



March 2021

## *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).

### In this issue

- Developing bridge expansion joint noise mitigation
- Understanding the performance of steel jacket retrofitted bridge columns
- Mitigating disruptions caused by the West Seattle Bridge closure
- Assuring the effective bonding and monolithic behavior of shotcrete structures
- Improving sidewalk data to help people with disabilities navigate more easily
- Determining how shared mobility options affect the demand for traditional travel modes
- Planning for Washington's electric vehicle charging station network
- WSDOT Webinar Wednesdays: previous webinars

## Bridges and Structures

### Sound mitigation study: WSDOT modular bridge expansion joints, phase 2



Research team: [Per Reinhall](#) (UW) | [Jeff Lipton](#) (UW) | [Mark Gaines](#) (WSDOT) | [Jon Peterson](#) (WSDOT)  
Sponsor: WSDOT

*Ongoing:* Expansion joints are connections in bridges that allow the structure to expand and contract with changing conditions such as temperature, lake level, wind/wave conditions, and traffic loads. Modular expansion joints are typically used when six inches or more of expansion/contraction are required at a joint. The noise created when vehicles drive over modular expansion joints is a nuisance to nearby residents.

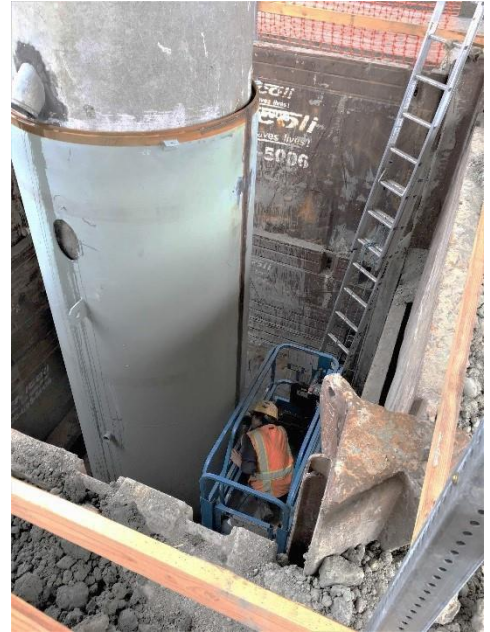
More than 50 WSDOT bridges statewide have modular expansion joints, including the Evergreen Point Floating Bridge (SR 520). This study is developing a noise mitigation method that reduces environmental noise caused by bridge expansion joints, as no commercially available noise abatement exists that is cost effective, safe, and durable. Phase 1 examined the noise generation mechanism. Phase 2 will develop ways to mitigate the noise. [Read more...](#)

## Performance of steel jacket retrofitted reinforced concrete bridge columns

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

Sponsor: WSDOT

*Ongoing:* WSDOT's primary method for retrofitting concrete bridge columns is to encircle them with steel jackets. However, the ability of WSDOT's steel jacketed bridge columns to resist increased earthquake hazard levels is not well understood. This project will characterize the expected performance, ductility capacity, and collapse probability of steel jacketed bridge columns in Cascade Subduction Zone earthquakes. It will develop a simple tool that WSDOT can use to assess whether a standard steel jacket retrofit is adequate to resist a design level earthquake for each bridge column in its inventory. [Read more...](#)



## Freight

### West Seattle Bridge case study



Research team: [Anne V. Goodchild](#) (UW)

Sponsor: Seattle Department of Transportation

*Ongoing:* Closure of the West Seattle High Bridge (WSHB) in March 2020 has negatively affected the livability and economy of the West Seattle peninsula. The unexpected closure of the WSHB disrupted passenger and freight mobility to/from West Seattle, increasing travel times and generating bottlenecks on the remaining bridges. The Seattle Department of Transportation (SDOT) is monitoring changes in travel behavior to/from West Seattle. This study will support SDOT in

understanding current freight movements and freight demand in West Seattle. It will develop a data-driven strategy to mitigate travel delay and minimize the disruption of the delivery of goods and services to West Seattle and will theoretically assess the effectiveness of an implemented strategy. [Read more...](#)

## Geotechnical Engineering

### Long-term bond characteristics of the interface between the substrate and overlays in shotcrete applications, phase 3

Research team: [Pizhong Qiao](#) (WSU) | [Patrick Glassford](#) (WSDOT) | [Marco Foster](#) (WSDOT) | [Mustafa Mohamedali](#) (WSDOT)

Sponsor: WSDOT

*Ongoing:* Shotcrete is increasingly used for fascia walls and soil nail retaining walls. However, use of shotcrete could possibly reduce the life expectancy of structures if the bond between the overlay and the substrate is not well developed. In close consultation with the shotcrete industry and WSDOT, this phase three project is investigating short-term and long-term debonding issues between the substrate and overlays. The study will develop recommendations for best practice and will test methods to assure the effective bonding and monolithic behavior of shotcrete structures for wall fascia, slope stabilization, and other applications. [Read more...](#)



## Multimodal Travel

### [Transportation data equity initiative](#)



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

Sponsor: USDOT

[Initiative website](#)

*Ongoing:* Detailed, accurate data about pedestrian spaces, travel environments, and travel services are crucial in helping people navigate more easily, particularly people with disabilities, older adults, veterans, and suburban and rural populations. This USDOT ITS4US Deployment Program project will develop a national pipeline of sidewalk data intended to support easier

pedestrian navigation. The project will also help extend the national data standards for on-demand transit services (GTFS-Flex), which are used extensively by people with disabilities, and for the mapping of multi-level transit stations (GTFS-Pathways). The project will demonstrate the use of those data and standards in three applications deployed in three states, with extensive public/private partnership and stakeholder input. This first year of the project will consist of finalizing the detailed plans required to build the necessary data infrastructure and to develop or improve the software needed for the mobility applications. [Read more...](#)

## [The impact of shared mobility options on travel demand](#)

Research team: [Anne Vernez Moudon](#) (UW) | [Jeff Ban](#) (UW) | Michael Lowry (University of Idaho) | Qing Shen (UW)  
Sponsors: PacTrans, WSDOT, Puget Sound Regional Council  
[Report](#)

*Completed:* The increasing availability of shared mobility options is affecting travel behavior and travel demand. Smartphone-based technology has permitted the rapid spread of shared mobility options such as bike-sharing, car-sharing, ride-sharing, and ride-hailing, which has affected how people use traditional travel modes. Although transportation policies need to consider these changes, a lack of data impedes the development of programs and policies that could address both the positive and negative aspects of the new travel options. This project aimed to provide much needed information about how app-based, shared mobility options affect the demand for traditional private individual and public transit travel. [Read more...](#)



## Transportation Planning

### [Technology transfer of the ChargeEVal simulation tool](#)



Research team: [Don MacKenzie](#) (UW) | [Tonia Buell](#) (WSDOT) | [Doug Brodin](#) (WSDOT)  
Sponsor: WSDOT

*Ongoing:* Washington is anticipating considerable investment in direct current fast charging (DCFC) stations for plug-in electric vehicles over the next several years. Given that funding is finite and DCFC stations are expensive, public investments must be made where they can generate the biggest impact on EV adoption and travel. To help WSDOT determine where it should invest in highway corridor DC fast charging, researchers developed a decision support system (ChargeEVal) in which planners can specify the locations and characteristics of charging stations along Washington's highway network (such as number of plugs and charging power). This project will make ChargeEVal available to WSDOT staff and contractors as a Web tool to support analysis of potential additions to the charging network. [Read more...](#)

## Webinar Wednesdays

WSDOT's [Research & Library Services Office](#) hosts *Webinar Wednesdays*, a series of bimonthly, one-hour webinars. Each webinar showcases a research project whose results could eventually be implemented statewide. [Previous webinars are available for access here.](#)

Below is information about recent webinars:

## Got roadside? Visualizing roadsides as transportation assets (February)

[Access the recording](#)

Presenter: [Ray Willard](#), PLA, WSDOT State Roadside Asset Manager

In the Port Angeles Maintenance Area, surrounded by the Pacific Ocean, Strait of Juan de Fuca, and the Salish Sea, work crews and engineers deal with significant roadside management challenges. Snowfall, heavy rains, and fog can impair travel and work schedules. The rainforest along the coast receives as much as 140 in. of rainfall annually. Flooding, mudslides, and erosion occur. Designing, constructing, and maintaining roadsides and roadside vegetation in such demanding geography and weather is no easy task! Take a



fascinating virtual tour along the Olympic Region's most scenic roadsides. Learn how maintenance crews across the state apply the principles of Integrated Roadside Vegetation Management using HATS, an innovative mobile technology developed by WSDOT IT. Discover why WSDOT's transportation asset management for highway maintenance activities is its most advanced system, ever. See how WSDOT's workforce—even under the most challenging conditions—keeps road teams and Washington's traveling public safe.

## ChargEVal: A tool for evaluating electrical vehicle charging along Washington highway corridors (November)

[Access the recording](#)



Presenters: [Tonia Buell](#), WSDOT Project Development Manager, Innovative Partnerships | [Don MacKenzie](#), UW Associate Professor of Civil and Environmental Engineering

ChargEVal is an on-line tool that simulates the effects of potential additions to the state's DC fast-charging network on electric vehicle (EV) usage and demand for charging stations. ChargEVal provides a web interface through which users can specify the location, capacity, and pricing for a set of new charging stations. The tool conducts an agent-based simulation of long-distance EV travel demand, integrating empirical models of vehicle choice and charging behavior, and presents results through a web-based viewer. Learn about WSDOT's needs and goals for a decision support tool for EV infrastructure planning and see a live demonstration of ChargEVal.

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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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