



December 2022

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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Environment

Reducing construction greenhouse gas emissions

Research team: [Kate Simonen](#) (UW) | [Jon Peterson](#) (WSDOT)

Sponsor: WSDOT

Ongoing: Increasingly, state and federal policies require transportation agencies to limit their greenhouse gas emissions, also known as embodied carbon, arising from the manufacturing, transportation, installation, maintenance, and disposal of construction materials. Like other transportation agencies, WSDOT uses large quantities of concrete, steel, and asphalt in its infrastructure projects. However, it has not yet conducted a systematic assessment of its construction-related greenhouse gas emissions. Researchers from the Carbon Leadership Forum at the UW will assess and analyze the greenhouse gas emissions associated with WSDOT's current use of concrete, asphalt, and steel. And they will develop a set of cost-effective, implementable strategies and recommendations for reducing embodied carbon in WSDOT's standard operating procedures. [Read more...](#)



Evaluation of electrochemical treatment for removal of arsenic and manganese from field soil



Research team: [Idil Deniz Akin \(WSU\)](#) | [Amanda Hohner \(WSU\)](#) | [Indranil Chowdhury \(WSU\)](#) | [Richard Watts \(WSU\)](#) | [Xianming Shi \(WSU\)](#)

Sponsors: Illinois Center for Transportation | Federal Highway Administration

Report

Completed: During roadway construction, transportation agencies frequently encounter soils that contain inorganic compounds that can pose a threat to human

health and the environment. Management of such compounds to meet environmental regulations can cause construction delays and increase costs. Treatment alternatives often require contaminants to be aqueous, increasing their contact with the treatment solution. However, conventional treatment technologies are less successful with metal-contaminated clay or organic-rich, fine-grained soils. For this study, the researchers sought to develop an accelerated, in situ electrochemical treatment approach to extract inorganic compounds from fine-grained soils that could be completed as quickly as excavating contaminated soils and disposing of them off-site. The results indicated that electrochemical systems that leverage low concentrations of hydrogen peroxide and citrate buffer can be effective at remediating soils containing manganese and arsenic.

[Read more...](#)

Bench-scale electrochemical treatment of co-contaminated clayey soil

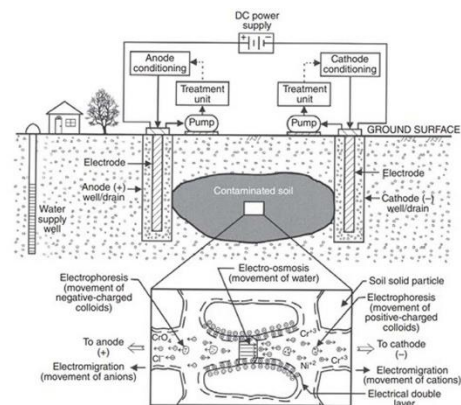
Research team: [Amanda Hohner \(WSU\)](#) | [Idil Deniz Akin \(WSU\)](#) | [Indranil Chowdhury \(WSU\)](#) | [Richard Watts \(WSU\)](#) | [Xianming Shi \(WSU\)](#)

Sponsors: Illinois Department of Transportation | Federal Highway Administration

Report

Completed: During roadway construction, transportation agencies frequently unearth industrial soil contamination that threatens both public health and the environment. Management of such

compounds to meet environmental regulations can cause construction delays and increase costs. Soils co-contaminated with high-molecular-weight polycyclic aromatic hydrocarbons (HMW-PAHs) and metals are commonly encountered in Illinois, and they are resistant to conventional remediation technologies. For this study, the researchers sought to develop an accelerated in situ remediation approach adaptable for use at any construction site to cost-effectively remove HMW-PAHs and metals from clayey soil. The results showed that an in situ electrochemical treatment that augments electrokinetics with hydrogen peroxide (H₂O₂) can replace excavation and disposal as a means of addressing clayey soils co-contaminated with HMW-PAHs and metals. [Read more...](#)



Freight

A smart truck parking monitoring and calibration system empowered by machine learning



Research team: [Yinhai Wang](#) (UW) | [Karthik Murthy](#) (WSDOT) | [Doug Brodin](#) (WSDOT)

Sponsor: WSDOT

Ongoing: Current systems that determine parking lot occupancy to inform drivers of available spaces have issues related to calibration and accuracy. In response, this research is creating a truck parking monitoring and calibration system powered by machine learning. Rather than relying on manual calibration, which is labor intensive, inefficient, and

difficult to scale up, this research will monitor and calibrate the installed sensing system by creating a data pipeline that includes deep learning and cooperative AI methods. For the developed system, counting data will be obtained by sensors installed at the entrance and exit of a truck parking lot. Then real-time parking occupancy will be calculated. The cooperative AI calibration component will generate a calibrated occupancy result, confidence rate, sensing system status, and calibration recommendations. [Read more...](#)

Maintenance

Review and summary of pre-wet methods and procedures

Research team: [Xianming Shi](#) (WSU)

Sponsors: Clear Roads Pooled Fund | Minnesota Department of Transportation

[Report](#)

Completed: Pre-wetting is an important part of the toolbox for winter road maintenance operations. Pre-wetted material stays on the road surface longer, produces less bounce and scatter, and resists traffic action. Field experience has suggested typical savings of 25 to 30 percent less

salt when pre-wetted salt has been used. The goal of this project was to compile a summary of pre-wetting practices, including equipment, materials, methods, and application rates, and to identify the history of successes and failures that have contributed to current practices. The researchers employed a comprehensive literature review, an online survey of winter road maintenance practitioners, interviews and case studies of nine agencies, and outreach to six equipment manufacturers and distributors. Through a synthesis of current and best practices, the project produced preliminary guidelines and recommendations based on trial-and-error and field experience. [Read more...](#)



Multimodal Transportation

Transportation Data Equity Initiative, Phases 2 and 3



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

Sponsor: USDOT

Ongoing: Detailed, accurate data about pedestrian spaces, travel environments, and travel services are crucial for trip planners, trip concierges, and mobile wayfinding applications—particularly those that serve the needs of people with disabilities, older adults, and rural populations. However, the necessary data are not collected, stored in standardized formats, or published in ways that navigation apps can access. This

project is addressing travel inequities by developing a national pipeline of data intended to help all people navigate sidewalks and transit stations more easily. The project will also extend the national data standards for on-demand transit services (GTFS-Flex), for pedestrian paths (OpenSidewalks), 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: a multi-modal, accessible travel planner (an extension of AccessMap); Microsoft's Soundscape application, which helps blind and low-vision people navigate the environment; and an auditory navigation tool called Audium intended to help low-vision individuals navigate transit centers. The project will be deployed in six counties: two each in Maryland, Oregon, and Washington state. [Read more...](#)

Transportation Planning

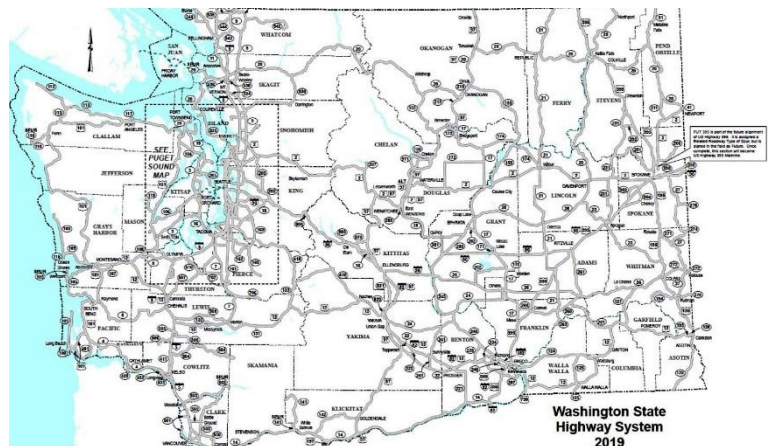
Community engagement support for WSDOT's Highway System Plan update

Research team: [Mark Hallenbeck \(UW\)](#) | [Anne Vernez Moudon \(UW\)](#) | [Jeremy Jewkes \(WSDOT\)](#) | [Jon Peterson \(WSDOT\)](#)

Sponsor: WSDOT

[WA-RD 911.1](#)

Completed: This project conducted a statewide community outreach effort designed to inform WSDOT about the transportation spending priorities of state residents as part of WSDOT's update of the Highway System Plan. The Highway System Plan (HSP) defines the state's vision for preserving, maintaining, improving, and operating state highways in Washington. The updated plan will cover years 2027 to 2046. Over 1,400 state residents completed a survey designed to understand Washington state residents' relative priorities for transportation funding. The survey results indicated that respondents' highest priority was repair activities. [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. [Sign up here](#) to receive announcements for future Webinar Wednesday sessions. [Previous webinars are available for access here.](#)

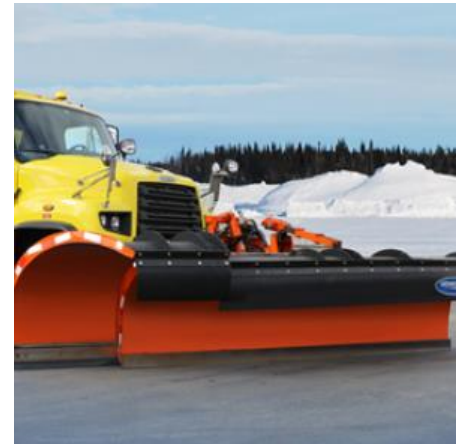
Below is information about WSDOT's most recent research webinar:

Innovating on the job: WSDOT's extendable front snowplow (August)

[Access the recording](#)

Presenter: James Morin, WSDOT Maintenance Operations Branch Manager

This webinar focused on a grassroots innovation from frontline maintenance workers in WSDOT's Eastern Region. Learn about how the extendable plow came to be developed and some preliminary findings on how it has been working in the field. Winner of this year's Maintenance and Operations Innovation Challenge at WSDOT, the plow extends beyond the length of a standard snowplow while "on the fly" to do the same work as a wing plow, and it is easily retracted when drivers approach bridges or narrow shoulders.



TRAC e-News will be delivered about three times a year. For more information about TRAC and the groundbreaking 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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