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OFFICE OF TRANSPORTATION
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TECHNICAL SUMMARY

Technical Liaison:

Dwayne Stenlund
Dwayne.Stenlund@state.mn.us

Project Coordinator:

Bruce Holdhusen, MnDOT
Bruce.Holdhusen@state.mn.us

Principal Investigator:

Joel Toso, Wenck Associates, Inc.

PROJECT COST:

\$38,010



The Marlee Float from SW Fee Saver is one of five currently available floating-head skimmers that researchers identified.

Reducing Construction Pollution by Skimming Stormwater Ponds

What Was the Need?

Sediment in stormwater runoff from construction sites or other sources can pollute lakes and rivers. Stormwater settling ponds provide one method of reducing the impact of stormwater runoff by providing a place where sediment can settle out before water is discharged.

Because stormwater ponds have limited space, a mechanism is needed to remove sediment-free water from the surface of the pond and prevent overflow of sediment-laden water. A floating-head skimmer, or floating weir, collects clear water from the surface of the settling pond, using gravity to discharge water to a ditch or receiving water. This passive dewatering from the surface of stormwater ponds will help meet the requirements of the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System permit program, which regulates sources of water pollution from construction sites.

The floating-head skimmer is, however, a new approach for MnDOT and Minnesota cities and counties. Research was needed to provide practical guidance for using these devices on construction sites.

What Was Our Goal?

The purpose of this research was to provide design guidance for floating-head skimmers, including drawings and notations, to help MnDOT meet the standards in Section III.C of the Minnesota General Permit Authorization to Discharge Stormwater Associated with Construction Activity (MPCA Permit MN R100001).

What Did We Do?

This project included several components:

- Conducting Internet research to identify and describe commercially available pond skimmers.
- Modeling temporary stormwater ponds. Researchers developed these models in [HydroCAD](#) to meet the requirements of watersheds ranging in size from 2 to 20 acres, and estimated the impacts of these designs on water quality using [P8](#) urban catchment modeling software.
- Developing a template for including these devices in the construction project Stormwater Pollution Prevention Plan. The SWPPP includes details for pond design, sizing, outlet, plan language, maintenance protocols and special provisions.

What Did We Learn?

Researchers found five viable floating-head skimmer options: the [Faircloth skimmer](#), [Erosion Supply Company skimmer](#), [Innovative Applied Solutions water quality skimmer](#), [Thirsty Duck](#) and the [Marlee Float](#) from SW Fee Saver. The research makes no recommendations about each device's effectiveness, but prior research suggests that skimmers can achieve better than 90 percent removal of total suspended solids in a properly designed basin.

Researchers created designs for temporary stormwater ponds on construction sites that computer models say will remove approximately 80 percent of total suspended solids from stormwater runoff. These designs will help contractors meet EPA requirements for stormwater pond dewatering.

“This was a small-scope implementation project for professionals to use as they design temporary stormwater ponds that meet state parameters.”

—Dwayne Stenlund,
Transportation Specialist,
MnDOT Office of
Environmental Services

“When sediment settles, it’s hard to determine when to clean out a pond. Based on the density of sediments in the Minnesota River and the loading rates we computed, we were able to calculate how often we need to clean out a pond so sediment doesn’t reach the height of the skimmer.”

—Joel Toso,
Principal, Wenck
Associates

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Minnesota Department
of Transportation
Research Services & Library
MS 330, First Floor
395 John Ireland Blvd.
St. Paul, MN 55155-1899
651-366-3780
www.mndot.gov/research



Floating-head skimmers in temporary stormwater ponds, including the Faircloth skimmer shown, use gravity to drain the cleanest water from just below the surface of the pond while sediment settles to the bottom.

Researchers evaluated pond design options with deadpool storage (the volume of water below what will be discharged through the skimmer) of 1,200 to 3,200 cubic feet per watershed acre. Models indicated that the deadpool depth had limited impact on treatment efficiency, with average total suspended solids removal efficiency near 80 percent regardless of depth. As a result, the pond design recommendation is to use a 1.5-foot deadpool depth to minimize excavation costs and safety concerns while providing enough depth to prevent accumulated sediment from entering the skimmer.

While there are other potential time scenarios for optimum trap drawdown, the performance recommendation must be clear. For this design recommendation and field implementation, the SWPPP specifies a 3.25-day retention time for a two-year, 24-hour rainfall event to provide significant length of time for soil particle settling for surface trap water discharge.

Temporary stormwater ponds need to be cleaned periodically so the accumulated sediment does not exceed the depth of the deadpool. One particularly novel aspect of this research involved determining how often a pool must be cleaned, based on watershed size, pool dimensions and deadpool size. The cleanout frequency ranges from 0.3 to 1.3 times per year, based on these variables.

What’s Next?

The easy-to-use guidance provided by the research should be useful for pond designers while still allowing the discretion necessary to design a pond that fits a given site.

As this research was based entirely on models, real-world implementation is required to be certain of its effectiveness, and adjustments may need to be made based on pilot projects. Additionally, several practical details remain unclear and will need to be addressed in an implementation:

- How skimmers will be attached to a pond structure.
- How contractors can know if the stormwater pond is inadequate and requires a chemical flocculent to be added to improve the settling of sediment.
- Whether there are skimmer designs that prevent clogging. The report recommends a floating absorbent boom, but other skimmer designs may also be effective.

This Technical Summary pertains to Report 2014-18, “Implementation of Floating Weir System for Surface Skimming of Temporary Stormwater Ponds,” published May 2014. The full report can be accessed at <http://www.lrrb.org/PDF/201418.pdf>.