TECHNICAL SUMMARY

IMPLEMENTATION PROJECT COST:

$31,997

Fliers like this one direct local public works officials to the new BMP guide posted on the LRRB Web site.

RESEARCH
SERVICES SECTION

Stormwater Maintenance Best Management Practices Resource Guide

What Was the Need?

Federal and state regulations have long required measures to control water pollution; by the late 1980s, nonpoint source pollution, such as from stormwater running off roadways, drew regulatory attention through National Pollution Discharge Elimination System permits, and state regulations increased attention on stormwater management practices.

To work well, stormwater facilities require maintenance, including periodic removal of debris and sediment. Inspections also must be conducted as problems are not always readily apparent. A retention pond brimming with water, for example, may be operating perfectly or it may be clogged; it may have filled up in one year, or it may have taken five. To the untrained eye, its condition will not be obvious. These inspections need to take place every five years, with 20 percent of state facilities inspected every year. Local agencies understand that more frequent inspection may be necessary; some specify that certain storm events will trigger a previously unscheduled inspection at certain sites considered susceptible to damage from strong storms. A rainfall of 1 inch in 30 minutes, for example, may be considered a two-year-inspection event for certain stormwater facilities.

Regulatory efforts have helped slow the continuing degradation of water quality, but have not reversed it. Despite the use of performance-based standards, there was little research to establish the performance of various stormwater designs or best management practices. Engineers lacked the hard data needed to accurately assess the costs and benefits of different stormwater management methods and determine the best approaches to keeping these systems in peak operating condition.

What Was Our Goal?

Investigators aimed to create a stormwater maintenance BMP resource guide that would describe the five most commonly used stormwater facilities in Minnesota and detail the best inspection and management practices for each. This guide would give city and county engineers a tool for use in inspecting and maintaining stormwater facilities for which they are responsible.

What Did We Implement?

Investigators and technical advisors drew upon the most current state and federal sources to assemble this description of BMPs, including the 2005 "Minnesota Stormwater Manual" and the Minnesota Pollution Control Agency's 2007 publication, "Assessment of Stormwater Best Management Practices."

How Did We Do It?

Investigators performed a literature search to gather resources on stormwater management. These materials were then reviewed and discussed by a panel of technical experts, including state and local engineers. The most relevant sources were used to assemble the resultant guide.

What Was the Impact?

The new guide, tailored to address the specific concerns of Minnesota's cities and counties, provides not just descriptions and definitions of the techniques but templates for inspection and maintenance procedures. It primarily covers five stormwater management methods:

Bioretention facilities use natural processes to control stormwater overflow and filter pollutants.

- Stormwater ponds, which collect runoff to mitigate impact on downstream water quality.
- Bioretention, such as bioswales, rain gardens and filtration basins that use plants, soils and microbes to remove pollutants from runoff.
- Underground treatment devices, which remove grit, oil and pollutants in a variety of ways. These devices generally fit within underground drainage systems and typically suit lower volumes of runoff than generated by large storms. Often these devices are used as pretreatment systems within other BMPs.
- Underground detention systems store runoff temporarily to regulate outflow to mimic predevelopment water passage. Many such systems include pretreatment technologies for removing floatables, skimming off oil and grease, and trapping sediments in deposits. Underground treatment devices are often used in concert with underground detention systems.
- Infiltration systems temporarily trap runoff and allow it to seep into soil. Natural or constructed depressions in permeable soils, these systems employ chemical, biological and physical processes to remove pollutants.

A few technologies are also presented that are less familiar to Minnesota public works engineers, including pervious pavement, sand filtration systems and stormwater planters.

The guide will help engineers plan maintenance activities, adapt practices to local storm events and forecast costs for effective budgeting for managing these structures.

What's Next?

Once the guide was published, investigators distributed fliers about it and posted it on the Local Road Research Board Web site. This manual is being deployed as part of the LRRB's comprehensive stormwater road map of research, training and technical transfer to implement a performance-based approach to managing Minnesota's stormwater. One ongoing goal is to further develop and refine a "treatment train" approach: a model that shows the effectiveness of each available BMP option given some project parameters.