UNIT X
MINIMUM STANDARD 19

INTRODUCTION

In each of the methods presented above (rational and graphical peak discharge/TR-55), runoff must be determined for both the pre-developed and the post-developed condition to determine if an increase in runoff will result from development. This is important because Minimum Standard 19 of the Virginia Erosion and Sediment Control Law states that "concentrated stormwater runoff leaving a development site shall be discharged directly into an adequate natural or man-made receiving channel, pipe, or storm sewer system."

Appendix B contains the text of Minimum Standard 19 as it appears in the Virginia Erosion and Sediment Control Regulations. Plan reviewers should be familiar with the requirements presented here and the additional guidance contained in the standard.

LEARNING OBJECTIVES

1. To learn how Minimum Standard 19 defines channel adequacy.

2. To become familiar with the ways applicants can address inadequate channels, as outlined in Minimum Standard 19.

3. To become familiar with additional tools for addressing stream channel erosion.

INSTRUCTION ELEMENTS

X.1 CHANNEL ADEQUACY

Minimum Standard 19 defines channel adequacy as follows:

* ***Natural Channel*** — Must convey the 2-year storm without overtopping or eroding.
* ***Manmade Channel*** — Must convey the 10-year storm without overtopping and the 2-year storm without eroding.
* ***Pipes*** — Must covey the 10-year storm.

It is important for the reviewer to be familiar with the capacity (runoff/Q) and erodibility (velocity/V) requirements in order to verify the adequacy of stormwater conveyance channels and pipe systems associated with a development project. For more information on how conveyance channels are analyzed to determine if they meet these requirements, refer to Unit V and Unit VI.

X.2 ADDRESSING INADEQUATE CHANNELS

In cases where natural receiving channels or previously constructed manmade channels are not adequate, the applicant has several options:

1) Improve the channel so that it can convey the 10-year storm without overtopping and the 2-year storm without eroding.
2) Improve the pipe system to convey the 10-year storm.
3) Develop a site design that will not cause the pre-development peak of the 2-year storm to increase when runoff outfalls into a natural channel or the 10-year storm when runoff outfalls into a manmade channel.
4) Provide a combination of channel improvement, stormwater detention, or other measures satisfactory to the plan-approving authority.

Frequently, designers pursue the third option of maintaining the pre-development runoff rates by providing on-site detention (dry ponds) and retention (wet ponds) facilities. This is why plan reviewers need to be very familiar with the inputs into the various runoff calculation methods. By manipulating the pre-developed runoff rate to make it higher than it actually is, designers can reduce the benchmark they have to meet through detention, or other site design modifications. The reviewer is charged with ensuring that the pre-developed runoff rate benchmark is sound and that the site design meets that goal.

X.3 ADDRESSING STREAM CHANNEL EROSION

In some cases, the pre-developed condition may already be resulting in stream channel erosion downstream from a development site. Therefore, maintaining the existing condition will prevent the situation from becoming worse, but it won't address the erosion problem already present.

Development in a watershed results in increases in runoff volume, velocity, and peak rate of flow. While stormwater controls help to reduce the peak rate of runoff, the increased volume of runoff and the impact of stormwater controls results in this peak being stretched over a longer period of time and in the peak occurring more frequently. Simply stated, development leads to a situation where there is an increase in the frequency of bankfull flow conditions in a stream channel. This persistent bank wetting can leave the channel even more susceptible to erosion, particularly in cases where the stream channel is already degraded.

To help address this situation, the amended Stormwater Regulations provide an alternative design criteria for degraded streams — extended detention of runoff from the 1-year frequency storm (in lieu of the detention of the 2-year frequency storm, released at the pre-developed rate. Extended detention of the 1-year storm (over a 24-hour period) decreases the rate and velocity of flow leaving the structure in order to offset the increases in volume, frequency, and duration of the discharge.

The Department of Conservation and Recreation has prepared a Draft Stream Channel Erosion Policy Guidance document to provide additional guidance on meeting the intent of Minimum Standard 19. This document is attached to the course book as Appendix C.

ENDNOTES

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2. *Water Resources as a Basis for Comprehensive Planning and Development in the Christina River Basin.* Water Resources Center, University of Delaware, Newark, Delaware.

3. Virginia Department of Conservation and Recreation. 1998. *Virginia Stormwater Management Handbook.* Department of Conservation, Division of Soil and Water Conservation, Richmond, VA.

4. Virginia Department of Conservation and Recreation. 1992. *Virginia Erosion and Sediment Control Handbook, Third Edition, 1992.* Department of Conservation, Division of Soil and Water Conservation, Richmond, VA.

5. Focazio, M.J. and R.E. Cooper. 1995. *Selected Characteristics of Stormflow and Base Flow Affected by Land Use and Cover in the Chickahominy River Basin, Virginia, 1989-91.* U.S. Geological Survey, Water-Resources Investigations Report 94-4225, Richmond, Virginia.

6. Virginia Department of Transportation. 1980. *Drainage Manual.* Virginia Department of Transportation, Richmond, VA.

7. Normann, J.M. and R.J. Houghtalen. 1982. *Course C: Basic Stormwater Management in Virginia.* Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, Richmond, VA.

8. USDA, Soil Conservation Service. August 1956. *Engineering Handbook, Hydraulics Section 5.* National Technical Information Service, U.S. Department of Commerce, Springfield, VA.