SECTION 6
PERMANENT TREATMENT PRACTICES (PTP)

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6.1 Introduction

This section presents the Stormwater Control Measure (SCM) specifications for Permanent Treatment Practices (PTP). PTPs are intended to treat stormwater runoff in the long-term. PTPs are designed for pollutant removal and are rated by their ability to remove Total Suspended Solids (TSS). Table 1 presents a pre-approved listing of PTPs and their assigned TSS removal capabilities. Some of these PTPs can be designed to achieve both stormwater quantity and quality management objectives.

Structural Control		TSS Removal %
PTP – 01	Stormwater Wet Ponds	80
PTP – 02	Constructed Wetlands	80
PTP – 03	Bioretention Area	80
PTP – 04	Surface Sand Filters	80
PTP – 05	Water Quality Swales	80
PTP – 06	Dry Ponds	60
PTP – 07	Filter Strips	50
PTP – 08	Grass Channels	50
PTP – 09	Greenroofs	*
PTP – 10	Underground Sand Filters	80
PTP – 11	Perimeter Sand Filters	80
PTP – 12	Organic Filters	80
PTP – 13	Gravity (Oil-Grit) Separators	40
PTP – 14	Infiltration Trenches	80
PTP – 15	Permeable Pavements	*

*For the purposes of water quality volume calculations, the area of the green roof or pervious pavement is subtracted from the site's impervious area and only the area of the practice is considered to receive 80% TSS Removal.

Each specification has a quick reference guide outlining selection, design, and implementation requirements.

The PTPs presented in this section are intended to serve as permanent treatment measures. Additional details are provided in sections covering Temporary Construction Site Management Practices (TCPs) for practices that are intended to function on a short-term basis (lasting only as long as construction activities) and covering Permanent Erosion Prevention and Sediment Control (PESC) that are intended to function on a long-term basis.

6.2 Water Quality Volume Overview

Metro's water quality treatment standard is designed to capture 85% of the annual stormwater runoff. Water quality systems must be designed to treat the runoff from the first 1.1 inches of rainfall. Each site's water quality treatment volume is also based upon its percent impervious cover. The treatment standard is the same for all sites throughout the community unless other secondary pollutant reduction goals are established, for instance, through the establishment of Total Maximum Daily Loads (TMDLs). Metro's water quality treatment methodology is as follows:

$$WQv = P \times Rv \times \frac{A}{12}$$

Where:

WQv = water quality treatment volume, ac-ft
P = rainfall for the 85% storm event (1.1 in)
Rv = runoff coefficient (see below)
A = drainage area, ac

$$Rv = 0.015 + 0.0092I$$

Where:

I = drainage area impervious cover, % (50% imperviousness would be 50)

6.3. Calculations for SCMs in a Series

SCMs that do not individually meet Metro's pollutant reduction goal may be used with another SCM to meet the 80 percent TSS removal requirement. That is, water may pass through one treatment device, into another in a "treatment train" to achieve added treatment. It is necessary to calculate the cumulative pollutant removal from SCMs in a series with an equation that accounts for the fact that the majority of the heavy (easily removed) suspended pollutants and particulate matter are removed by the first structural control in a series. The runoff that enters the second and subsequent controls contains sediment with much smaller particles, which are more difficult for the control to remove. Thus, the second control has a pollutant removal efficiency that is less than it would ordinarily have. The following equation accounts for the cumulative pollutant removal of SCMs in a series.

$$\boldsymbol{TR = A + (1 - A) * B}$$

Where:

TR = Total Removal
A = 1st structural control in series
B = 2nd structural control in series

Notes:
1) When runoff flows from a more efficient structure (one with a higher removal rate) to a less efficient structure (one with a lower removal rate), the cumulative pollutant removal of a structure does not increase. The reason is that a structure with a lower removal efficiency that follows a structure with a higher removal efficiency does not have an appreciable affect on cumulative pollutant reduction.

6.2.1 Example Calculation

A site is planned to have a manufactured pretreatment device that is approved for a 50% TSS removal credit, followed by a dry detention basin designed, built, and maintained as required by Metro regulations to achieve a 60% removal credit. The calculation is as follows:

$$\boldsymbol{TR} = A_{MD} + (1 - A_{MD}) * B_{DD}$$

Where:

TR = Total Removal
A_{MD} = 1st structural control—manufactured device
B_{DD} = 2nd structural control—dry detention basin

TR = 0.5 + (1-0.5)*0.6
TR = 0.5 + (0.5)*0.6
TR = 0.5 + 0.3
TR = 0.8

Total Removal equals 80%.