



## Updates from the States: Washington (November 2010)

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The Washington Department of Transportation (WSDOT) often partners with others through various programs in order to accomplish their concrete pavement related research needs. WSDOT partners with universities, other states' departments of transportation, and national centers through programs and organizations such as the Transportation Pooled Fund (TPF), Washington State Transportation Center (TRAC), Transportation Northwest (TransNow), and State Pavement Technology Consortium (SPTC).

TRAC is a partnership between WSDOT, the University of Washington, and Washington State University. TransNow is a Regional University Transportation Center led by the University of Washington. Universities from Idaho, Alaska, and Oregon are also a part of TransNow. SPTC pools the resources and efforts of California, Minnesota, Texas, and Washington DOT's for pavement research in an effort to improve design, construction, and maintenance methods and procedures.

To learn more about each of these programs, follow the links below.

- TPF: <http://www.pooledfund.org/>
- TRAC: <http://depts.washington.edu/trac/>
- TransNow: <http://www.transnow.org/>
- State Pavement Technology Consortium: [http://pavementinteractive.org/index.php?title=State\\_Pavement\\_Technology\\_Consortium](http://pavementinteractive.org/index.php?title=State_Pavement_Technology_Consortium)

The sections below identify research that is scheduled to begin in the near future, is currently ongoing (including TPF activities), and was recently completed. The research involves WSDOT and its partners. How each of the research activities align with the CP Road Map is identified.

### Future Research

WSDOT is planning work to evaluate long-term pavement performance and noise characteristics of next-generation concrete surfaces. With research work planned to potentially extend through 2015, evaluations will focus on resistance to studded tire wear, durability, friction resistance, and splash/spray characteristics over time.

The University of Washington plans to begin work in 2011 on a project titled *Determining Changes in Greenhouse Gas Emissions from Circa 1990 to Present due to Changes in Pavement Technology* can be categorized under [CP Road Map Track 13: Concrete Pavement Sustainability](#).

### Current Research

Following is a list of WSDOT research projects, categorized according to CP Road Map track.

- [Track 1: Performance-Based Concrete Pavement Mix Design System](#)
  - Concrete Performance Using Low Degradation Aggregate

- [Track 2: Performance Based Design Guide for New and Rehabilitated Concrete Pavements](#)
  - Best Practices for the Design and Construction of Portland Cement Concrete Pavements in Washington State

For more information on these on these and other ongoing research projects, [click here](#).

## Transportation Pooled Fund (TPF) Studies

WSDOT is involved in several TPF projects. A list of various concrete related TPF projects WSDOT is involved with and how the TPF projects are categorized according to the CP Road Map Track follows.

- Track 4: Optimized Surface Characteristics for Safe, Quiet, and Smooth Concrete Pavements
  - TPF-5(135) Tire/Pavement Noise Research Consoertium
  - TPF-5(139) PCC Surface Characteristics: Tire-Pavement Noise Program Part 3: Innovative Solutions/Current Practices
- Track 12: Advanced Concrete Materials
  - TPF-5(098) Self-Consolidating Concrete: Applications for Slip-Form Pavin

## Recently Completed Research

- Track 1: Performance-Based Concrete Pavement Mix Design System
  - Evaluation of Portland Cement Concrete Pavement with High Slag Content Cement
- Track 12: Advanced Concrete Pavement Materials
  - Use of Recycled Concrete Aggregate in PCCP: Literature Search (this work can also be categorized under Track 13)
  - Effect of Chloride-based Deicers on Reinforced Concrete Structures
  - Evaluating and Optimizing Recycled Concrete Fines in PCC Mixtures Containing Supplementary Cementitious Materials (this is also an example of work that can be categorized under Tracks 1 and 13)
- Track 13:
  - Greenroads – A Sustainability Performance Metric for Roadway Design and Construction
  - Sustainable Roadway Design and Construction: An Online Course

For more information on other completed projects, [click here](#).

## Highlights

The following highlights describe some of the recently completed research projects by providing additional details and direct links for more information.

### Greenroads

Stephen Muench and Jeralee Anderson recently completed a report titled *Greenroads – A Sustainability Performance Metric for Roadway Design and Construction*. The research was done through the SPTC and TransNow. This report discusses how Greenroads can be a tool for quantifying sustainability in roadway design and construction. The Greenroads approach presented in the report awards sustainability credits (i.e., points) for a variety of design and construction practices. The University of Washington research on sustainability and the development of the Greenroads rating system has been ongoing for a number of years. This report provides a summary of what Greenroads is; however, since its publication, additional research continues, with the goal of improving the Greenroads approach to quantifying sustainability. The Greenroads website provides the best outlet for the most up-to-date information on this topic. This work is an example of work categorized under [CP Road Map Track 13: Concrete Pavement Sustainability](#).

[Click here to download the report.](#)

To access the Greenroads website, [click here](#).

### **Sustainable Roadway Design and Construction**

Steve Muench, Shane Brown, and Jeralee Anderson recently completed a report, *Sustainable Roadway Design and Construction: An Online Course*, for TransNow. This report outlines an eleven-week online course that educates participants on four main topics: 1) the concept of sustainability, 2) systems for evaluating sustainability, 3) sustainable materials, methods, and practices, and 4) an introduction to life cycle analysis (LCA). This course is the first of its kind and will be available to University of Washington students in Spring 2011. This work is an example of work categorized under [CP Road Map Track 13: Concrete Pavement Sustainability](#).

To read this report in detail, [click here](#).

To find out more information about the online course [contact the University of Washington](#).

### **Evaluation of Portland Cement Concrete Pavement with High Slag Content Cement**

In June 2009, Keith Anderson, Jeff Uhlmeier, Kurt Williams, Mark Russell, and Jim Weston completed the report titled *Evaluation of Portland Cement Concrete Pavement with High Slag Content Cement*. The report presents a comparison study of two roadway sections one built with 25 percent slag cement and the other with 30 percent slag cement. Construction methods and test results are documented, as well as initial measurements for wear, ride, and friction. These measurements will be gathered regularly over the next few years and reported on accordingly. The purpose of this study is to evaluate the performance of pavements with higher slag cement content that are subjected to studded tires. This study is an example of work that can be categorized under [CP Road Map Track 1: Performance-Based Concrete Pavement Mix Design System](#).

[Click here to download the report.](#)

### **Use of Recycled Concrete Aggregate**

Aggregate used in concrete pavements constructed in Washington is of such good quality that the DOT is very interested in reusing the material. Therefore, in June of 2009, Keith Anderson, Jeff Uhlmeier, and Mark Russell completed a report for WSDOT that documents recommendations for the use of recycled concrete aggregate in DOT projects. The recommendations presented in the report, *Use of Recycled Concrete Aggregate in PCCP: Literature Search*, were developed based on an extensive literature search. This research is an example of work categorized under [CP Road Map Track 12: Advanced Concrete Pavement Materials](#) and [Track 13: Concrete Pavement Sustainability](#).

[Click here to download the report.](#)

### **Effect of Chloride-Based Deicers on Reinforced Concrete Structures**

In July 2010, the Western Transportation Institute completed a report that documents a literature review that explores the effect of chloride-based deicers on steel reinforcement in concrete pavements, and laboratory tests performed for the purpose of evaluating corrosion inhibitors in concrete pavements. The report, *Effect of Chloride-Based Deicers on Reinforced Concrete Structures*, identifies differences between the effects of magnesium and sodium chlorides. It is also suggested in this report that corrosion inhibitors delay the initial onset of corrosion of steel in concrete; however, after corrosion begins, the inhibitor does little to prevent the corrosion process. This research is an example of work that can be categorized under [CP Road Map Track 12: Advanced Concrete Pavement Materials](#).

[Click here to download the report.](#)

## **About the CP Road Map E-News**

The **CP Road Map E-News** is the newsletter of the [Long-Term Plan for Concrete Pavement Research and Technology \(CP Road Map\)](#), a national research plan developed and jointly implemented by the concrete pavement stakeholder community. To find out more about the CP Road Map, or to get involved, contact Dale Harrington, [dharrington@snyder-associates.com](mailto:dharrington@snyder-associates.com), 515-964-2020.

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