



October 2019

## *TRAC e-News: Delivering Research Results!*

The Washington State Transportation Center (*TRAC*), conducts transportation research through collaborative partnerships among WSDOT, the University of Washington (UW), and Washington State University (WSU).

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### Airports

#### Creating an emergency management airport inventory



Research team: [Mark E. Hallenbeck \(UW\)](#) | [John MacArthur](#)  
| [Jon Peterson \(WSDOT\)](#)

Sponsor: WSDOT

*Completed:* To be well prepared for a major earthquake or other substantial hazard event, the state must have a complete inventory of existing airport facilities and understand their potential for emergency usage. This project created a comprehensive inventory of airport characteristics and surrounding facilities at 23 general

aviation airports in Western Washington, to be used by WSDOT's Aviation Division, the Washington Military Department, and the Federal Emergency Management Agency (FEMA), that will increase the state's emergency preparedness and overall safety for Washington residents. [Read more...](#)

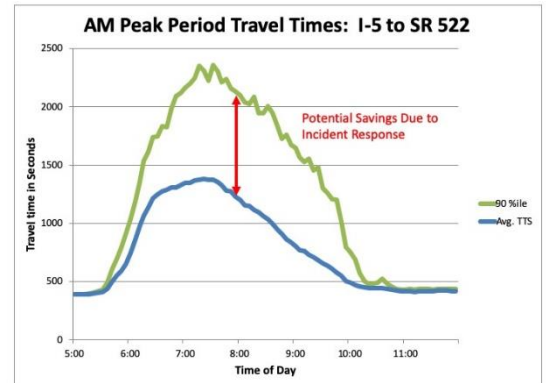
## ITS

### Providing operations performance management guidance

Research team: [Mark E. Hallenbeck](#) (UW)

Sponsors: Cambridge Systematics | FHWA

*Ongoing:* The Federal Highway Administration is looking to help transportation agencies shift their focus from simply measuring transportation system performance to directly using those performance measures within their project identification, project selection, and decision-making processes. A potential tool for accomplishing that is the Capability Maturity Model (CMM), and this project is helping to refine the CMM to examine how state agencies manage roadway performance. [Read more...](#)



## Maintenance

### Smart and environmentally friendly winter maintenance solutions



Research team: [Somayeh Nassiri](#) (WSU)

Sponsor: PacTrans

*Ongoing:* With recent advances in composite material technology, electrically conductive concrete (ECC) can be made with steel and carbon fibers that can increase the conductivity of the concrete—offering snow-melting capabilities—and simultaneously enhance the mechanical performance of the pavement. This study is investigating the effects of different types of fibers and fiber amounts on the conductive properties of pavement concrete and evaluating its deicing efficiency. [Read more...](#)

## Multimodal Travel

### Taming and tapping the bike share explosion

Research team: [Ronald Pimentel](#) (WSU)

Sponsor: PacTrans

*Ongoing:* In the Pacific Northwest, the availability of bike share systems (BSS) has exploded. At least one BSS company is operating in every major city in the region. The goal of this project is to examine consumer perceptions of BSS by interviewing key stakeholders in order to ultimately help transportation professionals and local governments more successfully implement BSS projects and improve consumer acceptance. [Read more...](#)



# Transportation Planning

## Evaluating data from emerging technologies for transportation applications

Research team: [Jeff Ban](#) (UW) | [Cynthia Chen](#) (UW) | [Natarajan Janarthanan](#) | [Doug Brodin](#) (WSDOT)

Sponsor: WSDOT



*Ongoing:* Emerging technologies such as automated vehicles, advanced data analytics and machine learning, and on-demand ride services will provide new data that can be used for transportation planning analysis. This project is examining the properties of these new data and identifying potential applications. Using the SR 99 Tunnel Tolling Project as a case study, Phase II will demonstrate the value of emerging big data and their fusion with data from other, conventional sources in evaluating a project's impact on transportation system performance. [Read more...](#)

## State Planning and Research Projects

Below are WSDOT State Planning and Research (SPR) projects recently awarded to or begun by TRAC researchers.

### Performance of steel jacket retrofitted reinforced concrete bridge columns in Cascadia subduction zone earthquakes

Research team: [Christopher Motter](#) | [Adam Phillips](#) (WSU) | [Bijan Khaleghi](#) | [Mustafa Mohamedali](#) (WSDOT)

This research will characterize the expected performance, ductility capacity, and collapse probability of bridge columns retrofitted with steel jackets in Cascadia subduction zone earthquakes. The project will provide WSDOT with a simple tool to assess whether a standard steel jacket retrofit is adequate to resist a design level earthquake for each bridge column in its inventory.

### Linear scheduling evaluation and best practices development for design, Phase 2

Research team: [Amy Kim](#) (UW) | [Mark Gabel](#) | [Mustafa Mohamedali](#) (WSDOT)

This project will define best practices for scheduling WSDOT projects, particularly with the development and use of linear scheduling during design. It will also document the benefit/cost ratio for the use of linear scheduling design and will provide initial training and vendor selection guidelines. [Read more....](#)

### Long-term bond characteristics of the interface between substrate and overlays in shotcrete applications

Project team: [Pizhong Qiao](#) (WSU) | [Mark Rosa](#) | [Mustafa Mohamedali](#) (WSDOT)

This project will address issues of shotcrete (sprayed concrete) debonding in the substrate and overlays of geotechnical structures. The resulting recommendations for best practices and test methods will assure the

effective and monolithic behavior of shotcrete structures for wall fascia and slope stabilization projects and will be adopted by WSDOT for designing and implementing shotcrete structures in the field.

## **Effects of Cascadia subduction zone magnitude 9 earthquakes on bridges in Washington state**

Project team: [Marc Eberhard](#) | [Jeffrey Berman](#) | [Brett Maurer](#) | [Steve Kramer \(UW\)](#) | [Bijan Khaleghi](#) | [Mustafa Mohamedali \(WSDOT\)](#)

Research is needed to quantify the effects of scientists' newly gained understanding of the seismic hazards of Magnitude 9 earthquakes on the design of new bridges and the evaluation of existing bridges. The capabilities of these bridges will have important consequences for the post-earthquake performance of the transportation network.

## **Evaluation of biofiltration swale media mixes for maximizing phosphorous removal, Phase 1**

Project team: [Nigel Pickering \(WSU\)](#) | [Alex Nguyen](#) | [Mustafa Mohamedali \(WSDOT\)](#)

The objectives of this study are to identify an ideal media mix for removal of stormwater phosphorus and to document the field performance of an amended mix biofiltration swale. Biofiltration swales have performed well for removing most pollutants, but recently a number of reports have shown that phosphorus can bleed out of compost-based media mixes, especially during the early years of operation.

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TRAC e-News will be delivered about three times a year. For more information about TRAC and the ground-breaking work we are doing, please visit our [Current Projects](#) and [Research News](#) pages. A downloadable, pdf version of [this newsletter](#) is also available.

For contact information, follow these links:

- [WSDOT Contacts](#)
- [UW Contacts](#)
- [WSU Contacts](#)

The Washington State Transportation Center (TRAC) is a cooperative, interdisciplinary transportation research agency. Its members, the Washington State Department of Transportation (WSDOT), Washington State University (WSU), and the University of Washington (UW), formed TRAC in 1983 to coordinate transportation research efforts—both state and commercial, public and private—and to develop research opportunities both nationally and locally. TRAC acts as a link among government agencies, university researchers, and the private sector.

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