Article 118

Technical Note #2 from Watershed Protection Techniques. 1(1): 11-13

Level Spreader/Filter Strip System Assessed in Virginia

The effectiveness of vegetated filter strips in urban areas is frequently defeated by concentrated runoff flows that quickly erode through the strip. To compensate for this recurring problem, Yu and his colleagues designed a concrete level spreader to direct runoff evenly across the entire surface of a vegetated buffer (Figure 1).

In a practical demonstration, runoff from a ten-acre shopping center was routed into a distribution box that diverted approximately 0.4 watershed-inches of runoff into an earthen "V" shaped trench nearly 600 feet in length.

Runoff volumes in excess of this treatment volume bypassed the system via an emergency spillway located at a higher elevation at the end of the trench. A concrete weir was installed at the lip of the downslope crest of the trench, where it served to evenly spread runoff overflows across a 150-foot grassed filter strip.

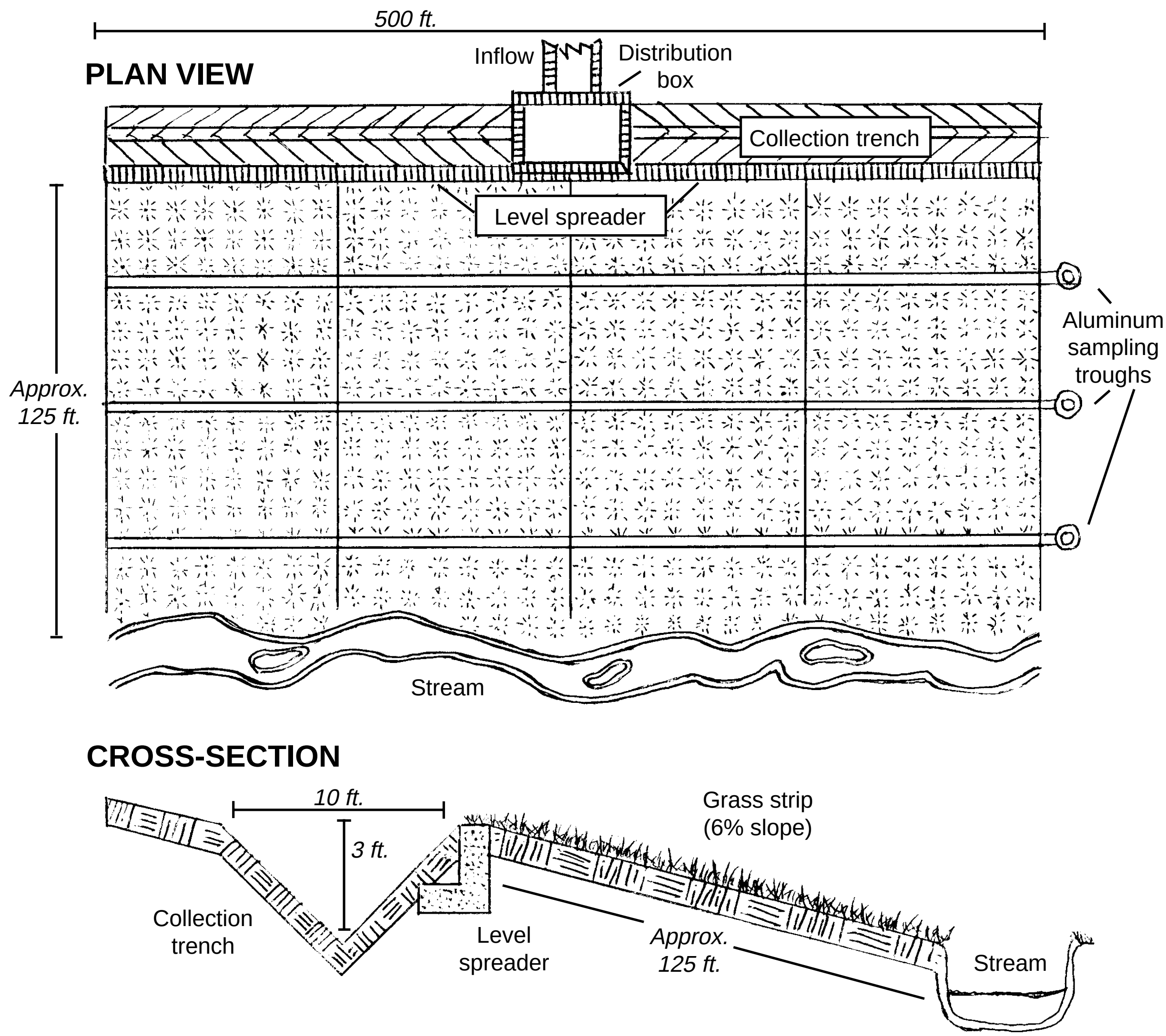

Figure 1: The Yu Concrete Level Speader/Vegetative Buffer System ***(Yu et al., 1992)***

The filter strip had an average slope of 6% and was primarily composed of Kentucky 31 Tall Fescue.

The pollutant removal performance was assessed through continuous monitoring at the distribution box (inlet) and grab samples collected in lateral aluminum trenches located parallel to the slope at distances of 75 and 150 feet downslope from the trench. Eight storms were monitored, of which four were deemed suitable for further analysis. The authors concluded that performance after 75 feet of filter strip treatment was mediocre, but removal of particulate pollutants increased sharply after 150 feet of treatment. Removal of nutrients such as nitrate and total phosphorus, however, was still rather modest even after 150 feet of filter strip treatment (Table 1).

The poor (and even negative) removal rates in the first 75 feet of the strip were thought to be due to sparse vegetative cover and, in some instances, gully erosion. Construction cost for the system averaged about 20¢ per cubic foot treated, which is about four times less than the cost of a comparatively-sized stormwater pond. However, the filter strip did consume a large fraction of site area (about 10% of the total site area in the project). The level spreader/filter strip system is projected to have a greater frequency and cost for maintenance than a pond system.

Regular maintenance activities include annual mowing, revegetation, and gully repair, in addition to periodic removal of deposited sediments in the collection trench. Maintenance has yet to be performed at the site in the six years since monitoring was completed.

During this time, a great deal of woody growth and weeds have replaced the dense turf cover. Despite the lack of vegetative maintenance, no obvious gully erosion was evident as of last year (Yu, per. comm.).

Table 1: Measured Pollutant Removal Performance of the LS/VBS System (Yu *et al.*, 1992)

Pollutant	75 Foot Filter Strip (%)	150 Foot Filter Strip (%)
Total Suspended Solids	54	84
Nitrate+Nitrite	-27	20
Total Phosphorus	-25	40
Extractable Lead	-16	50
Extractable Zinc	47	55

Based on the monitoring data and simulation modeling of the filter strip, Yu and his colleagues recommended an optimal filter strip length of at least 80 to 100 feet with the level spreader.

—TRS

Reference

Yu, S., M. Kasnick, and M. Byrne. 1992. "A Level Spreader/Vegetative Buffer Strip System for Urban Stormwater Management." *Integrated Stormwater Management.* R. Field *et al.* editors). Lewis Publishers. Boca Raton, FL. pp. 93-104