DESIGNING AN EFFECTIVE SEDIMENT CONTAINMENT SYSTEM

by
Jerald S. Fifield, Ph.D., CPESC

If a Sediment Containment System (SCS), a.k.a. a sediment pond/basin, is to be effective in capturing design size suspended particles by gravity, it must provide sufficient time for sedimentation to occur. While the most effective method for capturing sediment is to retain all incoming runoff waters, practicality dictates that a Retention SCS is not realistic due to the necessity of having prohibitory large containment volumes. It is for this reason that detaining runoff waters has been traditionally used on construction site, often using EPA's criteria for calculating detention volumes based upon a 2-year, 24-hour storm event.

A flaw with designing a traditional Detention SCS is the lack of accountability for reducing suspended solids when overflow conditions occur. Work by Fifield (2001 & 2004) overcame this shortcoming. Other problems associated with a Detention SCS to reduce suspended solids in inflow waters include:

- Capturing only large (e.g., medium silt and larger) diameter suspended particles,
- Not minimizing the discharge of colloidal size particles from the system,
- Requiring large containment systems,
- Not addressing discharges of sediment when overflow conditions occur, and
- Not significantly reducing turbidity in waters discharging from the system. .

Today, Effluent Limitations Guidelines (ELG) requirements dictate that discharges from an SCS must have low turbidity levels. Thus, the emphases for designing an effective SCS has now shifted from reducing suspended solids to reducing turbidity.

This paper presents new equations for the design of a Flow-Through SCS using a passive treatment system (PTS) to reduce the turbidity of discharge waters. Applying the new equations to various examples and test site data, it will be shown that by adding polymers in a controlled (and accountable) manner to inflow waters, discharges can have very low turbidity levels. In addition, it will be shown that containment surface areas and flow path lengths of a PTS Flow-Through SCS can be up to 70% to 90% smaller to similar parameters found with a Detention SCS. Thus, achieving ELG requirements for discharges from a construction site can be met in a cost effective and practical manner for design runoff events.

REFERENCES

Fifield, Jerald S. 2001 & 2004. Designing for Effective Sediment and Erosion Control on Construction Sites. Forester Communications Inc., Santa Barbara, CA.