November 2025

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

Workforce Development

Pathways for Civil Engineering Workforce Development in Washington State

Research team: Ryan Avery (UW) | Yinhai Wang (UW)
Sponsor: Joint Transportation Committee, Washington State Legislature
Report

Completed. Washington state's ability to deliver infrastructure programs is being constrained by a widening shortage of civil engineers and land surveyors. This study provided a comprehensive analysis of civil engineering workforce gaps, their underlying causes, and actionable solutions to rebuild and future-proof the state's civil engineering and land surveying talent pipeline. Descriptive statistics showed that for 59 percent of employers, vacancy periods for civil engineering positions exceeded six months. They also revealed an urgent need for employers to hire additional staff within five years. Analysis also revealed three systemic pressures on the civil engineering workforce: the high cost of living and uncompetitive salaries; misalignment between academic preparation and job-ready skills (especially with hands-on field training, advanced digital tools, and interdisciplinary project management); and weak succession planning that fails to transfer institutional knowledge. The report translated the findings into a three-part action plan that offers a pragmatic roadmap for legislators, educators, and industry leaders to rebuild, diversify, and future-proof Washington's civil engineering and land-surveying workforce. Read more…

Changes in WSDOT Research Project Management

Research Office Welcomes New Project Managers

WSDOT Research and Library Services is welcoming two new research managers.

Shervin Jahangirnejad, Ph.D., P.E., has over 22 years of experience in research, engineering, and management. Jahangirnejad has led research for entities such as NCHRP, SHRP 2, FHWA, and several state departments of transportation, and he has extensive expertise in pavement engineering, pavement management systems, and project management. He holds doctorate and master's degrees in Civil Engineering from Michigan State University and is a registered Professional Engineer in Washington, Oregon, and Michigan.

David Strich, PhD, joins the Research Office from his role as Senior Multimodal Planner for WSDOT's Northwest Region, where he developed and implemented Plan Review and Community Engagement programs. Strich's background includes work with a Northwest tribe and a local school district managing federal, state, and private grants. He earned his doctorate in Curriculum Studies from the University of British Columbia, with research interests in environmental education and Indigenous ontologies.

Doug Brodin and Jon Peterson Retire

This past June Doug Brodin and Jon Peterson, research managers with the WSDOT's Office of Research and Library Services, retired after many years of working with numerous TRAC researchers and staff at both UW and WSU.

Both men were instrumental in connecting those at WSDOT who had questions to resolve with research partners at the universities. They shepherded research projects through WSDOT's administrative processes and generally supported the completion of studies for the state DOT.

Brodin's entire career was in service to the state of Washington. He began his work at the Research Office in 1999 after joining WSDOT in 1989 and working in the financial offices of several state agencies before that.

Peterson also dedicated his life to public service. He began working at the Research Office in 2015 after joining WSDOT in 2002. Before that he had been a full-time park ranger at Fort Worden State Park, worked for the Washington State Department of Ecology, and spent ten years in the United States Navy Reserve as an intelligence analyst working at Fort Lewis & Whidbey Island Naval Air Station.

For staff and researchers at TRAC-UW and TRAC-WSU, the expertise, problem-solving, and project management skills of both men, as well as their equanimity, positivity, and good humor, will be missed.

Environment

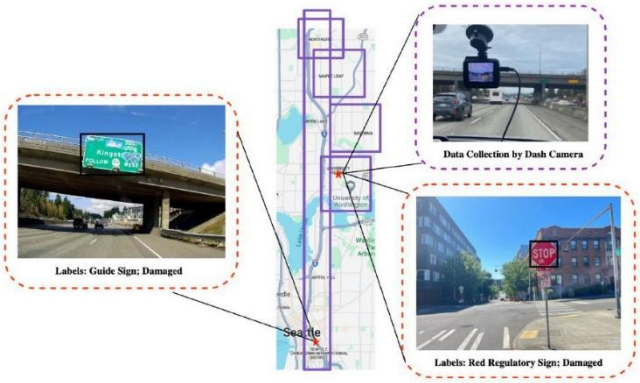
Ensuring Stream Stability with the Use of Organic Material in a Flume—Design Recommendation

Research team: Nicholas Engdahl (WSU) | Julie Heilman (WSDOT) | Jon Peterson (WSDOT)
Sponsor: WSDOT
Report: WA-RD 939.1

Completed: Fish populations in the Pacific Northwest have declined as spawning grounds have disappeared because of river and stream barriers, often under-road culverts. This research investigated ways to incorporate different kinds of organic material inside a culvert that would both maintain the stream channel shape while also improving the ability of fish to successfully navigate those culverts during low water flow. So far, there have been no clear guidelines on how organic material should be used inside a culvert. In particular, the researchers looked at the use of deformable grade control, meander bars, a meandering channel lined with root wads, and organic streambed mixtures. Overall, the research indicated that adding organic material to a streambed reduced the transport of sediment and maintained the target channel shape. Read more…

Highway Design and Safety

Automated Traffic Sign Recognition Using Computer Vision and Deep Learning



Research team: Yinhai Wang (UW) | Dina Swires (WSDOT) | Trevor McCain (WSDOT) | Doug Brodin (WSDOT)
Sponsor: WSDOT
Report: WA-RD 946.1

Completed: An up-to-date inventory of highway traffic signs is essential for roadway safety, infrastructure maintenance, and support of intelligent road systems. This research developed an automated system for collecting traffic sign imagery and related information. The system leverages deep learning and computer vision to detect and classify traffic signs from log videos and open street images and to generate a comprehensive traffic sign inventory. A key component of the system is a learning-based traffic sign detection and recognition algorithm. Additionally, the researchers explored traffic sign condition assessment based on six retro-reflectivity-related features. The integrated system consists of four modules: detection, tracking, assessment, and inventory building. By automating traffic sign management, this system provides a scalable, cost-effective solution that will allow transportation agencies to maintain accurate inventories, prioritize maintenance, and enhance roadway safety. Read more…

Multimodal Transportation

Maintenance of the Active Transportation Elements of Complete Streets

Research team: Daniel Malarkey (UW) | Don MacKenzie (UW) | Ursula Sandstrom (WSDOT) | Jon Peterson (WSDOT)
Sponsor: WSDOT
Report: WA-RD 945.1

Completed: The need for maintenance of active transportation facilities is relatively new, and the development of consistent levels of service for all aspects of these facilities is just emerging. This project explored the challenges and opportunities associated with maintaining these facilities, with particular emphasis on bike lanes. The report identifies the challenges and opportunities associated with designing these facilities for long-term maintenance. It describes how leading state and local jurisdictions currently maintain them, and it highlights emerging best practices among complete streets leaders. The researchers did not make recommendations about specific maintenance practices, but they did recommend a process for developing maintenance guidance for these facilities. The researchers found that communities with a strong commitment to maintaining well-functioning bike lanes and pathways have developed maintenance guidance that varies by the facility type, the useful life of the materials selected for that facility, the level of utilization by cyclists and pedestrians, the climate zone, and the amount of snow or debris that accumulates. Read more…

Pavement

Applications for Foamed Glass Lightweight Aggregate

Research team: Haifang Wen (WSU)
Sponsor: Illinois State Toll Highway Authority
Report

Completed. Recycled and lightweight fill materials are increasingly used in construction because they can address challenging site conditions, accelerate project timelines, and reduce reliance on natural resources while contributing to an agency's sustainability goals. This project investigated the use of one such material, foamed glass aggregate (FGA), a processed recycled aggregate made from waste glass. FGA is notable for its low dry unit weight, which can help minimize the risk of settlement and reduce the need for extensive soil excavation. The research team conducted tests on both wet and dry foaming FGA samples. These experiments included testing for basic FGA characteristics, gradations, volumetric and electrochemical properties, aerodynamic properties, and axial compression compaction, as well as one-dimensional consolidation tests, dynamic triaxial tests, and direct shear tests. In

addition, the researchers studied a pilot construction and performed economic and environmental analyses. Read more…

Webinar Wednesdays

WSDOT's Research & Library Services Office hosts Webinar Wednesdays, its continuing series of one-hour webinars to promote research technology transfer, encourage implementation, and foster innovation. Generally held every other month, the sessions cover a wide range of transportation topics. Each webinar showcases research results or innovative practices presented by researchers and subject matter experts, and each features a Q&A segment for attendees to pose questions.

Sign up here for webinar announcements and registration information. Previous webinars are available for access here.

Below is information about WSDOT's most recent research webinars:

Transportation Momentum: Developing and Maintaining a Culture of Innovation at Your DOT (October 2025)

Presenters: Dale Peabody (Maine DOT, retired) | Katie Walker (Minnesota DOT) | Winston Inoway (Utah DOT)

Access the recording

This webinar provided inspiration for innovation by taking a deeper dive into NCHRP Domestic Scan 23-04 with some members of the national Scan Team. Dale Peabody (Maine DOT, retired) summarized NCHRP Domestic Scan 23-04, *Developing and Maintaining a Culture of Innovation within DOTs*, highlighting recommendations, building blocks of innovation, and a brief description of the domestic scan process and methodology. Katie Walker (Minnesota DOT) discussed her agency's commitment to an innovative culture through the MnDOT Innovation Strategy program. Their mantra is, Everyone at MnDOT is a "MNovator"! Winston Inoway (Utah DOT) provided an overview of UDOT's Innovation Program and shared program accomplishments and activities that help drive a culture of innovation at UDOT.

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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