

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION

OFFICE OF RESEARCH AND LIBRARY SERVICES

REQUEST FOR QUALIFICATIONS AND EXPRESSIONS OF INTEREST

For serving as Principal Investigators on

WSDOT 2011-13
TRANSPORTATION RESEARCH PROJECTS

RFQ 11-001

Released

January 20, 2011

Response Due Date

February 21, 2011

INTRODUCTION

The WSDOT Office of Research and Library Services conducts research and development projects to better understand why certain transportation related problems occur and how to prevent or correct them through improved information or technology. The research program uses systematic inquiry to enhance the agency's ability to deliver transportation projects and operate a safe and efficient transportation system. This request for qualifications is being distributed to universities associated with the Washington State Transportation Center (TRAC) and the Council of University Transportation Centers (CUTC). The contracting organization for projects awarded through this RFQ must be a government organization.

OBJECTIVE

The objective of this Request for Qualifications (RFQ) is to obtain, by no later than February 21, 2011, written responses of interest from researchers to serve as Principal Investigators (PIs) for one or more of the attached transportation research problem statements. These projects were selected by WSDOT Executive Management to help solve transportation problems currently facing the department. In general, project dollar amounts range from \$50,000 to \$350,000. The proposed duration of each project is noted in the problem statement.

The PI for a project has the following responsibilities:

1. Develop a project work plan and budget
2. Develop a scope of work for the project
3. Identify/hire staff to carry out the work
4. Provide progress, summary and final reports and research notes
5. Manage the project budget, schedule and deliverables
6. Maintain contact with the WSDOT Technical Monitor and WSDOT Research Manager
7. Participate in outreach activities such as publication, presentation, and summary document development
8. Advise on appropriate uses and/or implementation of the research results

All responses must be received at the following address by no later than February 21, 2011 (electronic versions submitted by email are preferred):

Tim Carlile
Office of Research and Library Services
Washington State Department of Transportation
PO Box 47372
Olympia, WA 98504-7372
360-705-7975
carlilt@wsdot.wa.gov

Any general questions regarding this RFQ should also be addressed to Tim Carlile using the contact information above. Late submittals will not be accepted.

CONTENT OF RFQ RESPONSE

A completed response to this RFQ should not exceed ten pages and must contain the following information:

- The title of the problem statement
- The name of the researcher(s) - individuals or teams of two or more researchers from one or more universities may collaborate in submitting a joint response
- Education and experience qualifications of the researcher(s), including past research experience in the area the problem statement addresses
- References from organizations that previously funded past work in the area addressed by the problem statement. Contact information should include name, address, phone number, and name of funded project
- A statement of the research approach proposed to address the problem statement
- Matching funds that the researcher(s) have or will pursue

SELECTION

WSDOT Research Advisory Committee members, Research Managers and Technical Monitors (identified on each individual problem statement) will evaluate and rate the RFQ responses based on their content. Interviews may be conducted at the discretion of the proposal review team. Ratings will be submitted to the Director of the Office of Research and Library Services for a final decision. A letter will be sent to the selected researcher(s) by the Director of the Office of Research and Library Services notifying them of the selection of the preferred research team, the earliest possible start date, and contact information for the assigned WSDOT Research Manager and Technical Monitor. The letter will also direct the selected researcher(s) to begin development of a full proposal that must be submitted and approved by WSDOT.

If there are no responses to this RFQ for a particular problem statement(s) or if it is determined by the WSDOT Research Manager and Technical Monitor after review and rating of responses that an acceptable PI cannot be identified, WSDOT will pursue other avenues to obtain an appropriate researcher.

CONTACTS/INFORMATION

If there are specific questions regarding a problem statement, please contact the WSDOT Technical Monitor or Research Manager identified in the problem statement. Information on the WSDOT Research Program can be found at <http://www.wsdot.wa.gov/research/>. The *WSDOT Research Procedures Manual* may also provide helpful information and is available at the same link.

Attachment to RFQ

WSDOT APPROVED 2011-13 RESEARCH PROBLEM STATEMENTS

2011-13 Transportation Research Problem Statements	Funding Amount	Page
Steep Slope Best Management Practices for Western Washington	\$150,000	5
Extended Discharge Time and Revolution Count for Cast-In-Place Concrete	\$350,000	6
Structural Design Parameters of Current WSDOT Concrete Mixes	\$140,000	7
Prioritization of Future Active Traffic Management Deployment	\$80,000	8
Determining Expected Life and Best Practices for Pavement Maintenance Treatments	\$150,000	9
Determining the Cost/Benefit of Routine Maintenance Cleaning of Steel Bridges to Prevent Structural Deterioration	\$75,000	10
Two Lane Rural Road Safety Performance Functions	\$150,000	11
Effect of Fuel Prices on VMT, GHGs and Revenue	\$100,000	12
Media Filter Drain Longevity	\$75,000	13
Stormwater Model Comparison	\$50,000	14
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PROBLEM TITLE
Steep Slope Best Management Practices for Western Washington

RESEARCH PROBLEM STATEMENT

Vegetated Filter Strips (VFS) and natural/engineered dispersion are sloped vegetated embankments designed to receive highway runoff via sheet flow for the purpose of runoff treatment and/or flow control. Current design criteria, as specified in the Highway Runoff Manual (HRM), constrain the embankment slope to 15% or flatter. These design criteria present a challenge to WSDOT since most highway embankments are constructed at a 25% slope. When VFS or dispersion is utilized for stormwater management, the embankment slopes are generally flattened resulting in an expanded roadway footprint. This may result in the project incurring additional right of way (ROW) acquisition cost.

VFS and dispersion are preferred best management practices (BMPs) because existing vegetated embankments are used to manage stormwater close to the source, as opposed to traditional methods that collect and convey stormwater to a point location. Compared to alternative BMPs, construction and life-cycle costs for VFS and dispersion are generally lower. Due to the reduced maintenance and operational requirements, these BMPs are also considered more sustainable. Increasing the slope limit would not only align with the current embankment design for most highways, but also allow for more widespread use and reduce the need for additional ROW because of the BMP smaller footprint.

The majority of highways in Washington are in rural locations that currently have vegetated embankments used either directly or indirectly for stormwater management. With the current maximum 15% slope limit, some of these existing embankments will not meet the current design criteria for either VFS or dispersion. As a result, future improvement projects may require embankment upgrades to meet the current design criteria for VFS or dispersion, or more traditional BMPs may be sought that are cost prohibitive.

RESEARCH OBJECTIVE

The objective of this research is to develop technical justification to increase the maximum slope limits to 25% for VFS and dispersion. This will be done by evaluating multiple sites (40-60) in western Washington to determine which site factors contribute to the success and/or failure of slopes 25% or greater. Data collected at each site will include but is not limited to; photographs, site measurements, evidence of erosion, and soil testing of surface infiltration rates. The success or failure of a slope will be determined by evidence of erosion along the embankment or pooling at the toe of the slope. Once the data has been collected, the data will be evaluated to determine the site specific factors that contributed to the success or failure of slopes 25% or greater.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$150,000
Anticipated Start Date: July 1, 2011

TECHNICAL MONITOR

Mark Maurer 360-705-7260

RESEARCH MANAGER

Rhonda Brooks 360-705-7945

PROBLEM TITLE

Extended Discharge Time and Revolution Count for Cast-In-Place Concrete

RESEARCH PROBLEM STATEMENT

Existing WSDOT specifications require concrete be discharged within 90 minutes of batching cement and water and within 300 revolutions of the concrete mixing truck. These specifications were established prior to the introduction of set retarding chemical admixtures which delay hydration or setting of fresh concrete. The use of 90 minutes and 300 revolutions, although typical, affects delivery schedules and frequently leads to rejection of concrete that, in all other ways, meets owner requirements.

The cost of concrete and the schedules of concrete construction are strongly impacted by the requirement to discharge concrete within 90 minutes of batching. If this time was increased, concrete costs would be reduced by (1) reduction of rejected concrete trucks, (2) allowance of delivery from more batch plants, and (3) allowance of delivery during periods of heavy traffic. Set retarding chemical admixtures will also enable improvements to concrete quality by maintaining cooler concretes when the work is conducted in warmer temperatures, which is the typical construction climate.

RESEARCH OBJECTIVE

The research should evaluate the impact to concrete quality for increases to discharge time and mixing truck revolutions far beyond 90 minutes and 300 revolutions. The work should include an evaluation of the air entraining chemical admixtures, trial batches from multiple concrete suppliers (including admixtures from multiple manufacturers) and finally a field evaluation. Concrete assessment should include performance specifications for concrete quality and extended discharge times and with extended numbers of agitation revolutions. Performance criteria might include slump, temperature, compressive strength, modulus of elasticity, abrasion resistance, permeability, shrinkage, quality of entrained air dispersion, and/or total air content.

Performance criteria results that indicate acceptable concrete quality will be immediately incorporated into construction standard specifications which will directly lower concrete costs.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$350,000
Research Period: 24 months

RECOMMENDED TECHNICAL MONITOR RESEARCH MANAGER

Jesse Beaver 360-705-7825
Mike Polodna 360-709-5446

Kim Willoughby 360-705-7978

PROBLEM TITLE
Structural Design Parameters of Current WSDOT Concrete Mixes

RESEARCH PROBLEM STATEMENT

The variability of structural design parameters of concrete mix designs has been a major concern among bridge designers. The structural design parameters such as compressive strength, density, modulus of elasticity, modulus of rupture, creep, shrinkage, and permeability could be significantly different if concrete mix ingredients change. The traditional concrete mixes with minimum prescriptive amounts of ingredients were consistent with the range of variability of structural design parameters considered in the AASHTO Bridge Design Specifications. The structural properties of some concretes being recently used for WSDOT bridge projects are questionable and may not be consistent with specifications leaving bridge designers with concrete that underperforms in some places. Replacing underperforming concrete is not practical in most cases, leaving structures with permanent deficient members.

This research is needed to determine the structural properties of WSDOT concrete (primarily Class 4000 used for cast-in-place applications but could also include Class 5000 and other concrete mixes) used for bridge projects. Also, confirmation of conformance of structural properties of WSDOT concretes with the AASHTO LRFD Bridge Design Specifications is necessary.

RESEARCH OBJECTIVE

The objective of this project is to determine (at the least) the following hardened concrete properties:

- Density (for all mixes)
- Compressive strength (for all mixes): 28, 56 days
- Modulus of elasticity (for all mixes): 28, 56 days
- Modulus of rupture (for selected mixes): 28, 56 days
- Creep (for selected mixes): 28, 56 days, 1 year
- Permeability (for selected mixes): 28, 56 days, 1 year

Coordination with ongoing projects to obtain concrete mix and coordination with the State Materials Laboratory is necessary. The Materials Lab will be able to perform some of the tests listed above (mainly compressive strength and modulus). Researchers will recommend relevant changes to WSDOT's Bridge Design Manual and the Standard Specifications.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$140,000
Research Period: 12 months

RECOMMENDED TECHNICAL MONITORS RESEARCH MANAGER

Ron Lewis 360-705-7396
Mike Polodna 360-709-5446

Kim Willoughby 360-705-7978

PROBLEM TITLE
Prioritization of Future Active Traffic Management Deployment

RESEARCH PROBLEM STATEMENT

We know that as freeway corridors become more congested that average or typical travel times degrade. We have many analytical tools to estimate this degradation – travel demand models and traffic operations models. However, we also know that increasing travel demand and congestion levels affect the reliability of travel times – i.e. the variation in travel times one could see by day of week or intra-day. We also know that increased congestion or high flow conditions correspondingly increase the number of collisions and potentially injuries, especially in areas where high speed conditions suddenly encounter the back of a queue. There is also a likely relationship to an increase in non-collision incidents (e.g. running out of gas or a flat tire). But we lack a good tool set that describes when growth in traffic creates significant increases in both unreliable travel conditions, and significant increases in collisions and non-crash incidents, as well as how different operational treatments will affect the size and frequency of those negative events.

There are limited resources to resolve both congestion and safety improvements throughout the state. Better tools are needed to quantify problems, estimate potential benefits of lower cost operational treatments (when compared to very expensive capacity increases) and provide input to the programming and prioritization process.

RESEARCH OBJECTIVE

Using empirical data and a combination of both recently published work and new analysis, develop a sketch planning tool that can estimate the change in reliable travel (i.e. volatility) and the level of collisions and incidents, which can be applied to existing data to project future experience on a corridor. The project will provide criteria and a procedure for evaluating the benefits to be obtained from ATM and other mobility and safety improvement strategies.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$80,000
Research Period: 18 months

RECOMMENDED TECHNICAL MONITOR RESEARCH MANAGER

Mark Bandy 206-440-4451

Doug Brodin 360-705-7972

PROBLEM TITLE

Determining Expected Life and Best Practices for Pavement Maintenance Treatments

RESEARCH PROBLEM STATEMENT

It is reasonable to assume that pavement maintenance has an effect on the expected life of a pavement structure, but that effect is not well understood. The effect of maintenance on pavement life needs to be quantified, and best practices for maintenance treatments need to be developed.

The state typically spends approximately \$200 million - \$250 million per biennium on capital projects (P1) to preserve the pavement system. The appropriate use of maintenance could extend pavement life, but which techniques to use, and how effective they are, are not well known. Research needs to be performed to understand the best maintenance practices and determine how effective each one is at extending pavement life. This research pertains to the management of the state's entire 20,500 lane-mile road system (both flexible and rigid pavements).

RESEARCH OBJECTIVE

The research objective is to develop Best Practices for pavement maintenance activities, and develop guidelines regarding how each maintenance treatment affects pavement life. The scope of work will include: (a) evaluating results of existing research, (b) developing long-term designed experiments to test and evaluate different maintenance treatments under different conditions (e.g., Eastern Washington compared to Western Washington), (c) analysis of early research results and establishment of long-term procedures for research monitoring, (d) development of Best Practices for maintenance treatments, and (e) development of guidelines for estimated effect of maintenance treatments on pavement life.

The benefits of the guidelines developed from this project should be better planning and completion of maintenance activities, which will result in longer pavement life and reduced life-cycle costs. The guidelines would be used by Highway Maintenance and the Pavements Division of the State Materials Lab.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$150,000
Research Period: 24 months

RECOMMENDED TECHNICAL MONITOR RESEARCH MANAGER

David Luhr 360-709-5405
Monty Mills 360-705-7803

Kim Willoughby 360-705-7978

PROBLEM TITLE

Determining the Cost/Benefit of Routine Maintenance Cleaning of Steel Bridges to Prevent Structural Deterioration

RESEARCH PROBLEM STATEMENT

The accumulation of salt, guano, sand and other debris on steel bridges contributes to an increased rate of corrosion on bridges. It also hinders the completion of semi-annual bridge condition inspections as debris can oftentimes cover components of the bridge structure that may need repairs. Currently, WSDOT does not have information that identifies the cost benefit of pursuing a maintenance washing program for the purpose of preserving the lifespan of the bridge. More specifically, it is not clear what frequency of maintenance washing (annual, biannual, etc.) would result in greater investment return in preserving the lifespan of the structure.

Currently, WSDOT maintenance washing activity is covered under a 5 year NPDES permit issued by Ecology. WSDOT manages 264 steel component bridges over water located throughout all 6 WSDOT regions in the state. The scope of this study would address these locations that are covered under the NPDES permit. Due to restrictive provisions of the permit, the majority of bridge maintenance washing needs are being deferred and only a minor portion are being completed (approximately 12 sites per year). Results from this study would identify the cost benefit of routine bridge maintenance washing for steel bridges over water, and may support a greater frequency of this activity being completed in the future. In turn, this would support a greater investment in the program and achieve the larger goal of the department to preserve the lifespan of bridge structures and support bridge inspections.

RESEARCH OBJECTIVE

The objective is to identify a method and metrics for determining the cost benefit of washing bridges for the purpose of preserving the life span and providing improved bridge inspection conditions. WSDOT will be more effective in developing an investment strategy that will support whether more frequent routine maintenance washing activities result in increasing bridge structure lifespan. This will result in achieving an agency goal of preserving the lifespan of bridge infrastructure and promoting better bridge inspection with minimum expenditures.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$75,000
Research Period: 12 months

RECOMMENDED TECHNICAL MONITOR RESEARCH MANAGER

Gregor Myhr 360-705-7853

Kim Willoughby 360-705-7978

PROBLEM TITLE
Two Lane Rural Road Safety Performance Functions

RESEARCH PROBLEM STATEMENT

WSDOT and stakeholder agencies continue to work towards a goal of zero fatal and serious injury crashes. Numerous tools are being developed for use in the project development and programming process which will help safety stakeholders to better assess safety from a quantitative standpoint. This quantification is necessary since performance outcomes will require that each dollar spent in safety return on its investment. This means that decisions that are simply anecdotal in nature will no longer be acceptable. In other words engineers and planners will need to quantify outcomes through analytical procedures. Quantification of Safety through Safety Performance Functions (SPF) is the most accepted means nationally. In providing these tools, significant research has been undertaken nationally and from these efforts safety performance functions (equations) have been developed. These SPFs can be found in the Highway Safety Manual, SafetyAnalyst, Crash Modification Clearinghouse and the Interactive Highway Safety Design Model. Each of these performance functions requires states to calibrate the models to the states particular characteristics. However, even with calibration the SPF is not optimized for a state's use. Because of this, a number of states are developing state specific SPFs.

WSDOT believes that State and Functional class specific SPFs are a must. These SPFs will be developed over time, with the most critical routes in terms of the potential for crashes being assessed first. It is also important to understand that these SPFs can be in planning, programming, design and operation of the highways. These equations are used to assess current and future safety performance, as such, before and after assessment of performance is greatly improved. Use in developer reviewer, environmental review, before and after studies, deviation analysis and countermeasure selection in projects are just a few applications of the equations.

RESEARCH OBJECTIVE

The objective of this research effort will be the development and implementation of state specific SPFs for differing functional classes in Washington State. These SPFs will be used by all safety professionals and those responsible for safety assessment in Washington State. To achieve these objectives the following will occur: (1) An assessment of the current practice, (2) Literature Review of national and state practice, (3) Development of SPFs by functional class, (4) Development of SPFs Implementation procedures for the differing tools and offices (e.g., HSM, SafetyAnalyst, IHSDM, etc), and (5) Recommendation for subsequent SPFs development.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$150,000
Research Period: 12 to 18 months

TECHNICAL MONITOR RESEARCH MANAGER

John Milton 360-704-6363

Rhonda Brooks 360-705-7945

PROBLEM TITLE

Effects on VMT, GHGs and Revenue from Changing Fuel Prices and Availability

RESEARCH PROBLEM STATEMENT

Long range plans require making assumptions about future travel demand and future fuel tax revenue. At present there is great uncertainty about whether rising oil prices or limited availability will curtail driving, reduce fuel tax revenue or lead to lower GHG emissions.

Natural gas prices have fallen more than sixty percent from the high levels of 2008. Proven reserves are approaching all time high levels (despite reduced exploration). Over the last two years the historic parity in price per BTU between petroleum and natural gas has weakened and natural gas now enjoys a large cost advantage. This situation has broad implications for WSDOT, including likely impacts on travel demand and fuel tax revenue. The substitution of natural gas for petroleum fuels would also result in decreased GHG emissions making attainment of climate change goals somewhat easier.

A better understanding of future fossil fuel availability for transportation will enable WSDOT to more accurately anticipate future travel demand, future fuel tax revenue, and GHG emissions.

RESEARCH OBJECTIVE

Within the last two years new drilling and recovery techniques have resulted in a dramatic increase in the amount of recoverable natural gas and a consequent decrease in natural gas prices. Because natural gas can substitute for some uses of oil and gasoline it raises the possibility that rising petroleum prices may not diminish VMT to the degree assumed by some observers. The proposed research would include the following tasks:

- Document the increase in supply of natural gas, estimate future price and availability.
- Assess the extent to which natural gas is likely to substitute for petroleum (in particular the extent to which substitution limits petroleum price increases, and the extent to which natural gas substitutes for petroleum as a transportation fuel).
- Estimate the extent to which price and performance effects will influence VMT trends in Washington State.
- Estimate changes in GHG emissions in Washington State attributable to increased use of natural gas.
- Estimate potential loss of fuel tax revenue attributable to substitution of natural gas for petroleum fuels.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$100,000
Research Period: 12 months

RECOMMENDED TECHNICAL MONITOR

Charles Prestrud 206-464-1271

RESEARCH MANAGER

Kathy Lindquist 360-705-7976

Addendum and Clarification to WSDOT Problem Statement:

Effects on VMT, GHGs, and Revenue from Changing Fuel Prices and Availability

WSDOT's long-range plans are based on a number of important assumptions regarding future travel demand, fuel consumption, and tax receipts from fuel taxes. The purpose of the proposed study is to better understand how changing fuel prices and availability, and shifts in fuel type, are likely to influence:

- Travel demand on the state highway system
- Fuel tax revenue
- Greenhouse Gas emissions (GHGs)

The analysis of these issues must be market-driven and firmly grounded in economic analysis of fuel supply and price information. This is not a policy-driven exercise. In other words, assumptions about CAFE standards, ILEV/green vehicle requirements, etc., should reflect only those laws that have already been enacted. The study is not asking what would be required to achieve any particular target for VMT or GHG reduction. Instead it asks what outcome can be expected given what is known about fuel supplies, prices, vehicle characteristics, and travel demand.

The analysis should address the following key questions:

- 1) From what is known about travel demand, household income, vehicle technology, and fuel supplies, is there reason to expect vehicle miles travelled per capita in Washington State to change as result of changes in fuel prices?
- 2) If changes in fuel type are anticipated, what change in state fuel tax revenue would result (assuming that the existing tax rates remain unchanged)?
- 3) What effect on GHG emissions can be expected from changes in fuel type, changes in fuel consumption, and changes in travel behavior associated with changes in fuel price?

WSDOT can make available extensive VMT and fuel tax data. It is expected the selected researcher will have relevant information regarding elasticity of demand, costs of various vehicle technologies, estimated reserves, and production costs for various fuels, etc. A horizon year for the analysis will be established, probably 2030 or 2040.

PROBLEM TITLE
Stormwater Model Comparison

RESEARCH PROBLEM STATEMENT

WSDOT developed and uses the HI-RUN model to determine if the stormwater runoff from our projects will have a detrimental effect on aquatic organisms, mainly fish. FHWA and USGS are developing a similar model, called the Stochastic Empirical Dilution Model (SELDM) to test the same parameters, mainly dissolved metals. Since HI-RUN was developed by WSDOT it has some costs associated with it for updates and training. A comparison of the two models is needed to determine the differences between the two models, the ease of use, and cost of ownership of each.

RESEARCH OBJECTIVE

- Test both models using actual WSDOT projects as the starting conditions.
- Compare the outcomes from both models.
- Compare the ease of running the models including the amount of information required to initialize and populate the model.
- Compare cost of ownership including software costs, updates, and training.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$50,000
Research Period: 6 to 9 months

RECOMMENDED TECHNICAL MONITOR RESEARCH MANAGER

Alex Nguyen 206-440-4537

Rhonda Brooks 360-705-7945

PROBLEM TITLE
Stormwater Storage

RESEARCH PROBLEM STATEMENT

As a result of an August 2008 Pollution Control Hearings Board ruling, the Washington State Department of Ecology (Ecology) has set out to develop new stormwater management performance standards to drive the use of low impact development (LID) techniques and principles for new and redevelopment projects in western Washington (Ecology's also considering whether a similar standard should be developed for eastern Washington). This means that most of the stormwater runoff from impervious surfaces will have to be retained and either infiltrated or released very slowly over a long period of time to the extent is determined feasible. This will require more storage areas for the stormwater runoff or innovative ways of getting runoff back into the ground, including the possibility redistributing highway runoff below the pavement.

Ecology's proposed approach to LID is consistent with setting a hydrologic performance standard and providing a menu of best management practices (BMPs) to achieve that performance standard (via a mandatory list of requirements). The proposed standard for western Washington requires meeting historic flow durations from 8% of the 2-year flow through 50% of the 2-year flow. One of the LID requirements on the "Mandatory List" calls for "infiltration below pavement (permeable pavement or impermeable pavement with collection and redistribution below) for ... hard surfaces". In its proposal, Ecology seeks input to establish instances where impermeable pavements with redistribution of runoff below impervious pavement should be considered infeasible.

RESEARCH OBJECTIVE

As a result of an August 2008 Pollution Control Hearings Board ruling, the Washington State Department of Ecology (Ecology) has set out to develop new stormwater management performance standards to drive the use of low impact development (LID) techniques and principles for new and redevelopment projects in western Washington (Ecology's also considering whether a similar standard should be developed for eastern Washington). This means that most of the stormwater runoff from impervious surfaces will have to be retained and either infiltrated or released very slowly over a long period of time to the extent is determined feasible. This will require more storage areas for the stormwater runoff or innovative ways of getting runoff back into the ground, including the possibility redistributing highway runoff below the pavement.

ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

Recommended Funding: \$75,000
Anticipated Start Date: July 1, 2011

RECOMMENDED TECHNICAL MONITOR RESEARCH MANAGER

Mark Maurer 360-705-7260

Rhonda Brooks 360-705-7945