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Performance of a Proprietary Stormwater Treatment Device: The Stormceptor®

The Stormceptor® is a popular proprietary storm water treatment device that has been widely applied across the U.S. and Canada in recent years. Its primary application is on small, highly impervious sites. A schematic of the device is shown in Figure 1. The device is popular because it is relatively easy to design, can be easily installed in a wide variety of applications, and can be installed in small sites without sacrificing land area. The typical device incorporates a circular holding tank that receives runoff from a flow diversion structure. Storms that exceed the capacity of the off-line device are diverted to the downstream drainage network. Unlike other stormwater practices, the Stormceptor® is designed and sized primarily on the *rate* of stormflow rather than its *volume*. Consequently, the Stormceptor® provides treatment within a much smaller area than is possible with most other stormwater practices.

A much anticipated monitoring study was recently completed by Steve Greb (Wisconsin DNR) and Robert Waschbusch (USGS) that provides the most comprehensive and independent performance evaluation of Stormceptor to date. They installed a Stormceptor® unit as a retrofit at the Badger Road public works maintenance yard in Madison, Wisconsin in mid-1996. The maintenance yard was about 4.3 acres in area and almost completely impervious. The yard was used for refueling, maintenance and parking of heavy vehicles, and also for storage of road salt, sand, yard wastes, and other materials.

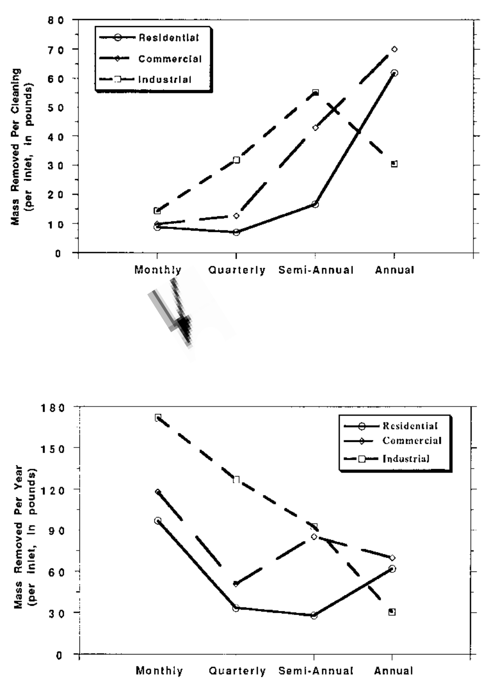

Figure 1: Schematic of Stormcepter® Unit with Sampling Locations

Maintenance yards often rank among the "dirtiest" pollutant source areas in the urban landscape, and the Badger Road yard was no exception. The median total suspended solid (TSS) concentration was reported to be 251 mg/l, which slightly higher than the Wisconsin commercial street median concentrations of 232 mg/l (Bannerman *et al*., 1996). The median chloride and total dissolved solids (TDS) runoff concentrations were 560 and 3,860 mg/l respectively, suggesting that stockpiled salt and other organic materials at the yard were a key pollutant source area.

The Stormceptor® unit selected for the retrofit at the Madison yard was the STC 6000 model with a sediment storage capacity of 610 ft^3. According to Stormceptor®'s sizing guidance, this unit has a sediment storage capacity of 142 ft^3/ac and is projected to have a suspended solids removal rate of approximately 75% (Stormceptor®, 1997).

Greb and his colleagues had to develop sophisticated monitoring techniques to measure the performance of such a small treatment unit. They installed flow-integrated storm samplers at the inflow and outflow locations of the Stormceptor® treatment tank, as well as at the bypass weir (see Figure 1 for locations). This sampling arrangement was needed to determine how much runoff volume bypassed the unit and was therefore not treated. If the bypass volume is high, then the treatment efficiency for the device would need to be adjusted downward. Although 24% of monitored storm events experienced some flow bypass around the Stormceptor® treatment tank, the team computed that only 10% of the total runoff volume during the study actually bypassed the device during the sampling period.

Flow was measured directly using a flow meter which was connected to a data-logger to initiate sampling during storm events. One composite sample was