

## Discussion of TSS Removal as Required by DEP Standards

The DEP Stormwater Standards (these are not regulations) require removal of 80% of Total Suspended Solids from the stormwater before discharge from the site. This standard only applies to rainfall up to ½ inch which is used to determine the water quality volume. An engineer does not have to design for 80% TSS removal for the larger storms such as the 1 yr., 10 yr. or 100 yr. which need to be controlled only for the rate of flow. The requirement to provide calculations substantiating the removal is a requirement contained on page 5 of the DEP **Checklist for Stormwater Report** and appears as follows:

### Standard 4 Water Quality

Calculations documenting that the treatment train meets the 80% TSS removal requirement and , if applicable, the 44% TSS removal pretreatment requirement, are provided.

The difficulty is that DEP never defined TSS. Neither particle size nor density are included in the standards. Both parameters are needed to calculate removal efficiencies. Certain removal efficiencies were assigned by DEP to systems such as grass swales, catch basins and constructed wetlands and if the systems used in a project design are the systems in the Massachusetts Stormwater Handbook the efficiencies attributed by DEP to those systems can be used by the engineer to certify compliance with the removal standard. The standards promulgated by DEP were not developed through testing but through a literature search of regulations developed by other states. ( It should be noted the DEP considers the engineer ultimately responsible for designing the removal system and if a system designed to DEP standards does not meet the required removal efficiencies the engineer is at fault.) To further complicate the issue when the standards were first adopted DEP tested proprietary units ( that is manufactured removal systems) to determine removal efficiencies and provided results to the public. That is no longer done, and DEP only provides literature searches for proprietary units and offers no opinion as to the efficiency of removal. DEP says it is up to each Conservation Commission to decide from the literature search which efficiency each Commission thinks is appropriate.

Many of the manufacturers of stormwater TSS removal systems provide reports of their own testing of their equipment. Engineers can then use that data to show compliance with Standard 4. Contech, which is the manufacturer to provide the Vortsentry catch basins to this project has developed removal efficiencies data for all its products and has an ongoing testing program to substantiate prior results and to test new products. It also provides sizing calculations for each system for application to a specific site. A brochure of their product is included at the end of the Drainage Report. In my opinion Contech does a great job assisting engineers by providing reliable designs and supporting data.

Unlike designing wastewater treatment systems where the inflow parameters are known and removal efficiencies can be calculated an engineer designing a stormwater system in Massachusetts must certify that the system meets standards when even those who wrote the standards don't know if the removal efficiencies provided in the Stormwater Handbook are accurate, were developed for a realistic TSS or reflect real world conditions. And although manufacturers provide supporting TSS removal data will the DEP in the future consider the material used in the testing not to be representative of TSS from project sites.

To further complicate the issue Total Suspended Solids as defined in wastewater design is what is left after the settleable solids are removed from a waste stream and are in most cases colloidal and would not be removed by any system used in Stormwater design. Laboratory tests to define TSS and settleable

solids in wastewater are contained in a text known as Standards Methods. The TSS term used in Stormwater regulations should more properly be called Entrained Solids and are really Settleable Solids and not Total Suspended Solids.

Because of the lack of engineering precision in development of the standards and requirements that engineers must certify to systems that the Commonwealth says provide the required removal I am opened to accepting water quality designs that meet the standard to the maximum extent practicable if not up to the 80% requirement.