



Program Progress Performance Report for University Transportation Center at Portland State University

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Consortia members: Portland State University (PSU), Oregon Institute of Technology (OR Tech), University of Arizona (UA), University of Oregon (UO), University of Texas at Arlington (UTA), University of Utah (UU)

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Signature:

A handwritten signature in black ink, appearing to read 'J. Dill'.

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1 ACCOMPLISHMENTS: *What was done? What was learned?*

The information provided in this section allows the OST-R grants official to assess whether satisfactory progress has been made during the reporting period.

1.1 What are the major goals of the program?

The major goals for NITC as described in our application fall into six categories:

1.1.1 *Research*

Build and extend existing research through Year 1 projects. The first year of funding will support projects that extend some of our existing work and use a competitive peer-review process to select additional projects proposed by researchers of our consortium.

Competitive, peer-review project selection process in Years 2 through 5. Our projects in Years 2 through 5 will be selected through a competitive request for proposal (RFP) process. These funds will be available for projects consistent with our theme.

Pooled-Fund Research. In addition to the regular RFP, we will continue the Pooled-Fund Research program.

1.1.2 *Leadership*

High Standing within National and International Arenas of Transportation. NITC faculty are well regarded nationally and internationally as leaders in their fields. They will continue to demonstrate this leadership by disseminating their research within and outside of academia, including professional, technical and general publications and other media.

NITC faculty help address national transportation problems through volunteer leadership on TRB committees and in other positions. By serving on these committees, faculty help set national research agendas and connect with agency leaders and practitioners on pressing research issues. To continue and reinforce this practice, NITC will mentor our new, junior faculty to apply for committee and panel membership and recognize the activities of all faculty members.

Solving Regional and National Transportation Problems. NITC researchers have a long history of conducting research that is useful in solving the problems practitioners and decision-makers face every day. NITC's director and staff will serve as points of contact for agency leaders and policymakers regionally, statewide and nationally. When we identify needs that match the expertise of our researchers, we will make a connection. We will work with key staff at the DOT modal administrations, both in Washington, D.C. and within our regions to determine the most effective way for our researchers to learn from and inform agency activities.

Future Leaders. We recognize the investment we must make in our young faculty and students by prioritizing research projects that include them. We will also support students traveling to conferences to present their work, a key activity in developing the next generation of leaders.

Development and Delivery of Programs. We demonstrate our leadership in innovating transportation education, workforce development, deployment of research results and conducting research.

1.1.3 *Education and Workforce Development*

Offer Degrees and Courses in Multiple Disciplines. NITC will continue to offer a rich array of degrees that serve the transportation profession.

Provide Experiential Learning. A key component of our education strategy is experiential learning, which will help attract and retain students. Our campuses will continue to provide these opportunities, and NITC will seek ways to expand them.

Develop Innovative New Curriculum and Learning Opportunities. We will develop new, innovative curriculum consistent with transportation and livable communities that can be tested and shared among NITC and other universities.

Educate Professionals. NITC will maintain a vibrant program of seminars, workshops, professional courses and other training opportunities that provide transportation practitioners with the latest tools and techniques.

Attract and Support Undergraduate Students. NITC will support projects and initiatives that expose middle- and high-school students to transportation concepts and careers. The efforts aim to attract and retain new undergraduate students to our degree programs, involve undergraduates in our research, increase the number of women and students of color in these programs, and expand the diversity and capacity of the transportation workforce.

Attract and Support Graduate Students. NITC will support graduate students directly through research assistantships working on projects. We will provide dissertation fellowships for students to research surface transportation topics that fit under the NITC theme. This will be a competitive process open to Ph.D. students at NITC universities.

1.1.4 *Technology Transfer*

Move Research into Practice. Each research project will include a well-defined scope of work that identifies the problem the research will solve, how the research will address the problem and how the results will be implemented. We will continue our practice of having every final report peer reviewed by at least one academic or practitioner with relevant knowledge. We recognize that many researchers do not have the right skills and knowledge of practice to help with implementing research results. Rather, we need to bridge research and practice with a liaison who can interpret results and identify, who and how it can be best applied in practice.

Use Innovative Approaches to Communicate Research Results. NITC will embark on an ambitious program of sharing information through traditional and new media.

1.1.5 *Collaboration*

Collaborating within our consortium. NITC's governance structure is cooperative and leadership is distributed. The Executive Committee includes one faculty member from each campus. The Executive Committee provides overall direction for the Center, makes project funding decisions, and selects Center award recipients, including student of the year. They will meet in person at least once a year, rotating the location between campuses, and hold regular conference calls. Each Executive Committee member will be responsible for representing and supporting their respective campus.

External collaboration. In addition to the partnerships that occur through individual projects and the pooled-fund program, NITC will foster collaboration with a range of "end-users" of our work through an External Advisory Board. As the National UTC for improving the mobility of people and goods, NITC will work with OST-R staff to foster collaboration between all the UTCs focusing on this DOT priority. Primary aims of this effort will be to avoid duplication of efforts and identify opportunities to collaborate between UTCs.

1.1.6 *Diversity*

Attract underrepresented students to transportation careers. We aim to attract underrepresented students to transportation through programs that target middle, high-school, or elementary school students. We do this by providing extra funds to researchers who engage underrepresented students in their projects, collaborating with STEM, WTS and education experts, and expanding our National Summer Transportation Institute Program (NSTI) to our partner campuses.

Priority funding to research with an equity focus. We give priority to funding research projects that have an equity focus by awarding them additional points in the RFP process.

1.2 What was accomplished under these goals?

1.2.1 Research

Build and extend existing research through Year 1 projects.

Twenty-three research projects were funded during Year 1 (2017). These projects included the first set of 11 Initial Research Projects that engage 22 researchers from our consortium members. Seven (64%) involve more than one partner university, demonstrating our commitment to collaboration. The total project funding was close to \$2 million. Nine of these projects started in the summer of 2017 and are, on average, 20% completed. Two projects have been delayed and are slated to start in late 2018 ([Appendix, Table 1](#)).

In 2017, NITC also issued the first RFPs for **General Research** and **Small Starts** grants. The General Research grants support larger scale projects while the Small Starts grants fund researchers who are interested in transportation but have not yet had the opportunity to undertake a small project that is consistent with NITC's theme.

- For the **General Research RFP** (Spring 2017, Round 1), NITC received 22 proposals, requesting a total of \$1,531,114 in funding. The Executive Committee selected **six projects**, ranging in funding requests from \$39,932 to \$99,764, for a total of \$437,762, requiring a 1:2 match (Table 1). These projects started in September 2017 and are, on average, 33% completed.
- The **Small Starts RFP** (Fall 2017, Round 1) drew 13 proposals from which the Executive Committee reviewed and funded **six projects**. The budget for these projects are \$20,000 each in addition to a 1:1 match (Table 1). These projects started in late 2017 or early 2018 and are, on average, 18% completed.

The 23 projects funded engage 43 different investigators from 10 different disciplines (Architecture, Computer Science, Economics, Education, Engineering, Geography, Mathematics, Planning, Social Work, Sociology). The research addresses all four focus areas of our Center, including

- **Increasing Access to Opportunities** (*Equity*)
- **Improving Multi-Modal Planning and Shared Use of Infrastructure** (*Multi-Modal*)
- **Advancing Innovation and Smart Cities** (*Smart Cities*), and
- **Developing Data, Models, and Tools** (*Models & Tools*).

The majority of funded projects will contribute broadly to NITC's theme as illustrated by the fact that 78% (18) address more than one of our focus areas (Figure 1).

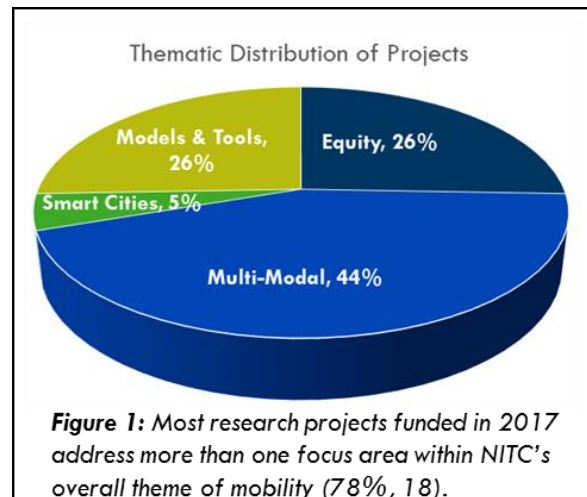


Table 1: Research Projects in Progress (Projects selected in 2017 through competitive peer review).

Grant	Project Title	Investigators ('Lead)	Univ. ('Lead)
General Research (Round 1)	Updating and Expanding LRT/BRT/SCT/CRT Data and Analysis	Arthur Chris Nelson*	UA
	Life-space mobility and aging in place	Ivis Garcia Zambrana* & Keith Dias Moore (UU); Alan DeLaTorre (PSU)	UU*, PSU
	Understanding Factors Affecting Arterial Reliability Performance Metrics	Avinash Unnikrishnan* & Sirisha Kothuri	PSU
	Planning in gateway and amenity communities: understanding unique challenges associate with transportation, mobility, and access to opportunity	Danya Rumore* (UU) & Philip Stoker (UA)	UU*, UA
	Developing Data, Models, and Tools to Enhance Transportation Equity	Amy Lubitow* & Julius McGee (PSU); Raoul Lievanos (UO)	PSU*, UO
	Universally Accessible Trail Improvement with Naturally Occurring, Sustainable Materials	Matthew Sleep*	Oregon Tech
Small Starts (Round 1)	A Decentralized Network Consensus Control Approach for Urban Traffic Signal Optimization	Gerardo Lafferriere*	PSU
	Is there a "buy local" case for lower travel speeds? Testing differences in driver recognition of local versus national retail at different travel speeds	Jonathan Bean* & Arlie Adkins	UA
	How Will Autonomous Vehicles Change Local Government Budgeting and Finance? A Case Study of Solid Waste, Drop-off/Pick-up Zones, and Parking.	Benjamin Clark*	UO
	Vehicle Sensor Data (VSD) Based Traffic Control in Connected Automated Vehicle (CAV) Environment	Xianfeng Yang*	UU
	How can interdisciplinary teams leverage emerging technologies to respond to transportation infrastructure needs? A mixed-methods evaluation of civil engineers, urban planning, and social workers' perspectives.	Noelle Fields* & Courtney Cronley, Kate Hyn, Stephen Mattingly	UTA
	A Comprehensive Examination of Electronic Wayfinding Technology for Visually Impaired Travelers in an Urban Environment	Martin Swobodzinski* & Amy Parker	PSU

Competitive, peer-review project selection process in Years 2-5

On February 1, 2018, NITC issued its second RFP (Round 2) for its **General Research Grant**. As with all research proposals, NITC requires that proposals fit within the NITC theme of improving mobility of people and goods to build strong communities. Forty-four abstracts were received in April. Proposals are due on May 1st, and funding decisions will be reported in the next PPPR.

Transportation for Livable Communities Pooled-Fund Research.

NITC issued a call for Problem Statements to regional and local agencies. Problem statements are due May 15, 2018. Once the problem statement is selected, we expect to issue the RFP proposals in late summer. These steps will be detailed in the next PPPR.

1.2.2 Leadership

High Standing within National and International Arenas of Transportation.

Many of the consortium's faculty members and students serve on national committees and panels and other volunteer positions.

- Faculty members and students at the six NITC member campuses currently hold 70 TRB volunteer memberships and serve on 59 different TRB committees/task forces and 11 different NCHRP/SHRP2/NCFRP/TRB panels. Three faculty members serve as Chair or Co-Chair on panels or

committees.

- Fifteen NITC faculty and staff serve on editorial, policy and other advisory boards.
- NITC staff are active in the AASHTO-RAC liaison group.
- NITC faculty are part of the team (led by ICF International) that developed FHWA's Strategic Agenda for Pedestrian and Bicycle Transportation.
- NITC's Director, Jennifer Dill, serves on the Board of Trustees for the Transit Center and on the Board of Advisors, UC Davis Institute of Transportation Studies.

Shape national & international conversations on transportation research and education.

NITC researchers provided a significant presence at the **2018 TRB meeting** in Washington, DC. NITC consortium members disseminated their research findings in 25 lectern sessions, 55 posters, and 3 workshops. The diversity of contributors also highlighted NITC's commitment to support current and future leaders in transportation research. Presenters included seasoned and early career academics, research associates and students. Eighteen students presented research projects; students were lead authors on all of the projects they presented. A total of 36 students (6 undergraduate, 11 Masters, and 19 Ph.D. students) were able to attend TRB with NITC support. The Transportation and Land Development Committee awarded the best paper to Keunhyn Park, a Ph.D. student from UU, for his research stemming out of the NITC project, ***Does Compact Development Increase or Reduce Traffic Congestion?*** (PI: Reid Ewing). Keunhyn will be moving on to a tenure-track position at Utah State University in the Fall of 2018.

NITC's director, Jennifer Dill, continues to provide leadership through a variety of activities. During this reporting period, she shared her expertise on the **panels "Beyond Bike Lanes on the Ground,"** held at the National Association of City Transportation Officials conference (Chicago, IL, Oct 31-Nov 2, 2017), and **"Achieving Equity Goals,"** held at the North American Bikeshare Association Conference (Chicago, IL, Aug 30-Sept 1, 2017). She was also the **Co-Chair of the Active Living Research Conference**, held in Banff, Alberta, Canada, February 2018, and a member of the **Planning Committee for Advancing Obesity Solutions through Investments in the Built Environment and Transportation: A Workshop** organized by the National Academies of Sciences (Sept. 12, 2017).

Solving Regional and National Transportation Problems.

While all our funded projects are still underway, already promising results are emerging. Here are some examples:

- **Arthur Chris Nelson, UA, (Updating and Expanding LRT/BRT/SCT/CRT Data and Analysis)** expands on his previous NITC work that resulted in numerous publications that had direct implications for planners. This project uses newly released HUD housing affordability data, transit station proximity, and median household transportation costs to provide a comprehensive assessment of outcomes between the Great Recession and early recovery into the period of relative economic stability. In addition, Nelson will make his database freely available to other researchers, which will allow them to conduct micro-level analysis as well as in-depth longitudinal and comparative analyses he will not provide (see [1.2.4 Technology Transfer](#)). Although his project is only 45% completed, he has already shared his work and insights through eight presentations at TRB 2018 and seven publications in peer reviewed journals or proceedings.
- **Cathy Liu, UU**, and collaborators are developing a **Social-Transportation Analytic Toolbox (STAT) for Transit Networks** that will assist agencies in evaluating the overall system performance and identifying existing public transit connectivity gaps, particularly for disadvantaged populations in reaching essential services. It can also act as a decision support tool for recommending improvements (e.g., prioritize the stations and routes, identify the necessity for introducing a new line within existing infrastructure, etc.). The research project will identify several important aspects of travel time estimation in arterial corridors, including the metrics that are currently in use by practitioners and researchers, data

requirements for quantifying the metrics, and accuracy of estimates given current practices. This project is 20% completed, and the Ph.D. student Nima Haghighi, who is working on the project, received the NSF student travel grants to attend the U.S. Semantic Technologies Symposium in Dayton, OH (March 2018). He has been working on social media analytics to discover fundamental patterns of interactions between users and transit services. Nima's paper "*Using Twitter Data for Transit Performance Assessment: A Framework for Evaluating Transit Riders' Opinions about Quality of Service Public Transport*" is currently under the first round of revision to Public Transport.

- **Ivis Garcia Zambrana, UU**, and colleagues from **UU** and **PSU** focus on better understanding the needs of older adults to improve service delivery for this demographic group in the project **Life-Space Mobility and Aging in Place**. The outcomes of this project will help inform the planning and decisions of policy makers and planners, allowing them to address the growing need for improving the accessibility of home and community environments, including the critically important connections between individuals' homes, transit systems, and services for the elderly. During this reporting period, the team successfully developed and combined a series of survey tools and started data collection by surveying low-income older adults. Initial survey results indicate that home modifications have positive influences on the mobility of older adults not only inside the house but also on their ability to go outside and sustain social connections, addressing the challenges in the built environment for aging in place.

1.2.3 Education and Workforce Development

Offer Degrees and Courses in Multiple Disciplines.

The six-university consortium offers a total of **1 certificate, 13 bachelor, 26 graduate and 8 PhD programs** in transportation and closely related fields, including several dual degree options. **Seven** of the programs offered by the **UTA** also receive support from other U.S.DOT funded UTC programs.

Provide Experiential Learning.

Our campuses continue to incorporate access to community partners and employment opportunities in a number of ways. This includes the support for **student groups** on each of our partner campuses. Under the guidance of the Executive Committee member, each group is able to set its own agenda and priority to cater to its unique student body, goals, and interests.

During this reporting period, **PSU's** student group, **STEP-ITE**, was supported by MAP-21 funds, and the group's activity is reported in the PPPR prepared for NITC's MAP-21 grant.

The **Oregon Tech** student group, **ITE**, focuses on getting students involved in the professional community and events. Specific activities of the group include the following:

- Professional networking events:
 - Kittelson & Associates' Careers in Transportation Night (23 students)
 - ASCE/ITE civil engineering fall banquet (98 students)
 - ITE Oregon Section Traffic Bowl & visit to transportation firms and agencies, Portland, OR (7 students)
- Professional meetings:
 - Asphalt Pavement Association of Oregon Annual Meeting and Scholarship Banquet, Portland, OR (2 students)
 - TRB Annual Meeting 2018, Washington, DC (6 students)
 - ITE Student Leadership Summit, Oregon State University, Corvallis, OR (4 students)
 - Asphalt Pavement Association of Oregon Winter Meeting, Eugene, OR (3 students)
- Webinars:
 - TRB Webinar: "How to Survive & Thrive at TRB" (8 students)
 - AISC Webinar: "Application of NSBA Resources in Bridge Design" (13 students)
- In addition, the group invited two professionals to share their expertise:
 - "The Future of Asphalt Pavement Design," Wade Collins (24 students)

- "What's Brewing In Traffic Safety," Beth Wemple (13 students)
- "Careers in Transportation Engineering," Beth Wemple (23 students)

The **UA** student group, **ITE**, primarily used student group funds this academic year to support student attendance at conferences, including the following:

- Rocky Mountain Land Use Institute (1 student)
- TRB 2018 Annual Meeting (6 students)

The **UO** student group, **LiveMove**, organizes a diverse range of events to connect students and the public with professionals that focus on sustainable transportation.

- The group organized or co-organized these community events:
 - "Better Housing Together" Forum (250 attendees including community members, researchers, advocates, students, leaders)
 - Bike Rodeo at Mt. Vernon Elementary (98 attendees including community members & students) & Maple Elementary (104 attendees including community members & students)
- Several events engaged the campus community and/or group members:
 - Liz Jose: "Equity in Biking," campus event, co-organized with UO's Bike Program (60 students)
 - Women's Bike Maintenance class, campus event (3 students)
 - LiveMove student meetings (4 total; attended by 18, 15, 12, and 10 students)
- Three Planner's Pub sessions and one Planner's Breakfast allowed students to learn from local practitioners and included discussions with:
 - Planner's Pub: Jillian Detweiler, the Executive Director of the Street Trust, Portland, OR (25 students)
 - Planner's Pub: Monica Witzig, an Engineering Associate in Transportation Planning with Lane County Works, and Amber Bell, an Associate Planner with Lane County Land Management Division (22 students)
 - Planner's Pub: Kaarin Knudson, Project Manager, Planning Specialist, & Designer at Rowell Brokaw Architects (25 students)
 - Planners Breakfast: Shane McRhodes, Transportation Options Coordinator at City of Eugene (20 students)
- The group made it possible for students to attend three conferences:
 - AARP Age Friendly Transportation Forum, Springfield, OR (1 student)
 - Urbanism Next Conference, Portland, OR (5 students)
 - Active Transportation Summit, Portland, OR (2 students)

UTA's ITE student group works to bring together students with an interest in transportation from across different disciplines. The group organized several events and, for some, partnered with WTS and the student group of UTA's Tier 1 UTC (CTEDD Student Council).

- Events that focused on fostering cross-disciplinary and/or social relationships:
 - Bowling night (8 students)
 - Beginning of semester gathering, co-hosted with CTEDD Student Council (30 students)
 - Movie Night & Discussion, co-hosted with CTEDD Student Council & WTS (15 students)
 - Book Club, co-hosted with CTEDD Student Council (10 students)
 - Research Lab Close Shot – (4 students)
 - Autonomous shuttle field trip, City of Arlington, TX, co-hosted with WTS (25 students)
 - "Construction Projects Near Railroad Tracks," October presentation (24 students)
 - Tim Huya from BNSF Railway — at Nedderman Hall. (20 students)
 - Sustainable transportation seminar (10 students)
- The group also supported student attendance at the following conferences:
 - Transportation Research Board Annual meeting, Washington, DC (16 students; 9 students presented)
 - Association of Collegiate Schools of Planning (ACSP) meeting (4 Students)

- Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting (1 student)

The **UU** student group, **Point B**, used its student funds to organize a workshop and support student attendance at conferences:

- Regional workshop on designing protected bike intersections that was co-sponsored with WTS and Salt Lake City (27 attendees)
- Conference attendance:
 - Mountain Town & Resort Planners Summit, Jackson Hole (2 students)
 - George Wright Society annual conference in Norfolk, VA (1 student attended & presented)
 - APA National Planning Conference, New York (6 students)

The Master's in Urban Design Program (MURP) at **PSU** offers a **workshop** course that provides students with the opportunity to work on projects for community clients that lead to a professional product. Projects developed through this course have been recognized nationally. In the past 11 years, the American Institute of Certified Planners has recognized eight of them as outstanding class projects. For the 2018 Workshop, 19 students are working on three projects that have a transportation focus. The projects are still underway and will be reported in the next PPPR.

Facilitated by NITC, **PSU** started a new initiative, the **Transportation Research Internship Program (TRIP)**, that offers **PSU** students the opportunity to gain research experience in the field of transportation. The internship is open to undergraduate and graduate students, regardless of their major. TRIP is faculty-guided and offered by a local agency or non-profit. For 2018, PSU is working with Explore Washington Park (EWP) in offering 6-month internships to two students. Students will research and propose an equity definition, review EWP's equity goal of increasing visitors from underrepresented communities by 10%, and evaluate survey data.

Develop Innovative New Curriculum and Learning Opportunities.

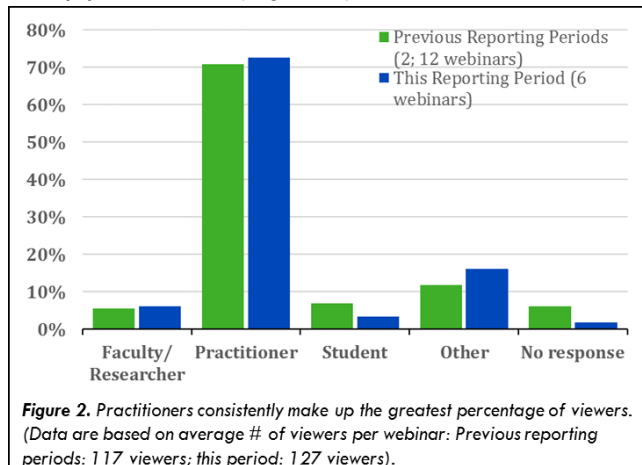
PSU is revising its current curriculum and will be offering this summer a training opportunity that targets the professional development needs of program managers in active transportation. Specific focus areas will include employer strategies to foster active transportation programs such as Safe Routes to Schools, and Sunday Parkways.

Educate Professionals.

During the reporting period, NITC supported **30 events** that were attended by **1443 professionals**. These events are detailed below.

NITC hosted **six webinars** between October 01, 2017 and March 30, 2018. The webinars, listed below, were attended by **753 individuals**, who were primarily practitioners (Figure 2).

- An Accessible Approach to Shared Streets (156 attendees)
- Ecological Momentary Assessment (EMA) Strategies, Noelle Fields, UTA (43 attendees)
- Racial Bias in Driver Yielding Behavior at Crosswalks, Kimberly Kahn, PSU (144 attendees)
- Case Studies in the FTA "Manual on Pedestrian and Bicycle Connections to Transit", Nathan McNeil, PSU (165 attendees)
- Transportation Benefits of Parking Cash-Out, Pre-Tax Commuter Benefits, and



- Parking Surtaxes, Allen Greenberg, FHWA (119 attendees)
- Bike-Ped Portal - National Bicycle and Pedestrian Count Archive, Hau Hagedorn, PSU (126 attendees)

During the academic year, **PSU** holds **Friday Transportation Seminars** that are open to the public. Seminars are also live webcasted to enable professionals and individuals across the country to participate. During this reporting period, PSU held **17 seminars** that were attended by **222 non-students**.

The **PSU's Initiative for Bicycle and Pedestrian Innovation (IBPI)** held its annual *Ann Niles Active Transportation Lecture* in November 2017. This year's speaker was Tamika Butler, Executive Director, of LA's Neighborhood Land Trust, who works in support of LGBTQA rights and fights for social justice and healthy communities. She spoke to a packed **auditorium of 200** with a wide range of backgrounds - practitioners, community members, researchers, faculty, students, advocates, and more. Her talk focused on providing the audience with a raw and uncensored picture of what it is like to be a young, gay, and black woman in America – insights that must be considered in transportation planning. To reach a broader audience, an panel interview was recorded as part of the podcast series *Why isn't anyone Talking About this?* in which Tamika Butler and Keyonda McQuarters, from *Black Girls Do Bike*, discussed equity and transportation (access the podcast [here](#)).

A **leadership roundtable of women** in transportation with Tamika Butler (**20 attendees**) sparked the creation of a **Women of Color in Transportation (WOCT)** group in Portland. NITC continues to sponsor this group and has since organized two luncheons for **WOCT (24 & 12 attendees)**. This group's mission and vision are still forming, but the goal is to attract, retain and advance WOCT by providing a safe space to discuss issues relevant to the group's specific needs. Discussions ranged from WOCT's mission, vision and goals to future planning for the organization and open discussions on any topics/issues members wanted to explore. Continued meetings are expected to occur monthly along with specific trainings (i.e. how to respond to micro-aggressions in the workplace) as the group's needs are identified.

NITC co-organized three different **professional development events** with Oregon ITE, WTS, and PSU's Graduate School of Education, including:

- ITE Winter Workshop, Topics: Congestion pricing, State Funding HB 2017, Bus on Shoulder pilot, etc. (75 attendees)
- Breakfast with Dr. Rob Wall Emerson, Topic: Planning and design of our transportation system for visually impaired travelers (12 attendees)
- Mobility Matters Summit, Topic: Latest technologies and approaches to access transportation systems for visually impaired travelers (125 attendees)

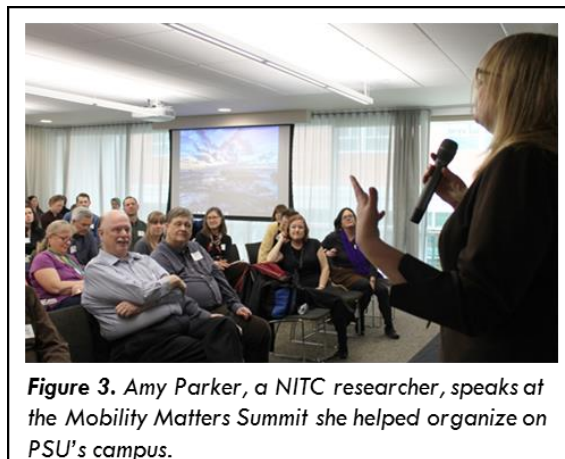


Figure 3. Amy Parker, a NITC researcher, speaks at the Mobility Matters Summit she helped organize on PSU's campus.

During this reporting period, practitioners were able to receive **28.5 professional development (PD) credits** for our events. Of those, **17 credits** could be claimed through the **American Planning Association (APA)**, and APA awarded a total of **216 AICP credits** for these events.

In order to earn credits, practitioners are required to review the event on APA's website, which also offers a mechanism to give providers feedback about the events they offer. The average score practitioners assigned to TREC events during this reporting period was a 3.96 APA rating (based on a five star rating system). This is consistent with the **4.03 APA rating NITC's events** have received since the center started providing PD opportunities to practitioners in 2016. To date, NITC's PD opportunities have been used by practitioners to earn **1465 AICP credits**.

Attract and Support Undergraduate Students.

NITC recognizes that transportation workforce development does not always take place at the university level. Students' interest in transportation can start much earlier, which is why NITC aims to attract and retain new undergraduate students to transportation-related degree programs and increase the number of women and students of color in these programs. Exposing these students to transportation concepts at a young age will eventually expand the workforce pool and diversity of new professionals. We continually work on supporting students and expanding NITC's reach into the K-12 classroom. These efforts and resulting events are detailed in this and the [Diversity](#) section.

NITC participated in **Forest Grove's College & Career Expo**, a high school career fair that provided 1500 sophomores, juniors and seniors access to career opportunities. Lisa Patterson spoke with high school students about transportation career options and advertised TREC's K-12 events.

NITC continues to offer **Transportation Undergraduate Research Fellowships (TURF)** that offers undergraduate students the opportunity to learn more about transportation engineering and planning research during the summer months. This year, the program expanded its reach and invited students from across the country to apply for the program. NITC received 46 applications from sophomores, juniors, and seniors of universities from 12 different states of the Continental US (38), Puerto Rico (6), and even Australia (2). Fellowship selection of the six finalists and their assignments are still underway, and details about the program will be summarized in the next PPPR.

Attract and Support Graduate Students

During the 2017-2018 academic year, NITC awarded **41 scholarships**, including 15 to students at UA, four to Oregon Tech, 3 to the UO, 8 to UU, and 11 to UTA. PSU scholarships are reported on the MAP-21 PPPR. In addition, **37 students** are currently supported as **graduate assistants** on NITC funded-research projects (2 undergraduate, 22 graduate, and 13 Ph.D. students).

NITC offers dissertation research fellowships in the spring, summer, and fall of each year to Ph.D. students, who have advanced to candidacy. During this reporting period, NITC funded **three dissertation fellowships**, including:

- Using Time-Series Analysis to Precisely Identify and Rank Road Hotspots, Alexander Lee, UA
- Transportation, Social Support by Family Visitation, and Depression of Older Adult Nursing Home Residents: A Mixed-Methods Study, Vivian Miller, UTA
- Social Equity in Transit: Toward social and environmental justice in transportation, Torrey Lyons, UU

Lisa Patterson was one of three professionals reviewing resumes at the **Careers in Motion Networking Fair** piloted during the 2018 TRB Annual Meeting. She sat individually with approximately **100 students** to review their resume and give advice on how to better present themselves on paper.

1.2.4 Technology Transfer

Move Research into Practice.

NITC researcher **Chris Nelson, UA**, developed a database as part of the project **Updating and Expanding LRT/BRT/SCT/CRT Data and Analysis**. The database provides U.S. census block data for use in GIS of the United States Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) data from 2002 to 2015, for a selection of U.S. cities. The goal of this database is to help advance research into and support policy decisions related to transit systems planning across the nation. To achieve this goal, it provides the necessary data to allow users to examine the implications of changes to transit systems on a range of outcomes relating to mobility, economic equity, the environment, and health at a variety of scales.

We are currently finalizing the database format and getting it ready for submission to our data archive on PSU's PDXScholar with the goal of making it also available on GITHUB to promote the wide use of these data. NITC is also working on developing a promotion and outreach strategy to relevant stakeholders.

Use Innovative Approaches to Communicate Research Results.

As our program expands, we continue to re-examine existing strategies to more effectively disseminate NITC research. Our newsletter subscribers are a highly captive audience and an effective means to this end. As of the last reporting period, our newsletter strategy focused on sending individual email announcements for each research report to small, targeted groups (ranging from 600 to 2,100 subscribers) based on research area interest. However, an increasing number of report publications followed by an increasing number of email distributions – increased the likelihood of email fatigue of NITC readership and low open and click rates.

To combat reader fatigue as well as to shift our focus to quality over quantity, NITC discontinued targeted email promotion of reports. Instead, we started the distribution of monthly newsletters to the entirety of NITC's readership (5000+ audience). Each newsletter highlights the newly published NITC research, upcoming tech transfer events, updates from consortium and public/private partners, press coverage of NITC research, and NITC student highlights ([see the April 2018 edition here](#)). The average open rate of 31% and average click rate of 5% (a measure of engagement of readership) already indicates that this new approach is successful in reaching and engaging NITC's multidisciplinary, multimodal audience, considering that these numbers are above the industry standard of a 20% open and 2.5% click rate.

NITC continues to leverage our strong social media presence to promote the results of our research and tech transfer events (webinars, seminars, and workshops), as well as raise awareness of important transportation issues and findings nationwide. Our followers on these platforms have increased steadily (**Twitter**, 2855 followers, +326; **Facebook**, 619 followers, +68; **LinkedIn**, 80 followers, +24; **YouTube**, 443 subscribers, +116; increases since last PPPR) and details about how each is used are outlined below ([Website\(s\) & other Internet site\(s\)](#)).

Additional changes to our approach include the successful launch of a new **Instagram** in the fall of 2017 that showcases the people behind the research and puts a face to our center. The communications team has also focused on revising the information design of NITC news stories and pages to better serve visitors in connecting with topical interests. Fostering more effective communication between the Tech Transfer and Research Administration functional units has enabled our center to be more strategic in day-to-day promotion and long-term forecasting for storytelling.

We look forward to sharing further insights into how our strategies progress, as we are able to gather more data to evaluate their impact.

1.2.5 Collaboration

Collaborating within our consortium.

NITC's governance structure is collaborative and the Executive Committee works together to make funding decisions and to discuss and resolve administrative issues related to implementing grants. The committee met in person on June 26, 2017 in Portland, OR, and held a conference call on November 6, 2017 to make funding decisions and discuss center logistics.

Executive Committee members also provide leadership on their respective campuses that include a variety of tasks that ultimately further NITC's mission. Here are some highlights of their activities. Activities from other Executive Committee members will be reported in the next PPPR.

- As a new UTC member, **Arlie Adkins, UA**, invested significant time and effort into apprising the university community and local transportation stakeholders of the opportunity the NITC partnership holds. He held four information sessions for UA faculty and students that provided information about NITC, grant requirements, and networking opportunities (66 attendees, total). He also organized a seminar that focused on NITC and the potential for partnerships. The seminar was attended by three NITC researchers and staff of MPOs, from multiple jurisdictions, SunTran (transit), Pima County, and Regional Transportation Authority (15 attendees).

- **Marc Schlossberg, UO**, attended three lectures, one panel, and regular discussions with a five-member cross-disciplinary group to find synergies on emerging, cross-cutting topics at UO that will further NITC's mission.
- NITC research relies on partnerships with agencies for research ideas and match funding. During this reporting period, **Stephen Mattingly, UTA**, attended the functional area meeting with the Department of Engineering's new faculty member. **TxDOT** reviews problem statements at this meeting before voting on the statements to recommend for their annual research RFP.
- **Keith Bartholomew, UU**, participated in a **UDOT** meeting that discussed the UTRAC process (UDOT's proposal process) to foster continued coordination & collaboration of research between UDOT and UU transportation research faculty.

External collaboration.

We are currently working on developing the advisory board that will expand upon the relationship developed with previous U.S.DOT funding. The advisory board will be key in identifying partners for external collaboration. We expect to have the advisory board identified in the next few months with the first board meeting later on this year.

1.2.6 Diversity

Attract underrepresented students to transportation careers.

NITC uses several approaches aimed at attracting women and minorities into the transportation field. This includes offering programs and fostering partnerships with partners that achieve this goal. Several programs and activities will be offered this spring and summer and the following have been completed or are underway during this reporting period.

ChickTech Workshop. This one-day workshop, co-hosted with ChickTech, continues to be a popular outreach opportunity that engages high school students. With the support of a dozen volunteers, **16 girls** learned about the transportation profession via a story mapping activity that used GIS Online, an open source software. Students were led through a tutorial in the morning, took a tour of PSU's active transportation infrastructure, and then built their own maps from photos taken on the afternoon tour. Girls not only learned valuable STEM skills, felt that they learned something new, but also as one student puts it "...".



NITC continues to offer **Diversity Grants** to faculty who wish to include an underrepresented, undergraduate student in their research project. NITC has awarded three diversity grants to date, including two new awards in the fall of 2018. The new awards support one female undergraduate student at **UA** and one female graduate student at **UTA**. The funding for both provides support for these students to engage in research.

NITC is also continuing its partnerships with **WTS Portland** with a focus on attracting female students to the transportation workforce, which includes a mentoring program for students and young professionals.

Priority funding to research with an equity focus.

Within the context of mobility, 26% (11) of projects (see [Figure 1, Appendix, Table 2](#)) address equity. These projects do so in a variety of ways, by:

- examining barriers to access, including the connections between transportation, land use, and housing;
- developing clear sets of strategies or interventions that will generate more inclusive measures of transportation behaviors; and
- examining electronic wayfinding technology for visually impaired travelers.

1.2.7 How have the results been disseminated?

Two NITC researchers gave **10 presentations** of their work at TRB 2018, where they reached an audience of **1632 practitioners and academics**. So far, **nine papers** of this work have been published in peer-reviewed journals (Table 2). Two additional papers are currently under review or awaiting publication.

Table 2. List of publications resulting from work of funded by NITC.

Publication type	Citation	Funding Ackn.?	Status
Peer-reviewed Journals (scientific, technical, or professional)	Nelson, A.C. et al. 2017. <i>Transit-Oriented Developments Make a Difference in Job Location</i> , Fordham Urban Law Journal, Vol 44 (4), 1079-1102	Yes	Published
	Nelson, A.C. 2017. <i>Transit and Real Estate Rents</i> , Transportation Research Record: Journal of the Transportation Research Board, Vol 2651(5), 22-30 https://doi.org/10.3141/2651-03	Yes	Published
	Nelson, A.C. 2018. <i>Streetcars and Economic Development: Do Streetcars Stimulate Employment Growth?</i> Transportation Research Forum, TBD	Yes	Publication, forthcoming
	Nelson, A.C. TBD. <i>Light Rail Transit and Economic Recovery: A Case of Resilience or Transformation</i> , Journal of the Transportation Research Forum	Yes	Under Review
Published proceedings of conferences & meetings (Peer-reviewed)	Nelson, A.C. and K. Kim. 2018. <i>Bus Rapid Transit and Economic Development: A Quasi-Experimental Treatment and Control Analysis</i> . Transportation Research Board 97 th Annual Meeting	Yes	Published
	Nelson, A.C. and R. Hibberd. 2018. <i>Analysis of the Variation in Apartment and Office Market Rents with Respect to Commuter Rail Transit Station Distance in Metropolitan San Diego and Salt Lake City</i> , Transportation Research Board 97 th Annual Meeting	Yes	Published
	Nelson, A.C. et al. 2018. <i>Commuter Rail Transit and Economic Development</i> . Transportation Research Board 97 th Annual Meeting	Yes	Published
	Nelson, A.C. et al. 2018. <i>Express Busways and Economic Development: Case Study of the Miami-Dade South Express Busway</i> . Transportation Research Board 97 th Annual Meeting	Yes	Published
	Hinners, S.J. et al. 2018. <i>Streetcars and Equity: Case Studies of Four Streetcar Systems Assessing Change in Jobs, People and Gentrification</i> . Transportation Research Board 97 th Annual Meeting	Yes	Published
	Hibberd, R. and A.C. Nelson. 2018. <i>Longitudinal Cluster Analysis of Jobs-Housing Balance in Transit Neighborhoods</i> . Transportation Research Board 97 th Annual Meeting	Yes	Published
	Nelson, A.C. and R. Hibberd. 2018. <i>Using the Real Estate Market to Establish Streetcar Catchment Areas: Case Study of Multifamily Residential Rental Property in Tucson, Arizona</i> . Transportation Research Board 97 th Annual Meeting	Yes	Published

1.2.8 What do you plan to do during the next reporting period to accomplish the goals?

Expected highlights for the next reporting period include:

- Reporting on progress of funded research
- Selection of projects of the Year 2 General Research grant (June 2018)
- Selection of Problem Statement and release of Pooled Fund RFP (Summer 2018)
- Professional development opportunities and K-12 events we will host during the next reporting period (Spring/Summer 2018)
- [Host the 2018 Transportation and Communities Academy](#) (September 2018)

2 PRODUCTS: *What has the program produced?*

2.1 Publications, conference papers, and presentations

At TRB 2018, two of our NITC researchers gave 10 presentations of their work that was funded by this grant (Table 2). They reached an audience of 1632 practitioners and academics. Nine papers of this work have been published in peer-reviewed journals (Table 2). Two additional papers are currently under review or awaiting publication.

2.2 Website(s) or other Internet site(s)

- **NITC website** (<http://www.nitc-utc.net/> or <http://nitc.trec.pdx.edu>): Updated daily, the website provides comprehensive information about our center and complete research portfolio (<http://nitc.trec.pdx.edu/research>). This includes stories about our research, press coverage, tech transfer resources, professional development events, and opportunities for students.
- **Twitter** (<https://twitter.com/TRECPdx>): Through Twitter we promote NITC sponsored research, publications, reports, and events and engage our audience in discussions of topics that are trending. We also share news from consortium members, including achievements of students, student group activities, and ongoing projects.
- **Facebook** (<https://www.facebook.com/TRECPdx>): In addition to sharing NITC research, a significant focus of Facebook is to share photos of NITC sponsored events and to connect with other organizations, researchers, and practitioners.
- **YouTube** (<https://www.youtube.com/user/askotrec>): To reach a broader audience, we publish freely accessible video recordings of our weekly seminars and monthly webinars, as well as promotional videos.
- **LinkedIn** (<https://www.linkedin.com/company/trec-the-oregon-transportation-research-and-education-center-/>): We target transportation professionals and share tools, practical information, and our latest studies.
- **Flickr** (<https://www.flickr.com/photos/otrec/>): An archive of photo collections from events we hosted or attended, most notably used to showcase the presence of NITC researchers and students at the annual meeting of TRB.
- **Instagram** (<https://www.instagram.com/trecpdx/?hl=en>): The newest platform to our strategy, we use it to showcase the people behind the research and put a face to our center. This platform has experienced the fastest growth and highest percentage of engagement.

2.3 Technologies or techniques

Nothing to Report.

2.4 Inventions, patent applications, and/or licenses

Nothing to Report.

2.5 Other products

Nothing to Report.

3 PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS: *Who has been involved?*

3.1 What organizations have been involved as partners?

Each NITC-funded general research project is required to have 120% match; other projects require a 100% match. For current projects, **29 different partners** from outside of the consortium provide match or contribute in other ways to projects (Table 3). This includes five partners from local governments, seven non-

profits, nine regional government agencies, two State DOTs, two transit agencies, and the University of North Carolina at Chapel Hill.

Table 3: Organizations partnering with NITC projects.

Organization		Type of Contribution					
Name	Location	Financial support	In-kind	Facilities	Collaborative research	Personnel exchanges	Other
Alliance for Walking and Biking	Washington, DC						x ¹
Assoc. of Pedestrian Bicycle Prof.	Lexington, KY	x					x ¹
City of Eugene	Oregon	x					x ¹
City of Springfield	Oregon						x ¹
City of Portland	Oregon		x				x ¹
League of American Cyclists	Washington, DC						x ¹
Metropia	Tucson, AZ		x		X		
Mid-American Regional Council		x					
Mountainland Assoc. of Gov't	Orem, UT				X		
Oregon DOT	Salem, OR	x	x				x ¹
OPAL Environmental Justice	Portland, OR						x ¹
Portland Metro	Portland, OR	x					x ¹
Project 7B	Utah	x	x		x		
Puget Sound Regional Council	Washington						x ¹
Regional Transportation Commission of Southern Nevada	Nevada	x					
Resource Systems Group (RSG)	Salt Lake City, UT				x		
Rowell Brokaw Architects	Eugene, OR	x	x				x ²
Smart Growth America	Washington, DC						x ¹
TriMet	Portland, OR				x		x ^{1,2}
Unlimited Choices	Portland, OR						x ³
Utah Office of Tourism	Utah	x	x		x		
Utah DOT	Salt Lake City, UT	x			x		
Utah Transit Authority	Salt Lake City, UT				x		
Wasatch Front Regional Council	Utah	x					
Washington County Engineering & Construction Services	Oregon				x		

¹Resource partner (provides input into research at various stages of project), ²Assistance with data collection and/or processing, ³Recruitment of survey participants

3.2 Have other collaborators or contacts been involved?

Ten (43%) of funded projects include investigators from more than one consortium member. Twelve (52%) are multidisciplinary or include investigators from more than one discipline within the consortium.

4 IMPACT: *What is the impact of the program? How has it contributed to transportation education, research, and technology transfer?*

4.1 What is the impact on the development of the principal discipline(s) of the program?

Please see MAP-21 PPR.

4.2 What is the impact on other disciplines?

Please see MAP-21 PPR.

4.3 What is the impact on the transportation workforce development?

NITC continues to offer professional development opportunities that directly contribute to workforce development and are relevant to practitioners. For example, NITC now offers **APBP webinar sessions** on a monthly basis at PSU that are open to students and professionals. The **Initiative for Bicycle and Pedestrian Innovation (IBPI)** continues to offer workshops that focus on training this and the next generation of active transportation champions. For this year, courses for practitioners include specific professional needs. The new workshop, *Creating Effective Active Transportation Programs*, for example, will allow program managers to learn and experience firsthand the design of various active transportation programs. Participants will learn how to plan for programs such as Sunday Parkways, Save-Routes to Schools, and other transportation options programs that play a key role in helping more people to bike, walk, and use transit.

4.4 What is the impact on physical, institutional, and information resources at the university or other partner institutions?

NITC is currently supporting research by **Noelle Fields, UTA**, and colleagues that will allow the team to move two android apps (*Safe Activity* and *My Amble*) to the next level and significantly impact UTA's research and teaching capacity. This technology improves upon traditional pen-and-paper-based daily transportation diaries in terms of quantity and quality of data collected, particularly for environmental justice populations. The goal of the interdisciplinary team is ambitious and will include:

- Developing collaborative tools and strategies that can improve mobility, economic equity, the built environment, and health outcomes.
- Identification of implementation strategies and collaborative applications for *Safe Activity* and *My Amble* within and across the engineering, planning, and social work disciplines.
- Developing courses that can be cross-listed between the UTA College of Engineering and School of Social Work to address transportation, activity scheduling, and transportation needs.
- Using their research as a stepping stone to develop an interdisciplinary program/course for submission to the National Science Foundation (Improving Undergraduate STEM Education: Education and Human Resources or Innovations in Graduate Education).

4.5 What is the impact on technology transfer?

NITC hosted **six webinars** between October 01, 2017 and March 30, 2018 that were attended by **753 individuals**, primarily practitioners. Practitioners were able to earn one credit per webinar, and APA awarded **156 AICP credits** (average of 26 AICP credits per webinar). Given a five star rating system, practitioners assigned, on average, **4.18 stars** to the webinars.

4.6 What is the impact on society beyond science and technology?

Please see MAP-21 PPR.

5 CHANGES/PROBLEMS

5.1 Changes in approach and reasons for change

Nothing to Report.

5.2 Actual or anticipated problems or delays and actions or plans to resolve them

Nothing to Report.

5.3 Changes that have a significant impact on expenditures

Nothing to Report.

5.4 Significant changes in use or care of human subjects, vertebrate animals, and/or biohazards

Nothing to Report.

5.5 Change of primary performance site location from that originally proposed

Nothing to Report.

6 Additional information regarding Products and Impacts

Nothing to Report.

Appendix

Table 1: Initial research projects funded during the first year of the grant.

Grant Program	Project Title	Investigators (Lead ^{*)})	Univ. (Lead [*])
Initial Projects	Access to Opportunities: Redefining Planning Methods and Measures for Disadvantaged Populations	Arlie Adkins* (UA); Stephen Mattingly (UTA)	UA*, UTA
	Bringing Bikes into the V2X Smart City Conversation	Stephen Fickas* & Marc Schlossberg	UO
	Economic and business impacts of non-motorized bike/pedestrian infrastructure,	Jenny Liu* & Jennifer Dill	PSU
	Evaluating Improved Transit Connections for Ladders of Opportunity	Stephen Mattingly* (UTA); Yi-Chang Chiu (UA)	UTA*, UA
	From Knowledge to Practice: Rethinking Streets for People on Bikes	Marc Schlossberg* (UO); Roger Lindgren (Oregon Tech)	UO*, Oregon Tech
	Improving Integration of Transit Operations and Bicycle Infrastructure at the Stop Level,	Miguel Figliozzi* & Chris Monsere*	PSU
	Key Enhancements to Four-Step Travel Demand Models	Reid Ewing	UU
	Network effects of disruptive traffic events	Juan Medina* & Cathy Liu	UU
	Social-Transportation Analytic Toolbox (STAT) for Transit Networks	Cathy Liu* & Ran Wei (UU); Aaron Golub & Liming Wang (PSU)	UU*, PSU
	Foundational Smart Cities Platform for NITC [#]	Kristin Tufte* & John MacArthur (PSU); Larry Head (UA)	PSU*, UA
	Non-Motorized Data Archive and Tools [#]	Jennifer Dill* (PSU); Stephen Mattingly (UTA)	PSU*, UTA

[#]Projects have not yet started.

Table 2: Funded research projects that address equity related to mobility.

Grant Program	Project Title	Investigators (Lead*)	Univ. (Lead*)
Initial Projects	Access to Opportunities: Redefining Planning Methods and Measures for Disadvantaged Populations	Arlie Adkins* (UA); Stephen Mattingly (UTA)	UA*, UTA
	Evaluating Improved Transit Connections for Ladders of Opportunity	Stephen Mattingly* (UTA); Yi-Chang Chiu (UA)	UTA*, UA
	Social-Transportation Analytic Toolbox (STAT) for Transit Networks	Cathy Liu* & Ran Wei (UU); Aaron Golub & Liming Wang (PSU)	UU*, PSU
General Research (Round 1)	Updating and Expanding LRT/BRT/SCT/CRT Data and Analysis	Arthur Chris Nelson	UA
	Life-space mobility and aging in place	Ivis Garcia Zambrana* & Keith Dias Moore, Alan DeLaTorre	UU*, PSU
	Planning in gateway and amenity communities: understanding unique challenges associate with transportation, mobility, and access to opportunity	Danya Rumore* & Philip Stoker	UU*, UA
	Universally Accessible Trail Improvement with Naturally Occurring, Sustainable Materials	Matthew Sleep	Oregon Tech
	Is there a "buy local" case for lower travel speeds? Testing differences in driver recognition of local versus national retail at different travel speeds	Jonathan Bean* & Arlie Adkins, Tara Goddard	UA*, TAMU
Small Starts (Round 1)	How Will Autonomous Vehicles Change Local Government Budgeting and Finance? A Case Study of Solid Waste, Drop-off/Pick-up Zones, and Parking.	Benjamin Clark	UO
	How can interdisciplinary teams leverage emerging technologies to respond to transportation infrastructure needs? A mixed-methods evaluation of civil engineers, urban planning, and social workers' perspectives.	Noelle Fields* & Courtney Cronley, Kate Hyn, Stephen Mattingly	UTA
	A Comprehensive Examination of Electronic Wayfinding Technology for Visually Impaired Travelers in an Urban Environment	Martin Swobodzinski* & Amy Parker	PSU