

Development of a Process for Quantifying the Benefits of Research

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July 2017

Research Project
Final Report 2017-13

Appendix A1

Assessment and Recommendation for Operation of Standard Sumps as Best Management Practices for Stormwater Treatment

MnDOT Report Number: 2012-13

Publication Date: May, 2012

Authors: Kurtis McIntire, Adam Howard, Omid Mohseni and John Gulliver

Project Cost: \$257,000

Project Summary

This research effort concluded that standard sumps and baffles are effective at removing sediment from stormwater during low flow rates, but are not able to retain these sediments during high flow rates. To address this issue, the Saint Anthony Falls Laboratory (SAFL) baffle was developed to work within a sump to reduce the energy of the water entering the sump and improve sediment retainage. The research project recommends use of the SAFL baffle as a lower-cost method to improve sediment retainage.

Challenges of Data Collection

The research report did not contain sufficient data to do any computation of benefits. The cost of the SAFL baffle was not provided, the cost of competing devices was not provided and an estimate of the number of storm water sumps that would potentially be candidates for installation was not provided.

Efforts were made to document the number of sumps that would be candidates for the baffle in both state and local storm water systems. However, MnDOT staff members Beth Neuendorf and Barb Loida could not provide an estimate and a sample of city engineers in the Minneapolis/St. Paul metropolitan area indicated that there were no candidates in their systems (they already owned vacuum trucks and had staff assigned to clean out their sumps).

An additional effort was made to document the number of baffles MnDOT had already purchased using bid price summaries, however it was determined that the baffle did not have a unique bid number and was included in a catchall – “storm water special design”. Ultimately, an estimate of the potential size of the market for SAFL baffles was produced using material provided by the marketing director for the manufacturer.

Assumptions for Benefits Estimation

The data collection challenges necessitated development of the following assumptions to proceed with the benefit estimation process:

- Benefit is based on cost difference between SAFL baffle and competitor baffle.

- The other benefits of the SAFL baffle related to reduced maintenance and associated costs, and less sediment in the waterways will not be included in the benefits calculation due to inability to accurately capture these benefits.
- Competitor baffle price of \$25,000 is based on estimate of \$30,000 from Andy Erikson (SAFL) and \$20,000 to \$30,000 from AJ Schwibber (president of Upstream Technologies).
- SAFL baffle price of \$4000 was provided by AJ Schwibber of Upstream Technologies (produces the SAFL baffle) and confirmed by Omid Mohseni (Principal Investigator).
- Omid Mohseni estimated that 200 SAFL baffles were sold in 2014, 70 to 80 percent of which were to agencies in Minnesota. Assume 70 percent, the lower percentage in this range, as a conservative estimate of potential benefit. 70 percent of 200 equates to 140 SAFL baffles annually purchased and installed in Minnesota.

Benefits of the Recommendations

The SAFL baffle can be lowered into existing manholes in pieces for installation in existing structures. This ability to assemble on site lowers the cost compared to other baffles which require retrofitting or reconstructing existing structures. The quantitative benefit captured in this estimation effort is based on the reduced cost of the SAFL baffle compared to other baffle and sump installation practices. The SAFL baffle provides another quantitative benefit through reduced maintenance requirements. A potential qualitative benefit is the reduction in sediment deposited in waterways.

Benefit Quantification Process

The benefit of implementing the recommendation to use the SAFL baffle was quantified as a material savings based on the cost difference between purchase and installation of the SAFL baffle and traditional methods of purchasing and installing baffles in stormwater manholes. The quantification process used a cost of \$4000 for the SAFL baffle and an average cost of \$25,000 for other baffles, provided by the company that produces the SAFL baffle and the Principal Investigator. Based on recent sales data, the demand for SAFL baffles in Minnesota is estimated to be 140 annually. This data can be seen on the screen captures of the benefit calculation spreadsheets on the following pages.

Quantitative Benefit of the Recommendations

The potential benefit of implementing the recommendation to use SAFL baffles is approximately \$8.5 million over a three-year time period. Comparing this benefit to the cost of the research project results in a benefit-cost ratio of 33. This high ratio indicates the research effort was beneficial and its recommendation will likely result in cost savings for Minnesota agencies that choose to implement the SAFL baffle. The ratio increases to 102.7 for the 10-year benefit estimation time frame, based on a potential savings of \$26.4 million.

