



## Stormwater Pollutant Removal in Rain Gardens

**Project Number** 2010-03

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**Problem** Increased environmental awareness has led local roadway agencies to consider various means of mitigating the effects of stormwater discharge into lakes and rivers. One technique is to install rain gardens that partially treat the stormwater. Unfortunately, many urban settings do not have enough space to construct a rain garden large enough to fully absorb storm runoff.



**Solution** The City of Grand Rapids began constructing modified rain gardens as part of a 2008 street reconstruction project on First Avenue Northwest. Since the rain gardens are not large enough to be used solely as infiltration basins, they are connected and allowed to discharge to the city's storm sewer system.

**Procedure** The gardens were constructed between the curb and the sidewalk on First Avenue Northwest. Each garden is about 15 feet wide and 25 feet long, with a total size of 375 square feet. The rain garden design includes an infiltration pipe and an overflow pipe, allowing the rain gardens to discharge excess water to the storm sewer system.

During the summer of 2011, two of the rain gardens were monitored during rainfall events. Samples of stormwater runoff entering the garden were collected, as were samples from the discharge pipe from the rain gardens to the storm sewers. These samples allowed researchers to determine if the rain gardens reduced the amount of total suspended solids, nitrogen, and phosphorus in the runoff.

**Results** Although no significant conclusions can be drawn about the rain garden's effect on phosphorus or nitrogen levels, test results indicate that the rain gardens were very effective in removing total suspended solids from the water. Data collected from 10 samples indicated that an average of 69 percent of the total suspended solids was removed as the water passed through the gardens. These results demonstrate that the modified rain gardens have potential as a best management practice for controlling and reducing stormwater pollutant discharges to receiving bodies of water.

**Approximate Cost** \$14,000

**OPERA Funding** \$8,000

**Implementation** The city plans to continue implementing this modified rain garden design where feasible. Additional research should also be completed to further quantify the potential benefits of these rain gardens.

**Status** Complete

**Prepared by:**

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