

Attachment E
Research Proposal Template
Roads & Highways Monitoring Committee
Subgroup of the Stormwater Working Group

1. RESEARCH PROPOSAL TITLE

Provide a title that briefly and immediately conveys to the reader the intent of the proposed study.
Optimizing porous pavement shoulders through operations and maintenance

2. RESEARCH PROBLEM DESCRIPTION

In one or more paragraphs, provide background to set the context and explain the reason for the research by stating the general problem or need. Be explicit about the significance and scope of the problem. Explain the consequences, if any, of not doing this work.

The most current round of municipal and transportation-related stormwater permits coming on line will require the use of low impact development (LID), also called green stormwater infrastructure, as the preferred and commonly used approach to managing stormwater in development and redevelopment projects. The goal is to treat and/or infiltrate stormwater in numerous small structures rather than a limited number of larger regional facilities. As a relatively new approach to stormwater management, many questions remain about the optimization of these systems, including siting, limitations, and maintenance needs.

As more and more LID structures are installed, local and state jurisdictions will increasingly take on ownership, operation and maintenance, and/or inspection responsibilities for these structures. For planning, compliance and execution purposes, transportation agencies will need information on appropriate levels of maintenance to optimize LID performance. Currently, this information is limited and further research is needed. This information will be particularly important to agencies that are forced to prioritize their work due to limited maintenance funding.

This study will address the need for more information by investigating LID performance under varying maintenance scenarios. It will consider a real-world application that has the potential to be commonly used once LID requirements take effect in coming years. By conducting the research now, local and state DOT's will have information available to make better decisions on implementing optimized maintenance programs as soon as the LID structures are installed. The results of this study could also be used to establish maintenance standards, as required by stormwater permits.

3. RESEARCH OBJECTIVE

Describe in very brief terms how the expected benefits/products of the research will be used and by whom. Indicate which one of the three categories the research proposal targets.

Effectiveness Source Identification Status & Trends

This study would seek to answer the following questions:

- Are porous pavement shoulders on rural roadways feasible from a transportation perspective?
- Will porous pavement shoulders provide cost-effective stormwater treatment and flow control?
- What types of maintenance activities/equipment and what frequency of maintenance will optimize the performance of porous pavement shoulders?
- How will porous pavement shoulders perform over time with respect to stormwater treatment, flow control, and structural integrity?

Answers to these questions will inform transportation and regulatory agencies on the performance, cost effectiveness and feasibility of stormwater management via porous pavement shoulders.

Attachment E

4. LITERATURE SEARCH AND RESEARCH IN PROGRESS SUMMARY

Summarize literature and ongoing research found on the topic. Describe any shortcomings or deficiencies in the current body of research and how this project will address them.

In 1997, St. John and Horner stated “porous asphalt shoulders appear to provide both the environmental and road operations benefits desired by regulatory and transportation agencies.” (Effect of Road Shoulder Treatments on Highway Runoff Quality and Quantity, 1997). The results of St. John and Horner’s study suggest road shoulders could successfully be converted to porous pavement, which could help transportation agencies comply with upcoming LID requirements.

The Washington Stormwater Center, in partnership with Washington State University – Puyallup, has installed a porous parking lot with monitoring systems built in to measure BMP performance under both maintained and unmaintained conditions. This ongoing study will provide valuable data about porous pavement applications, but the maintenance conditions under examination are limited (either maintained or not). Additionally, this study is being conducted in a campus parking lot, rather than along a road or highway, so it is unclear how applicable the results will be to road and highway situations.

The study proposed in this outline would build on the studies described above. The goal is to assess multiple maintenance conditions *in situ*. That is, the installations and monitoring would occur along a representative county road in western Washington. This proposal also extends the duration of sampling to three years, producing results that represent longer-term performance. Transportation agencies would have directly applicable answers to questions of performance optimization and feasibility.

5. Geographic Scope and Urgency of Research

How broadly will the results of this research apply?

Nationally Pacific Northwest WA Only Eastern WA Western WA Puget Sound Basin

How quickly will you need the results of this research?

ASAP Within 6 months Within 1 year Within 2 years Within 5 years Ongoing

6. Conceptual Research Approach

Summarize what the proposed research involves. Identify any potential technical, institutional, or political barriers to its implementation.

The proposed study will incorporate the siting and design, installation, maintenance and monitoring of a stretch of porous pavement along a roadside shoulder that is representative of rural roadways in western Washington. The porous shoulder will be split into three or more subsections, each designed, installed and monitored identically, but with varying degrees and/or types of maintenance. An additional and adjacent section of existing gravel or traditional asphalt shoulder will be equipped for monitoring and will serve as the control site for this study.

7. ESTIMATED COST AND TIMING (Optional)

Identify: 1) The funds required; 2) How long the project will take; and 3) Whether the project depends on another action before it can proceed.

Ideally, this would be a five year project to account for different weather patterns in the Pacific Northwest and test the different maintenance techniques in varying flow regimes. This will also be enough time to evaluate maintenance needs over time.

Additional analysis would be necessary to estimate the cost of this study.

Attachment E

8. CONTACT INFORMATION

Provide specific contact information for the person(s) involved in developing the research proposal.

Jennifer Keune, Environmental Scientist III
King County Road Services Division
Jennifer.Keune@kingcounty.gov

Jim Crawford, Environmental Scientist I
King County Road Services Division
Jim.Crawford@kingcounty.gov

Rob Fritz, Supervising Ecologist
King County Road Services Division
Rob.Fritz@kingcounty.gov

Jake Finlinson, Environmental Scientist II
King County Road Services Division
Jake.Finlinson@kingcounty.gov