



PacTrans

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University Transportation Center Newsletter

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PacTrans Selected as FAST Act Federal Region 10 University Transportation Center on Mobility

December 6, 2016 – The Pacific Northwest Transportation Consortium (PacTrans) has been awarded a five-year grant from the U.S. Department of Transportation of \$14.35 million for transportation research, education, and outreach. The grant names PacTrans as one of ten regional university transportation centers across the country.

The University of Washington (UW) has led the Region 10 University Transportation center, along with consortium partners Oregon State University (OSU), University of Alaska Fairbanks (UAF), University of Idaho (UI), and Washington State University (WSU), since 1988. Through this most recent funding from the FAST Act, our consortium is excited to welcome new consortium members: Boise State University (BSU) and Gonzaga University (GU).

The PacTrans program will focus on the USDOT identified priority of Improving the Mobility of People and Goods. This priority includes the following non-exclusive topic areas:

- Increase access to opportunities that promote equity in connecting regions and communities, including urban and rural communities;
- Smart cities;
- Innovations to improve multi-modal connections, system integration, and security;
- Assistive technologies for those with physical or cognitive disabilities;
- Data modeling and analytical tools to optimize passenger and freight movements;
- Innovations in multi-modal planning and modeling for high-growth regions;
- Novel (non-traditional or alternative) modes of transport and shared use of infrastructure; and
- Regional planning and setting of transportation priorities.

PacTrans Director, Dr. Yin Hai Wang, said this award recognizes PacTrans' contribution to using technological advances to develop data-driven, sustainable solutions for the diverse transportation needs of the Pacific Northwest. "This

NEWS AND EVENTS



exciting new grant will allow us to address broader mobility challenges, of which our region certainly has many,” said Dr. Wang.

“Transportation mobility is one of the great challenges facing Washington State as we seek to remain competitive now and in the future,” said Sen. Patty Murray. “This funding will support important advances that will benefit our local communities and the nation as a whole.”

“When it comes to transportation problems, I have found that most folks want facts and data to guide decision-making,” said Rep. Rick Larsen, a senior member of the U.S. House Committee on Transportation and Infrastructure. “That is why this grant is important – it will help the UW and its PacTrans partners develop smarter transportation solutions that will help drive job growth and keep the economy moving.”

The latest grant means PacTrans has brought Region 10, which encompasses the four states of Alaska, Idaho, Oregon, and Washington, \$29 million from a single federal program in the last 5 years. The requirement that each federal dollar be matched from a nonfederal partner has leveraged that investment, creating fruitful partnerships with more than 100 agencies and organizations nationally, including each of the four states’ departments of transportation, dozens of city and county agencies, and private companies such as Kittelson and Associates, Transpo Group, DKS Associates, BMW, and Microsoft.

“Considering the transportation challenges facing America, our country needs this innovative research being done by these universities to help speed up freight movement and reduce congestion,” said Sen. Maria Cantwell.

Under the Fixing America’s Surface Transportation (FAST) Act competition, U.S. DOT received 212 applications for 35 grants creating five national centers, 10 regional centers and 20 lower-level centers. Regional centers must obtain matching funds equal to the \$14.35 million grant amount, distributed over federal fiscal years 2016 through 2020.

Potential research projects under this new grant include:

- Emerging mobility modes to improve transit accessibility for all users
- Performance-based management of shared-use facilities
- Shared infrastructure to promote non-motorized mobility
- Emerging data-enabled, network-wide traffic system control methods
- Aligning incentives to improve the efficiency of multimodal transportation systems
- Integrating electric vehicle infrastructure into long-distance mobility support
- Travel time reliability assessment methods and tools
- Optimal winter maintenance operations in urban areas
- Methods and tools for improving travel reliability during special events
- Solar energy driven wireless sensors for user and infrastructure connection
- Trusted big data sharing platform (TBDSF) for smart cities
- Internet of Things (IoT) technology test-bed for smart transportation applications

PacTrans Sponsored UW Hyperloop Team Places 4th in Nation, 6th in World

This January, the 35-member UW Hyperloop team competed against other Hyperloop teams from across the country and the world in Hawthorne, California. Last January, at the first of a series of competitions, *the UW team was identified as one of twenty-six teams* to advance to the building phase of the competition. In this competition each team's "pod" was tested on safety, design, and scalability (ease with which the design could be constructed at full size). The UW team placed 4th in the nation and 6th in the world under these criteria.

For the next competition, which will be held this summer, the focus will be on speed. "In the coming months, the UW team will likely focus on its use of composite materials in the pod's construction," said Malachi Williams, one of the directors of UW Hyperloop Team. More on this great achievement can be found in *The Seattle Times*, *The UW Daily*, *Geekwise*, and *Geekwire*.



PacTrans Represents at TRB Annual Conference

The Transportation Research Board (TRB) 96th Annual Meeting was held this past January 8–12, 2017, at the Walter E. Washington Convention Center, in Washington, D.C. The event attracted more than 12,000 transportation professionals from around the world. Those professionals hosted more than 5,000 presentations in nearly 800 sessions and workshops. This year's meeting had a spotlight theme of *Transportation Innovation: Leading the Way in an Era*

of Rapid Change, composed of three hot topics: *Transformational Technologies, Resilience, and Transportation & Public Health*.

With policy makers, administrators, practitioners, researchers, and representatives of government, industry, and academic institutions in attendance, the TRB annual meeting continues to be an excellent forum for PacTrans to demonstrate our abilities, expertise, innovation,

and research, as one of the country's leading regional University Transportation Centers (UTCs).

PacTrans student and faculty researchers were in active attendance from all five of our consortium institutions (Oregon State University, University of Alaska, Fairbanks, University of Idaho, University of Washington, and Washington State University). In total, PacTrans Universities participated in over 90 lecturns, posture sessions, workshops, committees, and subcommittees, and submitted over 100 papers to the meeting.

To read more, check out our special edition newsletter highlighting the PacTrans researchers and research that was presented during the five day convention [here](#).



Two PacTrans PIs from OSU Recognized as Outstanding ASCE Reviewers

Congratulations David and Chris!

This past year, two of our Oregon State University (OSU) PIs were recognized for their outstanding efforts with the recognition of outstanding reviewers of ASCE Journals. Dr. Chris Parrish was recognized as one of the 2016 Outstanding Reviewers of ASCE Journal of Surveying Engineering, and Dr. David Hurwitz (PacTrans associate director) was recognized

as one of the 2016 Outstanding Reviewers of ASCE Journal of Transportation Engineering, Part A: Systems. The American Society of Civil Engineering (ASCE) produces a total of 38 journals that range in topic from leadership and management in engineering to the Journal of Highway and Transportation Research and Development. Production of such



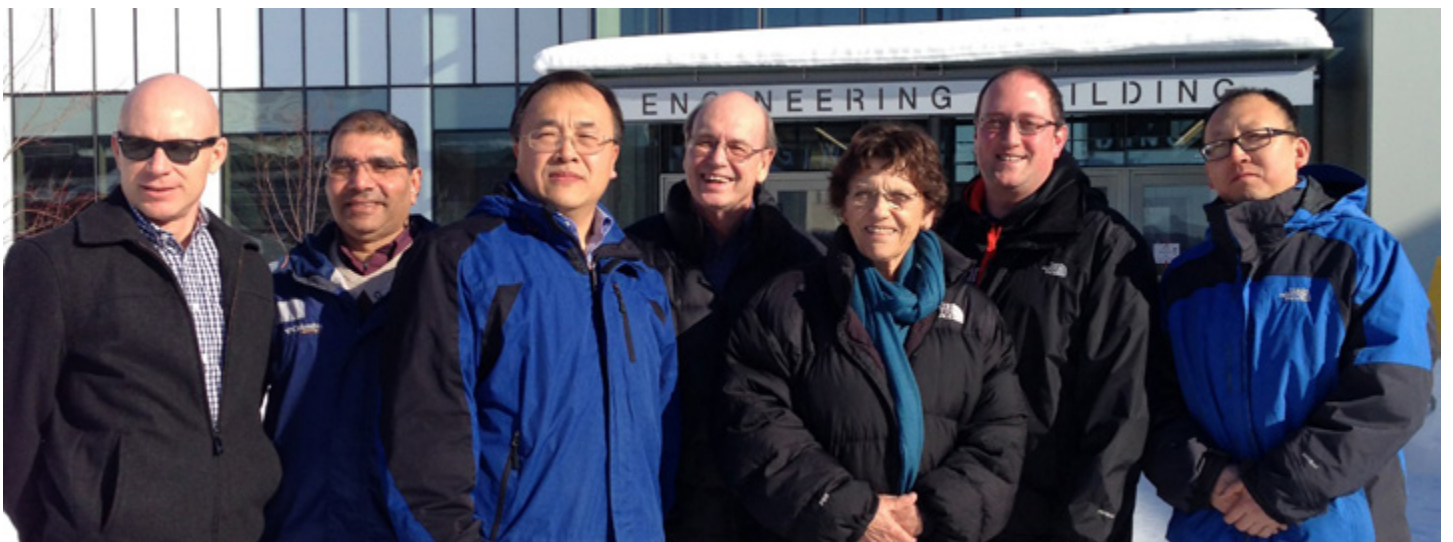
peer reviewed publications takes significant effort, both from the editors of each edition but also from the people who provide external reviews of each article. PacTrans is very proud that our PIs take this privilege and responsibility very seriously and make every effort to provide honest, productive, and timely reviews to our peers and colleagues.

PacTrans Board of Directors Retreat

With PacTrans' selection as the Federal Region 10 University Transportation Center with FAST Act funding, the Center has five more years of grant funding solidified. Thus, the Board of Directors took a several day retreat to Fairbanks, Alaska, this March to discuss the many things we've done well over the last five years and what we can improve on over the next five years. Among

topics discussed were research, education, outreach, and technology transfer.

The board took this opportunity to invite PacTrans PIs from UAF to present PacTrans funded research outcomes. We also had an opportunity for some leisure time, and PacTrans board member, Billy Connor, organized a dog sled ride for the group.



PacTrans PIs from OSU Take Part in College of Engineering Podcast

The college of Engineering at Oregon State University is currently in its second season of hosting a podcast called *Engineering Out Loud*. In this second season, their second episode featured two PacTrans PIs. Titled *By Air & By Land*, this episode interviewed PacTrans PI and OSU Associate Professor Katherine Hunter-Zaworski, and PacTrans Associate Director and OSU Associate Professor David Hurwitz about their respective areas of research.

Katherine Hunter-Zaworski studies subjects that bring the gap between transportation engineering and rehabilitation engineering. In this podcast she discusses work that efforts to help make airplane more accessible to handicapped individuals, “Importance of accessible transportation is essential for independence. Accessible transportation

enables people to get an education, to go to work, to live independently, and really to have full inclusion.”

David Hurwitz spends significant amounts of time and research power exploring the interaction between vehicles and bicycles. His lab has both a vehicle simulator and a bicycle simulator. In these simulations they can preprogram a series of interactions and have specialized equipment that allows them to observe where the participant’s vision is focused and for how long in each situation.

With our new FAST Act grant focusing on Mobility in the Pacific Northwest, both of these researchers and their work are well situated to make significant contributions to our larger impact.

“Mixed mode conflicts tend to be more severe than other types of crash conflicts, in part because of the lack of safety equipment that a pedestrian or a bicyclists has access to. They’re not surrounded by thousands of pounds of crash designed vehicle systems...so they’re at risk. They are what some would term “vulnerable populations.”



Kate Hunter-Zaworski (OSU)



David Hurwitz (OSU)

A PacTrans Funded Project on UAVs is Making Headlines

Several years ago, PacTrans funded a multi-institution project that incorporated PIs from three of PacTrans five consortium institutions.

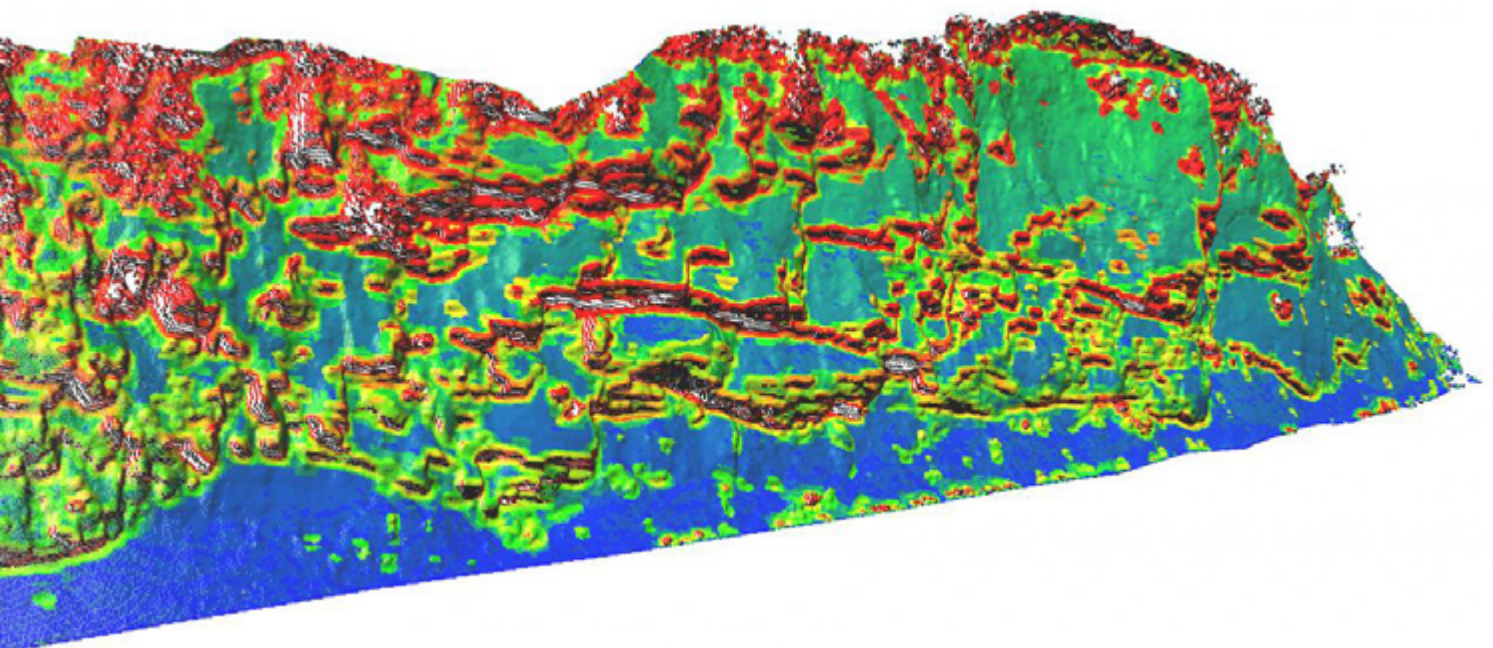
Keith Cunningham from the University of Alaska Fairbanks, Michael Olsen from Oregon State University, and Joe Wartman from the University of Washington, set out to develop a new, automated technology that fundamentally shifted slope asset management (risk of rock fall and land slide) from a reactive method to a proactive method. The potential benefits of such a shift, had the potential to increase speed and improve this type of risk evaluation, help protect public safety, and ultimately save money and lives.

The system has become feasible with the emergence of technology that enables new capabilities using light detection and ranging (LIDAR) technology. The “rockfall activity

index,” as it’s called, should add precision to and expedite what has, until recently, been a somewhat subjective, time-consuming process in an effort to determine just how dangerous a cliff is to the people, vehicles, roads or structures below it.

The paper that was produced from this work was just published in the Engineering Geology Journal (<http://www.sciencedirect.com/science/article/pii/S0013795216305671>) this April. It has since made headlines in: *UW Today*, *Science Daily*, *Phys.org*, *Sci News*, and *Hi Tech Days*, among others. **KEZI News** in Corvallis covered this story several weeks ago and video footage in the article is a clear and succinct explanation of the work.

PacTrans engages our PIs in two different levels of research: single-institution (or small) projects that typically have more modest budgets, and multi-institution projects that require PI collaboration within our consortium and typically have more substantial budgets. Further, all PacTrans dollars must be matched 1:1 from external sources. This project was concurrently funded by the National Science Foundation and the Alaska Department of Transportation and Public Facilities. Thank you to everyone’s efforts...great work!



STUDENTS

PacTrans Hosts Visiting Prospective Graduate Students

Each year, the Civil Engineering department at the University of Washington invites prospective graduate students to come visit campus.

The transportation students spend the day attending meetings with each individual transportation faculty, they go on a campus tour with several current students, and they eat lunch and dinner with the faculty and current graduate students. It's a great opportunity to showcase all of the great things we are engaged in, it allows faculty

to meet new prospective RAs and TAs, and specifically in the case of PacTrans, offers us an opportunity to meet with prospective PacTrans fellows.

Each year, PacTrans offers four or five students who have been accepted to the program, a fellowship that will cover the four quarter Master's program. These students

are required to maintain excellent grades and serve in an internship position. The fellowship is geared toward encouraging those top tier students who typically to get accepted to all of the best programs in the country, to come to the University of Washington.



PacTrans Regional Transportation Seminar with Prof. Terry Friesz

This past March, PacTrans hosted our quarterly Regional Transportation Seminar. This is a seminar that is held at one consortium member campus but then is live streamed via YouTube so that other consortium partners can listen in and participate. For this winter quarter's seminar, the University of Washington hosted Dr. Terry Friesz.

Terry L. Friesz is the Harold and Inge Marcus Chaired Professor of Industrial Engineering at Penn State, where he also Director of the Center for Service Enterprise Engineering. He has previously been a faculty member at MIT, George

Mason University, and the University of Pennsylvania, where he held the UPS Foundation Chair in Transportation. Dr. Friesz' seminar was titled *The History, Frontier and Interdisciplinary Impact of Dynamic Traffic Assignment Research*, where he talked about some of the history of dynamic traffic assignment research, with emphasis on dynamic user equilibrium and parallel developments in the theory of dynamic noncooperative games. In particular, he presented some simple dynamic congestion games using the notion of differential variational inequalities. He also



discussed how other applications, including revenue management and supply chains, may be similarly modelled. The presentation included algorithms and numerical examples, as well as remarks about the future of model-based transportation planning.

Shinji Tanaka Seminar

On top of the Regional Transportation Seminars, PacTrans also regularly hosts seminars at the single institution level. These seminars are generally geared toward an individual lab with invitation sent out to the broader academic community, but they are not made available via webinar. So, for example, this past March, the University of Washington hosted

Dr. Shinji Tanaka, associate professor of engineering at Yokohama National University in Japan. Dr. Tanaka focuses in traffic engineering, traffic operations and control, and intelligent transportation systems.

His seminar was titled, *Recent traffic operation and control in Japan: from construction to utilization*, where he discussed the population in Japan

that began decreasing from 2008. "We cannot expect sufficient amount of budget any more to invest in a lot of infrastructure development as before. Therefore, we have to think of not to construct new roads but to utilize existing ones in efficient ways. In this context, temporal and spatial management of road infrastructure would be an important idea."

In this presentation, Dr. Tanaka presented recent practice of traffic operation and control in Japan as well as some related research activities in YNU. His talk included general state of conditions and practice for freeways, highway operations and control as well as parking management systems. Finally he discussed more innovative solution in these areas that integrated ITS technologies.



PacTrans Student Researchers Assist FHWA with New Travel Time Reliability Data Guide

Currently, researchers in the Smart Transportation Applications and Research Laboratory (STAR Lab) are working on development of a travel time reliability data guide (RDG) for the Federal Highway Administration (FHWA). The project team also includes members from Carnegie Mellon University and Leidos. The main purpose of the RDG is to help anyone who may ever need to do a study on travel reliability work with the data they need to complete their analyses from start (e.g., data collection) to finish (proper interpretation of results). Put simply travel time reliability is a measure of consistency in travel time along a certain path. It has been an area receiving increased attention after it was selected as a focus area under the second Strategic Highway Research Program (SHRP 2).

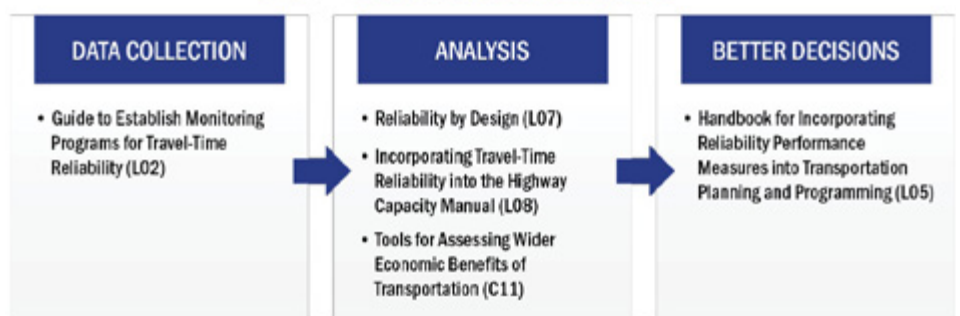
An important operational measure, reliability is a critical metric as it can help allow road users to better plan their travel. For instance, a traveler from a suburban area to a downtown central business district would likely prefer to know their trip will take them one hour the vast majority of the time (even if the trip could be completed in a shorter time when considering only distance and not congestion level), than having no knowledge of how long of a trip they may be in for. Hence, travel time reliability is often studied by constructing distributions of travel times along certain routes that occur under a variety of conditions. Such distributions then allow inferences to be made; for example, “on route

X, 95% of the travel times during the morning peak period on weekdays are less than Y minutes.”

With little thought, one can imagine numerous factors that can affect travel time reliability including weather, special events, work zones, incidents, inadequate base capacity, fluctuations in demand, and traffic control devices. Each of these factors has the ability to increase travel time on a certain route, or even network wide, beyond what would be experienced under ideal or freeflow conditions. Further, the magnitude of the factor and interaction between multiple factors can make it such that different travel times along the same route are observable under different conditions.

As such, analysts studying reliability must answer a variety of questions about these factors in order to complete a proper, data-driven analysis of travel time reliability. For instance, they must decide what kind

of data to acquire (e.g., crash data, weather data, volume data, etc.), where to get the data from, how to aggregate the data (what if weather data is only provided hourly, but traffic volume data is available every five minutes?, what if data are missing for certain time periods?), how to compute travel time (in many cases, travel times are not directly measured and only average speeds along adjacent segments are available), what metrics to analyze, and many others. Ultimately, however, most questions deal with collection, storage, cleaning, aggregating, processing/modeling, and interpretation of diverse, multi-source data. How to answer these questions properly and how to provide a uniform means of analyzing travel time reliability that is accessible to people with varying backgrounds and understandings of statistics and data science is precisely the goal of the RDG.



TECHNOLOGY TRANSFER

PacTrans Met with Several Other Potential Partners



PacTrans director, Yin Hai Wang, regularly meets with potential collaborators to talk about opportunities to partner with our center. We have many opportunities for partnership including: partner on a research project, serve on an advisory board or review board, fund match on a research project, sponsor/help facilitate events (i.e. seminars, conferences, and workshops), offer graduate student internship opportunities, or take part in technology transfer. During this past winter quarter, two such meetings included DiDi and Sound Transit.

DiDi Chuxing is a ride-share company that originated in China and is very similar to Uber. Headquartered in Beijing, they have over 400 million users and operate across 400 cities in China. They have about a dozen different mobility service options and have recently

began reaching internationally for customer cities. Dr. Wang met with DiDi to discuss many of the projects currently under development in his STAR Lab, including mobile sensors, collision detection software, and the DRIVE Net data analytics platform, amongst others.

Sound Transit is one of a number of transit agencies operating in the Puget Sound Region. They operate both spines of the LINK light rail, the Sounder commuter rail, and a number of bus routes across all four counties in the region. Dr. Wang met with representatives of Sound Transit to discuss his smart road sticker which is a connected technology that allows the collection of many different kinds of information that can then be communicated to other stickers, other infrastructure, or to a central data center in real time.

PacTrans is always excited for the prospect of new collaborators. If you, your company, your agency, or your constituency are interested in chatting about such opportunities please visit our website and contact us, www.pactrans.org!

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SAVE THE DATE: UPCOMING PACTRANS EVENTS

PacTrans Regional Transportation Conference | Friday, October 6, 2017

Location: University of Washington campus

Region X Student Conference | Saturday, October 7, 2017

Location: University of Washington campus

The Pacific Northwest Transportation Consortium (PacTrans) is the Region 10 University Transportation Center (UTC) established in January 2012 with a \$6.89 million grant from the US Department of Transportation (USDOT).

PacTrans is a coalition of transportation professionals and educators from Oregon State University (OSU), the University of Alaska Fairbanks (UAF), University of Idaho (UI), University of Washington (UW), and Washington State University (WSU). With dual themes of safety and sustainability, PacTrans serves as an engine and showcase for research, education, and workforce development in the Pacific Northwest.

The goal of PacTrans is to create an environment where consortium universities and transportation agencies within Region 10 work together

synergistically. The solutions that we develop will meet the needs of the region and provide direction for the five strategic goals of the U.S. Department of Transportation.

- Safety
- State of good repair
- Livable communities
- Environmental sustainability
- Economic competitiveness

The Pacific Northwest offers a unique blend of opportunities to examine a variety of transportation issues, including those related to urban centers, rural communities,

diverse geographic features (e.g., coastal plains, mountain ranges), and a growing population of pedestrians and bicyclists. This diversity makes the Pacific Northwest a natural laboratory in which to investigate transportation solutions that are applicable both locally and nationally.

PacTrans is dedicated to collaborating with transportation agencies, companies, and research institutions to jointly develop safe and sustain-able solutions for the diverse transportation needs of the Pacific Northwest.

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