_v-ED	extended detention of the 1 year post-development runoff	**R_v**	volumetric runoff coefficient
d_f	depth of filter bed	**R/W**	right of way
du	dwelling units	**SD**	separation distance
DOT	Department of Transportation	**SPDES**	State Pollutant Discharge Elimination System
DPW	Department of Public Works	**t_c**	time of concentration
ED	extended detention	**t_t**	time to drain filter bed
f_c	soil infiltration rate	**TR-20**	Technical Release No. 20 Project Formulation-Hydrology, computer program
fps	feet per second	**TR-55**	Technical Release No. 55 Urban Unit Hydrology for Small Watersheds
h_f	head above filter bed	**TSS**	total suspended solids
HSG	hydrologic soil group	**Vr**	volume of runoff
Ia	initial abstraction	**Vs**	volume of storage
I	percent impervious cover	**Vt**	total volume
K	coefficient of permeability	**Vv**	volume of voids
NYSDEC	New York State Department of Environmental Conservation	**WQ_v**	water quality storage volume
NRCS	Natural Resources Conservation Service	**WQ_v-ED**	12 or 24 hour extended detention of the water quality volume
P	precipitation depth	**WSEL**	water surface elevation