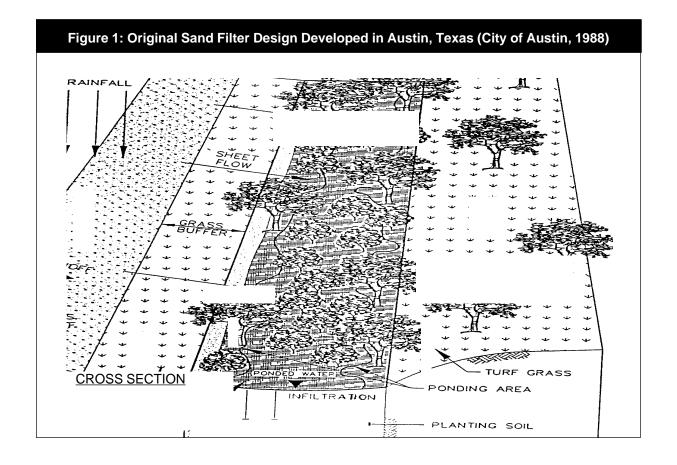# Developments in Sand Filter Technology to Treat Stormwater Runoff

The use of sand filtration to improve water quality is not a new concept. Slow sand filtration has been used for decades to treat wastewater and purify drinking water in many parts of the globe. In this respect, sand filtration has been demonstrated to be both an economical and effective option for removing pollutants.

The City of Austin, Texas first pioneered the use of sand filters to treat urban stormwater runoff in the early 1980s. The earliest designs consisted of a simple off-line sedimentation chamber and an 18- inch bed of sand (Figure 1). The first flush of runoff is diverted into the first sedimentation chamber. In this chamber coarse sediments drop out and the runoff velocities are reduced. Runoff is then spread over the sand filter bed where pollutants are trapped or strained out. A series of perforated pipes located in a gravel bed collect the runoff passing through the filter bed and subsequently return it into the stream or channel.

This type of sand filter was developed in Austin because no other stormwater management practice works well in the Texas hill country. High rates of evapo-transpiration and frequent droughts ruled out the use of ponds and marshes. Thin clay soils and a desire to protect groundwater quality eliminated the use of infiltration practices. Low soil moisture during the hot and dry summers made it difficult to establish dense and vigorous cover needed for vegetative practices. Stormwater designers were thus forced to create a closed and self-contained practice with an artificial filtration media. Hence, the sand filter was developed.

Sand filters have many advantages. They have a moderate to high pollutant removal capability, possess very few environmental limitations, require small amounts of land, and can be applied to most development sites, large or small. Compared to most other stormwater management practices, they have fewer limitations and constraints. These qualities have made

Figure 1: Original Sand Filter Design Developed in Austin, Texas (City of Austin, 1988)