TRANSPORTATION RESEARCH AND EDUCATION CENTER

2024

ANNUAL REPORT

Portland State
UNIVERSITY

FROM THE DIRECTOR
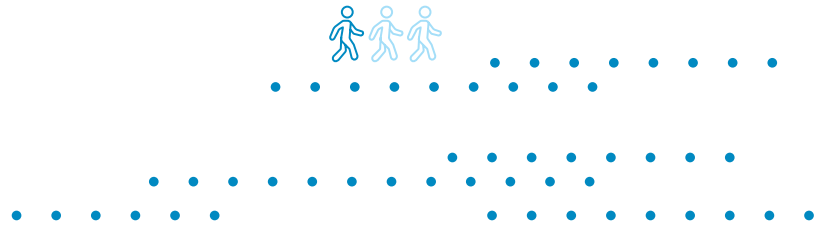
TREC and the transportation programs on campus play a vital role in PSU's mission as an urban-serving research university. We are producing innovative research that makes a difference in practice and policy, supporting and engaging undergraduate and graduate students, and providing lifelong learning opportunities for K-12 students through to professionals of all ages.

2024 marked the end of our federal university transportation center grant for the National Institute for Transportation and Communities (NITC), a partnership with University of Oregon, Oregon Tech, University of Utah, University of Arizona, and University of Texas, Arlington. Looking back on NITC's 12-year history, I am proud of the impact of our research and education programs. For example, our research provided evidence to support the inclusion of green bike boxes in the new federal Manual on Uniform Traffic Control Devices (MUTCD), making installation across the country easier. Similarly, NITC-funded research on separated bike lanes and on the economic impacts of bicycle infrastructure has provided the evidence agencies need to expand active transportation networks. Our research on how people travel in urban, multimodal areas was used to improve the ITE Trip Generation Manual to more accurately reflect the lower rates of driving in mixed-use neighborhoods. This can reduce the need for expensive mitigation and encourage more infill development. Other NITC projects helped improve VisionEval, an open-source modeling framework used by transportation agencies all around the country, to include more modes, such as active transportation, car sharing, and autonomous vehicles. NITC's funds helped PSU support over 270 students, with many of them going on to transportation careers. We also provided professional development opportunities to hundreds of practitioners in Oregon and beyond.

We've been able to build on the success of NITC to grow our activities and diversify our funding sources. In fact, in 2024 PSU received over $5.6 million

dollars in new external funding awards for transportation research and scholarships, our second highest annual amount ever. One thing that sets PSU's transportation program apart from many other universities is the diversity of disciplines involved. While much of the activity is concentrated in TREC, Civil and Environmental Engineering, and Urban Studies and Planning, we have faculty and students doing transportation research throughout campus, including in Computer Science, Engineering & Technology Management, Environmental Science & Management, the Homelessness Research & Action Collaborative, Psychology, Sociology, Special Education, Women, Gender & Sexuality Studies, and more.

This report highlights a few examples of this work from 2024 – work that would not be possible without the stellar TREC team, colleagues across campus, and our many community partners. I'm looking forward to our continued collaboration!

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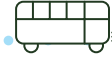
TREC 2024 BY THE NUMBERS

18,390

people attended or viewed professional development offerings

$5.6 M

in transportation research projects awarded to PSU principal investigators in 2024
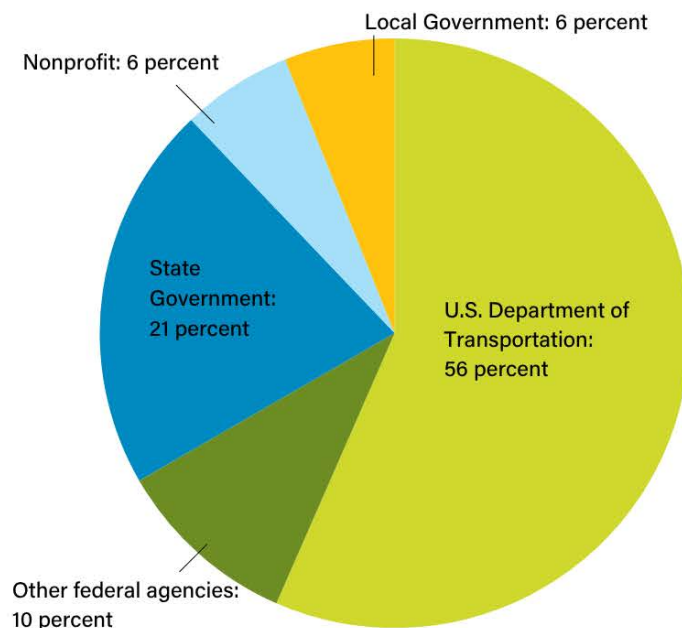
3,800+

citations of PSU transportation researchers

358

students enrolled in transportation courses
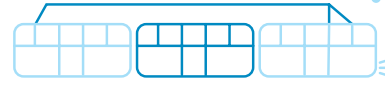
39,000+

research reports downloaded

Sources of funding, 2020–2024:

Nonprofit: 6 percent

Local Government: 6 percent

State Government: 21 percent

U.S. Department of Transportation: 56 percent

Other federal agencies: 10 percent

PROGRAM HIGHLIGHTS

COMPREHENSIVE BIKEWAY DESIGN WORKSHOP

Our annual summer Bikeway Design workshop, offered through the Initiative for Bicycle and Pedestrian Innovation (IBPI), was held August 26-30, 2024. Eighteen professionals attended, learning from local active transportation experts on topics including bicycle facility design, traffic engineering techniques that support active travel, and designing for suburban environments. The week-long workshop also included field tours of bicycle infrastructure in Portland and its surrounding communities. The final day of the workshop, students convened in PSU's Engineering Building to confer together about design problems they were currently being challenged by at work, in their home communities. "Participating in the IBPI Bikeway Design Workshop left me rejuvenated and excited to improve my own town! The magic of implementing safe, connected, and attractive bike infrastructure was revealed by the expert planners and passionate engineers leading the engaging and interactive course," said one participant.

TRANSPORTATION DATA EDUCATION

Data-driven policy and strategy are critical to meeting transportation goals, and data education for professionals is a key aspect of this. In 2024, TREC held two data education workshops: an intro to R and a workshop on SQL. Twenty-one professionals attended the R workshop, studying coding and scripting basics, learning best practices for version control, and creating data visualizations. The workshop helped attendees share their data and results with others, better manage and maintain their workflows, and transition from spreadsheets to R. In the SQL workshops, 24 participants received an introduction to relational databases. This included an overview of structured query languages, as well as instructions on how to set up a PostgreSQL database and use it to analyze data. "I liked that we were working with a live PostgreSQL installation so it's easy to keep practicing. The notes will be useful as I keep working at SQL," said one participant.

SUSTAINABLE TRANSPORTATION STUDY ABROAD

With the support of ScanDesign Foundation, this year our annual study abroad program took us to Denmark. A class of eight students, led by Hau Hagedorn and Drusilla van Hengel, spent two weeks this summer traversing Denmark by public transportation, foot, and (of course) bike. Students came from all over the country to attend the course. What they had in common was a desire to learn from a city that is renowned to have some of the best bike infrastructure in the world and bring that knowledge back to their respective towns. Students attended lectures from a variety of transportation professionals around the country, including consultants, engineers, and architects. They rode bikes around Copenhagen and outside the city, took a ferry to Sweden and heard from the Swedish Transportation Administration, and completed course assignments tackling infrastructure challenges which focused on how the knowledge they gained from the course could be applied to cities in the U.S. context.

UNDERGRADUATE RESEARCH

The Virtual Alternative Research Experience for Undergraduates (altREU) program is funded by the National Science Foundation (NSF) and offers undergraduates experience in designing, programming, and using computers to benefit society. In summer 2024, two altREU students worked on transportation topics. Linden Faye, a math major from Hofstra University, focused on the effects of AVs on transportation networks. Using statistical analysis, geographic information systems, and data visualization, he developed and applied a strategic planning model of transportation using Portland as a case study.

Allie Hopper, studying computer science at Carleton College, focused on bicycle and pedestrian count data at intersections. Using Python and over forty thousand images from a EuroCity Persons Dataset, she trained a computer model to predict nonmotorized counts with a high degree of accuracy. She shared her work with TREC's PORTAL Users Group, and contributed to the development of PORTAL and BikePed Portal programs.

BETTER BLOCK PSU

The Better Block PSU Program allows PSU students to support community projects. In 2024, several Better Block PSU projects advanced through planning, engineering, and implementation stages. A notable example is the Steel Bridge Skatepark. Better Block PSU students had created a set of design options, a weighted decision matrix, and other plans for the site. Their work provided a basis for ongoing conversations with stakeholders around the project, which ultimately resulted in a green light: Funding for the new skatepark was announced in January by Commissioner Dan Ryan, who oversees Portland Parks & Recreation.

Meanwhile, for the International School of Portland, PSU students redesigned a segment of SW Sheridan Street to improve walking and biking access to the school's campus. And during the upcoming closure of Portland's Burnside Bridge, the neighborhood anticipates reimagining West Burnside Street. Students in the Better Block PSU program outlined several possible design approaches in partnership with the neighborhood associations.

GRADUATE WORK

Master of Urban & Regional Planning (MURP) workshop projects let students work with real-world clients. Two MURP groups developed transportation plans, as students engage with communities to meet their mobility needs. One 2024 MURP group created a Bike and Pedestrian Implementation Strategy for the City of Hillsboro, Oregon, developing an actionable approach to expand and improve the City's active transportation network. A second group of MURP students identified and designed multimodal improvements for Portland's Sandy Boulevard.

Maseeh College of Engineering & Computer Science Capstone projects also allow students to work with community clients on real-world projects with an impact. Civil & Environmental Engineering Capstone projects in 2024 covered a range of topics, including working with Portland Public Schools on Bike Improvements in the Beaumont-Wilshire Neighborhood, and working with ODOT to improve resilience for a hazardous landslide site on Interstate 84.

2024

Eleven PSU students attended the annual meeting of the Transportation Research Board (TRB), where three of them – engineering graduate students Michael Bronson and Kayla Sorenson, and planning doctoral candidate Kyu Ri Kim – shared their own research.
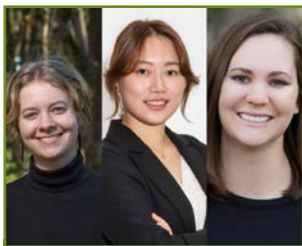
Three PSU students were awarded WTS transportation scholarships. Eun Jun Choi and Holly Querin are both graduate students in the College of Urban and Public Affairs, and Isa Swain is an undergraduate in the College of Engineering.

Kyuri Kim defended her PhD dissertation on "The Central Role of Perceived Safety in Connecting Crash Risk Factors and Walking Behavior." Kim then became an adjunct research associate at TREC working on active transportation and safety of vulnerable road users.

Toulan School Assistant Professor Ozcan Tunalilar is the inaugural recipient of the Arthur C. and Monika Z. Nelson Endowed Scholar Award, and Urban Studies doctoral candidate Minju Song of the new Nelson Endowed Doctoral Award.

JAN **MAR** **MAY**

FEB **APR** **JUN**

A new round of funding for the Portland Regional Transportation Archive Listing (PORTAL), in the amount of $1.6 million, was awarded by Oregon Metro to cover PORTAL's activities through the next five years.

Susan Handy of the University of California, Davis visited PSU to present at a Friday Transportation Seminar about the core set of ideas that are embedded in transportation practice. In a separate session on the same day, she also met with transportation students who read her book, *Shifting Gears: Toward a New Way of Thinking about Transportation*, as part of PSU's Transportation Equity Book Club.

TREC Director Jennifer Dill was named editor-in-chief of the *Transportation Research Record*, TRB's flagship journal and one of the most cited transportation journals in the world, with a mission of improving the nation's transportation system through high-quality research.

YEAR IN REVIEW

A research project led by John MacArthur with urban planning masters student Evan Howington gathered information on bike buses nationwide, inspired by the success of Sam Balto's bike bus initiative at Alameda Elementary School in Portland, Oregon.

Our Fall slate of Friday Transportation Seminars focused on decarbonization, with nine presentations from industry leaders on topics including EVs, embodied carbon and life cycle assessments for infrastructure, and state climate and energy policy.

Liang Ma, assistant professor of urban and regional planning in the College of Urban and Environmental Sciences at Peking University, visited PSU to give a presentation on the impact of daily commuting by various modes on physical and mental health.

JUL　　　　**SEP**　　　　**NOV**

AUG　　　　**OCT**　　　　**DEC**

Two undergraduate students, Linden Faye and Allie Hopper, showcased their transportation projects at PSU's Summer Research Symposium. They were participants in the Virtual Alternative Research Experience for Undergraduates on Computational Modeling.

BikePed Portal added a dashboard for the Portland, OR and Vancouver, WA metropolitan area which lets users see activity on a particular segment broken down by month, year, and day, or by individual counter.
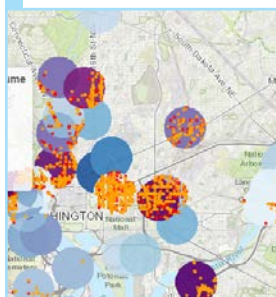
The Pacific Northwest Transportation Consortium (PacTrans) Region 10 Transportation Conference was held at the University of Idaho, with a keynote address from Eddie Curtis of FHWA.

PSU students Kayla Sorenson and Ana Tijerina Esquino, both graduate students in the Maseeh College of Engineering and Computer Science, were awarded Dwight D. Eisenhower transportation fellowships by the U.S. DOT.

RESEARCH

Removing Residual Lane Markings to Reduce Driver Confusion

Funded by the Oregon Department of Transportation (ODOT), research led by Christopher Monsere of PSU compared methods used to remove pavement markings and evaluated driver confusion when encountering "ghost lines." The study included field and video experiments, to examine the frequency with which drivers did not follow the correct markings when encountering ghost lines. Hydroblasting was found to be the most effective method in all weather and lighting conditions. Based on the results of this research, ODOT established recommendations for mandating use of hydroblasting rather than grinding in work zones, including extended wetting of lane markings prior to removal. The agency has updated its construction specbook, reflectivity standard, and traffic line manual to mandate evidence-based limits on the amount of reflective pavement material left after marking removal procedure.
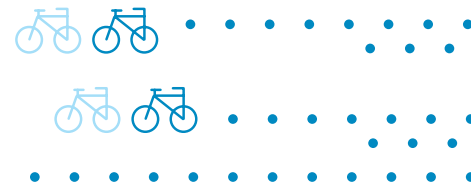

Active Transportation Data Fusion

Planners and decision-makers have increasingly voiced a need for network-wide estimates of bicycling and walking. Traditional permanent and short-term counting methods can directly provide active transportation counts, but are limited to certain locations or short periods of time. Meanwhile, crowdsourced data (such as Strava or StreetLight) can cover a wider area but with less accuracy, as they only capture a subset of users. Fusing the two methods together–potentially with the use of deep learning algorithms–is a promising way to get the best of both. PSU research since 2018 has pioneered a data fusion method which allows transportation professionals to estimate bike volumes for an entire transportation network. Building on those efforts, Sirisha Kothuri of PSU led a project in 2024 aimed at applying the method to pedestrian count estimates. The emerging method allows cities, agencies, and state DOTs to track changes in walking and bicycling mode share over time.

> **This study builds our understanding of a topic that is near and dear to the hearts of cities, riders, and micromobility operators: how to run a system that is affordable for riders while also remaining financially sustainable for micromobility operators.**

Calvin Thigpen, Director of Public Partnerships & Policy Research, Lime

Taxing Shared Micromobility

Shared micromobility (including shared electric scooters and bikes provided by private companies) is one of the newest transportation options that has come to cities in the last several decades. There have been numerous studies on cities' shared micromobility policies around parking, ridership, safety, equitable distribution of vehicles, and sustainability. By contrast, there has been little research on the taxes and fees levied on shared micromobility systems and how they work to advance or deter municipal goals for shared micromobility. John MacArthur of PSU, working with micromobility provider Lime, led a study exploring the different ways cities charge shared micromobility companies to operate and how these funds are used. Digging into how each city made the decision of what to charge, the researchers found that taxes and fees vary dramatically from city to city and may not always reflect the city's stated policy goals. The findings also reveal a trend of cities charging less for shared bicycles than for shared scooters. While cities' concerns over budget are understandable, this consideration can be at odds with cities' broader goals for supporting alternative transportation. This research offers a comprehensive look at how cities around the world are approaching the question of what to charge, and suggests strategies to ensure that a city's fee structure supports transportation policy goals.

IMPACTS

Active Transportation Counts from Existing On-Street Signal and Detection Infrastructure

Led by Sirisha Kothuri, this study's objective was to use data from existing traffic signal infrastructure to estimate pedestrian volumes. Pedestrian push-button actuations were collected from signal controller logs at 49 intersections in western Oregon and an additional 16 intersections in eastern Oregon. These actuations were then compared to observed pedestrian counts—totaling over 34,000 people, obtained from video recordings—and used to create a model of pedestrian volumes. The results suggest that existing traffic signal infrastructure data can be used to estimate pedestrian volumes in Oregon with reasonable accuracy. Using such pedestrian volume estimates can lead to improvements in pedestrian traffic monitoring, safety assessments of exposure, and equity and health analyses. Results from this research were used to update ODOT's internal signal data, and were also used in subsequent ODOT research to create a predictive pedestrian safety performance model. A dashboard incorporating ODOT's push-button data was also added to our BikePed Portal.

Homelessness: A Guide for Public Transportation

In a project funded by the Transit Cooperative Research Program (TCRP), TREC partnered with PSU's Homelessness Research and Action Collaborative (HRAC) to develop a guide for public transportation agencies and concerned stakeholders on effective approaches and best practices that are responsive to those who are experiencing homelessness. The guide is intended to be a resource to help transit agencies support people experiencing homelessness in our communities and minimize the impacts on public transportation services and facilities. TREC's Sustainable Transportation Program Manager, John MacArthur, presented insights from the study in Transportation Research Board (TRB) Webinar on March 25, 2024, sharing strategies and opportunities for transit agencies to work with local partners to be a part of helping individuals in need, while providing a safe, reliable, and customer-friendly experience for all riders. The webinar also included members of TRB's National Transit & Vulnerable Populations Workgroup.

> **There aren't many opportunities in our world to be able to do this extensive amount of design study and then have that followed by real-world analysis and evaluation. So this work has been recognized as something very unique.**

Jesse Stemmler, Design Manager and Urban Design Lead, TriMet

FX2: Division Transit Project

PSU researchers partnered with TriMet to evaluate the design of a new shared-use bus platform that incorporates a sidewalk-level bike lane. The project, led by Research Associate Nathan McNeil, assessed how well the new design is working for transit riders and other road users along Portland's Southeast Division Street. The most common bus and bike lane design typically has a bike lane directly adjacent to the right side of the bus lane with no physical barrier. This presents several safety concerns. In this scenario, a bike behind a bus would have to wait behind or pass the bus by riding into traffic. As vulnerable road users, these conflicts pose a potentially serious risk to bicyclists. The research found that after installation of the new shared-use platform, the primary conflicts which gave rise to the need for this design, including bikes moving out into automobile traffic, have been largely alleviated. Interactions between bicyclists and transit passengers generally occurred at slow speeds with each user aware of one another, negotiating for space, and only 2% of bicyclists and other micromobility users used motor vehicle travel lanes.
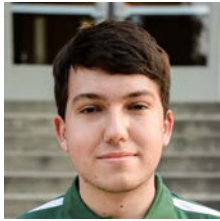
STUDENT SPOTLIGHTS

Students who worked on TREC projects, received scholarships, or served in leadership roles in 2024

Eun Jun Choi
PhD in Urban Studies, WTS Jannet Walker-Ford Leadership Legacy Scholarship

Dylan Giliberto
Master of Urban and Regional Planning, STEP Leader of Administration

Brady Hilgenberg
Master of Urban and Regional Planning, Graduate Research Assistant

Evan Howington
Master of Urban and Regional Planning, Graduate Research Assistant

Allison Kirkpatrick
Master of Urban and Regional Planning, Graduate Research Assistant

Julay Leatherman-Brooks
Masters in Computer Science, Graduate Research Assistant

Jiahui Ma
PhD in Urban Planning, Graduate Research Assistant

Joshua Miller
Master of Urban and Regional Planning, Alta Planning + Design Scholarship

Maura Paxton
Master of Urban and Regional Planning IBPI Innovation in Active Transportation Scholarship

Elias Peters
Masters in Civil Engineering & Urban & Regional Planning, STEP Communications Leader & Social Chair

Jules Mai Plotts
Masters in Urban Studies, Graduate Research Assistant

Holly Querin
Master of Urban and Regional Planning, WTS Helene M. Overly Memorial Scholarship

Pabitra Kumar Roy
Masters in Civil Engineering, STEP Future Leader of Events & Finance

Sophia Semensky
Masters in Civil Engineering, STEP Leader of Events & Finance

Saurav Kumar Singh
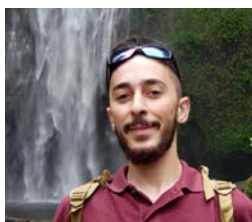Masters in Computer Science, Graduate Research Assistant

Kayla Sorenson
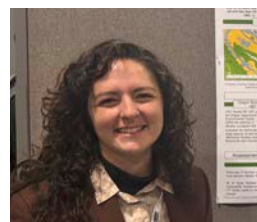PhD in Civil Engineering, Eisenhower Fellow

Isa Swain
Bachelors in Civil Engineering, WTS Molitoris Leadership Scholarship

Moe Taha
Bachelors in Civil Engineering, Walter H. Kramer Fellowship

Ana Tijerina Esquino
Masters in Civil Engineering, Eisenhower Fellow

Ken Yoneda
Master of Urban and Regional Planning, Graduate Research Assistant

ABOUT TREC

THE TRANSPORTATION RESEARCH AND EDUCATION CENTER (TREC) AT PORTLAND STATE UNIVERSITY

The Transportation Research and Education Center (TREC) at Portland State University (PSU) is a multidisciplinary hub for all things transportation.

We are home to the Initiative for Bicycle and Pedestrian Innovation (IBPI), the data programs PORTAL and BikePed Portal, the Better Block PSU program, and PSU's membership in PacTrans, the Pacific Northwest Transportation Consortium. Our continuing goal is to produce impactful research and tools for transportation decision makers, expand the diversity and capacity of the workforce, and engage students and professionals through education, seminars, and participation in research.

THE PEOPLE

TREC STAFF MEMBERS

Jennifer Dill, Director
Becca Bornstein, Events & Office Coordinator
Joe Broach, Research Associate
Basem Elazzabi, Senior Research Associate
Lacey Friedly, Communications Coordinator
Kyu Ri Kim, Adjunct Research Associate
Tammy Lee, Transportation Data Program Administrator
John MacArthur, Sustainable Transportation Program Manager
Nathan McNeil, Research Associate

PORTLAND STATE UNIVERSITY RESEARCHERS

Jason Anderson	Amy Lubitow
Tanmoy Bhowmik	John MacArthur
Joe Broach	Nathan McNeil
Jennifer Dill	Chris Monsere
Peter Dusicka	Diane Moug
Miguel Figliozzi	Amy Parker
Aaron Golub	Thomas Schumacher
Arash Khosravifar	Liming Wang
Maura Kelly	David Yang
Sirisha Kothuri	Marisa Zapata
Jenny Liu	

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2024 PUBLICATIONS FROM PSU'S TRANSPORTATION FACULTY

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Chai, E. P. Y., Jashami, H., Hurwitz, D. S., Kothuri, S., & Monsere, C. (2024). Influence of Curb Return and Crosswalk Setback on Turning Driver Decision-Making and Speed Selection. Journal of Transportation Engineering, Part A: Systems, 150(4), 04024004.

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