Article 108

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Field Evaluation of a Stormwater Sand Filter

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Sand and other media filters are gaining popularity in the United States as stormwater quality treatment practices. A study conducted recently by Denver, Colorado's Urban Drainage and Flood Control District ("the District") investigated the causes of low hydraulic performance of such stormwater filters and the effects on constituent removal. While there is extensive literature on the ability of sand filters to remove pollutants, very little has been reported on long-term hydraulic performance and the myriad of problems stemming from partially or fully clogged filtering practices. Stormwater filters have been widely used in more humid climates recently (Delaware, Virginia, Washington, D.C.) with some degree of success (see article 105), but have yet to be tested in more arid or colder climates. How well do they perform under these more severe conditions?

To help answer this question in a field test, the District, in cooperation with the City of Lakewood, Colorado, constructed and installed an underground sand filter to manage a two-acre, mostly impervious, catchment. Figure 1 shows a perspective of this installation. It consisted of a sedimentation chamber with overflow pipes designed to skim off floatable debris and a sand filter chamber. The sand filter layer was 12 inches in depth and was underlain by a 12-inch gravel layer with underdrain pipes. Flows were measured using a V-notch weir. Discrete flow samples were taken at the inlet, just upstream of the filter and at the filter's outlet pipe. All samples were flow-weight composited to obtain accurate event mean concentrations for each storm. The filter was designed to operate off-line during larger storms, meaning that flow volumes larger than the design treatment capture volume bypassed the filter itself.

Performance Assessed

The water quality performance characteristics of the District's test sand filter were found to be comparable to those reported in the literature, especially for total suspended solids (EPA, 1983; Veenhuis, 1989; City of Austin, 1990). However, this was true only for the

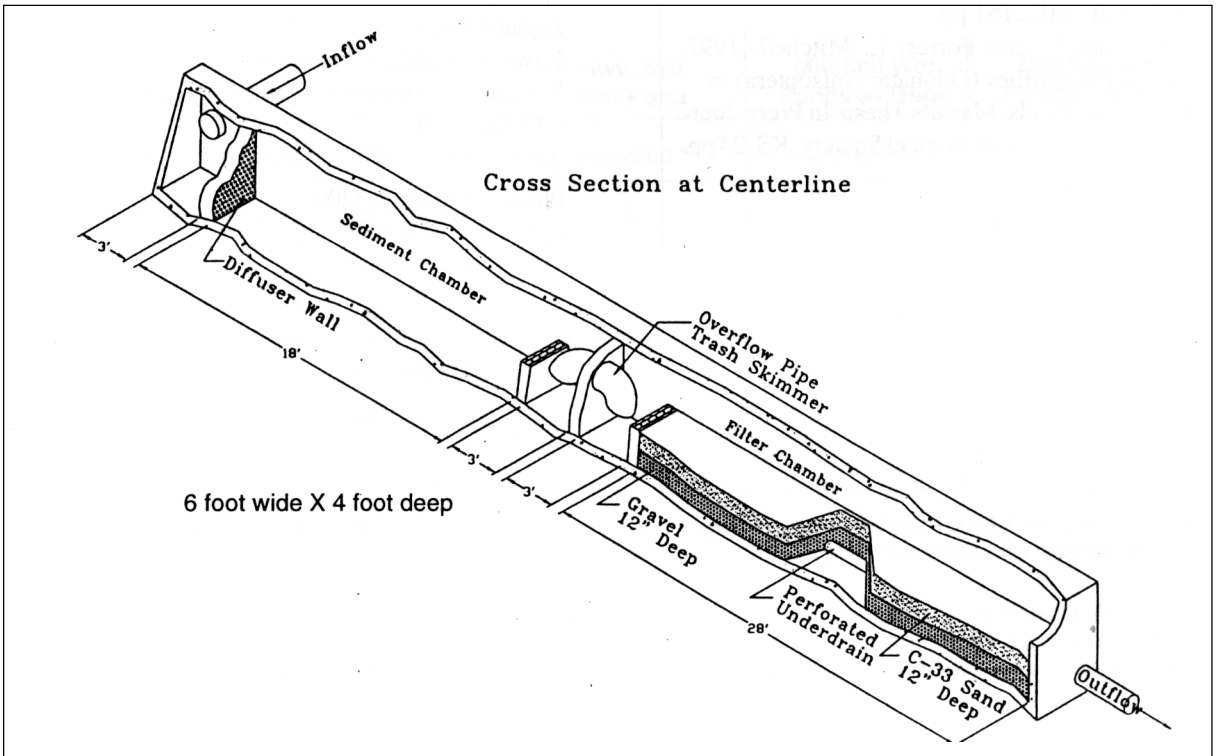

Figure 1: Schematic of Underground Sand Filter Tested in Lakewood, Colorado