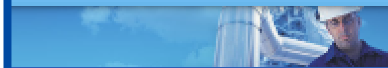

WHITEPAPERS/ARTICLES

Research Focus - Flow Thru Rate, Design Height, & Design Capacity of Silt Soxx (TM) & Silt Fence

Silt fence is the current industry standard used for sediment control in construction activities; therefore, its performance has been widely evaluated (Wyant, 1981; Fisher and Jarret, 1984; USEPA, 1993; Barrett et al, 1998; Britton et al, 2000). Geosynthetic silt fences, when installed correctly, function as temporary runoff detention storage areas (Robichaud et al, 2001), designed to increase ponding depth (Goldman et al, 1986) to allow suspended particulates to settle out of storm runoff before discharging the runoff down slope of the sediment barrier. Barrett et al (1995) concluded that effective sediment trapping efficiency of silt fence is a result of increased ponding behind the silt fence, while a study by Kouwen (1990) concluded that excessive ponding is largely due to eroded sediment clogging the fabric of the silt fence. Barret et al (1998) further concluded that sediment removal efficiency by silt fence was not attributable to the filtration by the fabric but due to length of runoff detention time behind the silt fence.

While this design may function well under relatively small runoff events, if ponding becomes excessive the silt fence may fail due to overtopping. In response, the design height of silt fence has steadily increased from 18 (46 cm) to 24 (61 cm) to 36 inches (91 cm) over recent years. However, the force created by the increase in head and the prolonged detention of storm runoff, may predispose silt fence to failure in field applications. Wyant (1981) and the USEPA (2005) recommend that silt fence have a minimum sediment-laden flow rate of 0.3 gal/ft^2/min (12.5 L/m^2/min). Sediment-laden runoff concentrations appropriate for testing silt fence according to ASTM D 5141 are approximately 2900 mg L^{-1} (2900 ppm)(Barrett et al, 1995).

Filtrexx Filter Soxx (Silt Soxx, Inlet Soxx, Ditch Chexx) have filters that are of a three dimensional construction and are designed to allow water to flow through at higher rates. The larger, three dimensional construction of these sediment filters may allow *the filter itself* to trap suspended solids from runoff reducing the need to pond water to allow settling to occur. Less ponding and lower head pressure may reduce the propensity for failure from blowout and over topping in the field. Additionally, if sediment removal efficiency is a result of the performance of the filter, instead of its ability to pond water, then the design height and capacity for these new sediment control devices should be based on flow through rate not ponding rate.

Research conducted by the University of Georgia and published in the *Journal of Soil and Water Conservation* (Faucette et al, 2005) showed that under simulated rainfall, runoff flow rates (prior to vegetation) from filter berms were 21% greater than silt fence, and total sediment loads were 5% less, on a 10% slope of compacted sandy clay loam in 48 ft^2 field plots.

Research conducted at the USDA ARS Environmental Quality Lab in Beltsville, MD and submitted for presentation and publication in the 2006 American Society of Agricultural Engineers Annual International Conference in Portland, OR (Sadeghi et al, 2006) found that flow through rates of 8 in Filtrexx Filter Soxx were on average 50% greater than 24 in silt fence, on a 10% slope of compacted sandy loam soil under a simulated rainfall of 3 in/hr for 30 min duration.

Research conducted by the Ohio State University Department of Food, Agricultural and Biological Engineering Department and accepted for presentation and publication in the 2006 American Society of Agricultural Engineers Annual International Conference in Portland, OR (Keener et al, 2006) found the following results. On a 10% slope, using a sediment-laden runoff concentration of 10,000 mg/l of silt and clay (no sand) for 30 minutes, average flow rates were 50% greater for Silt Soxx relative to silt fence, and ponding height was 75% greater behind a 24 in silt fence vs 12 in Silt Soxx. At fow rates less than 5 gpm/linear ft an 8 in Silt Soxx had the same design capacity (failure due to overtopping) as a 24" silt fence, a 12 in Silt Soxx had a greater design capacity (failure due to overtopping) than 36 in silt fence. At 6 gpm/linear ft a 12 in Silt Soxx had an equal design capacity as a 36 in silt fence, and an18 in Silt Soxx had a greater design capacity than 36 in silt fence. Results from this research have been used by Ohio State University to create a comparative and interactive, MS Excel based, design capacity prediction model for sediment control using silt fence and Filtrexx Silt Soxx.

For more information, visit **http://www.filtrexx.com/**

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