

AN ABSTRACT OF A THESIS

DETENTION BASIN RETROFIT

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A detention basin receiving urban stormwater runoff from a parking lot in Cookeville, TN, was evaluated to determine if enhanced sedimentation would result from an outlet structure retrofit. An analysis of the total suspended solids (TSS) load entering and leaving the peak-flow control basin was performed for events occurring between December 2001 and August 2002 to determine the baseline removal. The analysis utilized area-velocity and ultrasonic flow meters to measure runoff flow as well as discrete-automated samplers to collect stormwater samples. For pre-retrofit conditions six runoff events were monitored with an average TSS removal of $-5.4\% \pm 18.9\%$ which is comparable to peak-flow detention studies in the literature. A detailed hydrologic and hydraulic model of the existing system was developed, and an iterative process was used to maximize the water quality volume while maintaining existing peak-flow reduction through a basin outlet retrofit. However, the resulting water-quality volume was almost five times smaller than that required by design guidelines. To offset this limitation a floating riser or skimmer was selected to drain the water quality volume from near the surface. Sod was also planted on the bottom of the basin to improve vegetative cover for sediment stabilization. Post-retrofit runoff samples were taken in the basin outfall culvert, near the bottom of the ponded area, and from the inflow culverts for events between June and August 2003. The average TSS removal efficiency was increased to $38.1\% \pm 25.7\%$ for the post-retrofit conditions. Statistical analysis indicated a significant reduction in means TSS outflow concentration from 45.4 mg/L for pre-retrofit to 11.9 mg/L for post-retrofit conditions.