



Center for Safety Equity in Transportation

If you have a right to get there, you have a right to get there safely.

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Semi-Annual Progress Report for University Transportation Centers

Submitted to: Office of the Assistant Secretary for Research and Technology
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Project Title: **Tier 1 University Transportation Center for Safety Equity in Transportation (CSET)**

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Report Term: Semi-Annual Progress Report

Signature:

Billy Connor
CSET, Director

Abbreviations

- AKDOT&PF – Alaska Department of Transportation and Public Facilities
- ANTHC – Alaska Native Tribal Health Consortium
- AUTC – Alaska University Transportation Center
- CSET – Center for Safety Equity in Transportation
- GIS – Geographic Information System
- ORCID – Open Researcher and Contributor ID
- PI – Principle Investigator
- PPPR – Program Progress Performance Report
- RiP – Research in Progress
- RITI – Rural, Isolated, Tribal, Indigenous
- UAF – University of Alaska Fairbanks
- UHM – University of Hawai'i Manoa
- UI – University of Idaho
- UW – University of Washington

1. Accomplishments

What are the major goals and objectives of the program?

The goal of CSET is to develop context-sensitive transportation solutions that address the safety needs of RITI communities. The Center will develop safety approaches that are sensitive to heritage, traditional ways of knowing and learning, and the preservation of culture. The mission of the Center for Safety Equity in Transportation (CSET) is to provide everyone with fair and equitable access to a safe transportation system.

What was accomplished under these goals?

During the past six months of the project:

- *Setting up email list, website, and social media accounts*

The official CSET email, cset.utc@alaska.edu, has been used to communicate with Executive and Advisory Board members as well as project PIs. A contact list is being maintained for the duration of the project. Center announcements are distributed through emails and social media posts to various audiences and stakeholders. Activities are posted to the website in a timely fashion.

- *Communication: gotomeeting and gotowebinar*

An account has been set up for CSET with gotomeeting and gotowebinar. The Center will utilize gotomeeting for project progress reports and updates, advisory board meeting and board of directors. The Center will utilize gotowebinar for project updates to stakeholders and other efforts to disseminate research findings. Zoom functionality for meetings and webinars is being investigated as a possible replacement for gotomeeting and gotowebinar.

- *E-newsletters*

The Center distributed its eighth quarterly newsletter in February 2020. The newsletter is available under the *Publications* section of the website. <http://cset.uaf.edu/publications/>

- *Research projects*

Twenty-three projects continued during this reporting period under three primary areas: knowledge gathering, outreach, and baseline data collection. Four reports were submitted to TRID during the reporting period. The project information is posted on the CSET website, and logged in the RiP database. Annual project update meetings are held each summer, and quarterly reports are collected in a timely manner.

- *Training programs*

Training in dust management was provided to tribal representatives from the Lower Kuskowim River tribes in Bethel Alaska on March 3, 2020. There were about 50 people in attendance.

- *Active student internships*

None developed during this period.

- *Teacher training and curriculum development activities*
None developed during this period.

- *Data collection tools developed*

- A CSET project at the University of Idaho, *Documenting the Characteristics of Traffic Crashes for RITI Communities in Idaho*, focused on continuing to develop a methodology to Estimate Average Annual Daily Traffic (AADT) on RITI Roads. The project team worked with ITD staff in the planning department to align our estimation methodology with the methodology used by ITD. We continued working on RITI-Crash Rate Analysis for Idaho. We created a toolbox of GIS tools that can be used for safety analysis. The tools are written in Python and follow the methods described in the Highway Safety Manual. We are currently alpha testing the tools and plan to work with ITD in the near future for further development.
- The University of Hawai'i Manoa CSET project *Driving Behavior and Traffic Safety Perceptions of Hawaiians, part-Hawaiians and Pacific Islanders*, developed a detailed, computer-based survey to collect information on the traffic safety perceptions of Hawaiians, part-Hawaiians and Pacific Islanders in rural and urban areas. The survey was deployed in May 2019 and concluded in December 2019.
- The CSET project at UAF, *Enabling Data-driven Transportation Safety Improvements in Rural Alaska*, completed development of a traffic counting application. The design effort was successful and the complete app is ready for field-testing in a rural setting. The app, UAF Traffic, was developed to obtain traffic counts for all types of conveyances in rural Alaska, as well as monitoring turning movements. The app was designed to work on an iPad or similar device. The final product supports non-traditional vehicles common in Alaska, allows data collection on up to five vehicles at a time, ease-of-use to support future STEM/STEAM education efforts, can handle 2-, 3-, and 4- way traffic intersections. The app is available for free download through the Apple Store. <https://apps.apple.com/us/app/uaf-traffic/id1477376858>

- *Sponsorship*

Nothing to report for this period.

How have the results been disseminated?

CSET staff and researchers have been actively seeking out opportunities to interact with the public, stakeholders and the transportation community.

Professional Meetings

During this reporting period, CSET representatives attended the following professional event:

The 99th Annual Meeting of Transportation Research Board, Washington, D.C.,
January 2020

Outreach

- *Yakama Tribe Visit, December 9, 2019*

The University of Washington (UW) research team has conducted extensive outreach activities with the Yakama Nation. In particular, the research team representatives (Dr. Wang and Dr. Sun) drove to Toppenish on December 9th, 2019 to visit the Yakama Nation Department of Natural Resources (DNR) and met with several local traffic engineers and planners. During the visit, the Yakama Nation DNR Engineering program representatives and the research team discussed the Yakama Nation's current roadway safety issues, such as high vehicle fatality rate, high pedestrian fatality rate and speeding. Therefore, the Yakama Nation DNR Engineering program decided to collaborate with the research team in developing solutions to improve Yakama Nation's traffic safety conditions.

- *UAF Engineering Open House, February 22, 2020*

CSET provided an activity to demonstrate structural stability using the shake table in the Hi-Bay Facility to the Fairbanks community during the annual UAF College of Engineering and Mines (CEM) Open House.

- *Pearl Creek Elementary STEM Night, January 30, 2020*

CSET staffed a table on road construction and design for elementary school students at Pearl Creek Elementary School's annual STEM night.

- Multiple outreach activities have had planning placed on hold due to the restrictions on gatherings put in place to combat the spread of COVID-19. Specifics on the events that get canceled will be in the next Semi-Annual Report.

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

We will follow the implementation plan to ensure that all the CSET's funded research, education, and outreach activities move forward as scheduled.

- The Center website, social media presence, and emailing contact lists will be regularly updated and used to promote the Center and its activities.
- CSET's ninth and tenth quarterly newsletters will be distributed during the month of May and August. The newsletter will highlight Center progress, such as projects starting/concluding, new calls for proposals, STIs, etc.
- Steps will be taken to continue bringing students on as research assistants.
- Steps will be taken to develop training programs, curriculum development activities, outreach, and sponsorship opportunities.
- Center researchers and staff will continue participation and involvement with seminars, workshops and conferences.
- Year 4 request for proposals will be reviewed and approved.
- Efforts to provide community training will be increased based on CSET research. Specifically, there are plans in place for conducting safety training and dust mitigation training for rural Alaska communities pending lifting of COVID-19 social distancing and travel restrictions. We will look at alternate means of training.

2. Participants & Collaborating Organizations

What organizations have been involved as partners?

- *Collaborative research and financial support*
Newtok Village Council, Newtok Alaska, Alaska Native Tribal Health Consortium

Northern Arizona University Tribal Technical Environmental Program related to dust management training for Alaskan Villages.

- *Technology Transfer Expert Task Groups*
CSET projects have established advisory groups for improving technology transfer from the project to interested stakeholders. Each project has met with members of the groups either individually or in a group during the period covered by this report.

Have other collaborators or contacts been involved?

Email correspondence been exchanged during the reporting period to discuss research ideas and broad collaborations on research, education, workforce development, and outreach activities between CSET and various collaborators.

- The center collaborated with the Region 10 Transportation Center (PacTrans) to co-sponsor the annual Regional Transportation Conference held in Seattle, Washington on October 11, 2019.

3. Outputs

Publications, conference papers, presentations, websites, lectures, seminars, workshops, invited talks

Publications

- *Journal Publications*
 - Zhenning Li, Xiaofeng Chen, Yusheng Ci, Cong Che*, and Guohui Zhang. A hierarchical Bayesian spatiotemporal random parameters approach for alcohol/drug impaired-driving crash frequency analysis. *Analytic Methods in Accident Research*. In Press. 2019.
 - Zhenning Li, Yusheng Ci, Cong Chen, Guohui Zhang, Qiong Wu, Zhen Sean Qian, Panos D. Prevedouros, and David T. Ma. Investigation of driver injury severities in rural single-vehicle crashes under rain conditions using mixed logit and latent class models. *Accident Analysis and Prevention*. In Press. 2019.
 - Harrison Togia, Oceana Francis, Karl Kim, Guohui Zhang. A Segmentation-based Approach for Assessing Hazard Risk of Coastal Highways in Hawaii. In Press. 2019. *Transportation Research Record: Journal of the Transportation Research Board*.

- D. L. Barnes, B. Connor, B. Trost, E. McTigue, K. Krauss, and B. Bluehorse, Managing Alaska's Road Dust Problem: A Model for Road Dust-Impacted Regions, ASCE Journal of Transportation Engineering, Part A: Systems, 2020
- *Reports*
 - Bennett, F. Lawrence, Metzgar, Jonathan B. and Perkins, Robert A. *Enabling Data-Driven Transportation Safety Improvement in Rural Alaska*. CSET Project Reports, December 2019.
 - Wang, Yin Hai, Sun, Wei, Yang, Hao, Gottsacker, Christopher, Ricord, Sam and Yin, Shuyi. *Developing a Data-Driven Safety Assessment Framework for RITI Communities in Washington State*. CSET Project Reports, November 2019.
 - Awwad-Rafferty, Rula, Chang, Kevin and Brown, Helen. *Reaching Out to Tribal Communities: Lessons Learned and Approaches to Consider*. CSET Project Reports, December 2019.
 - Zhang, Guohui, Prevedouros, Panos, Ma, David T., Yu, Hao, Li, Zhenning, and Yuan, Runze. *Developing an Interactive Baseline Data Platform for Visualizing and Analyzing Rural Crash Characteristics in RITI Communities*. CSET Project Reports, November 2019.
- *Conference papers*
 - *Presentations*
 - Nomura, Diana, Panos D. Prevedouros and Rafaela De Melo Barros, *Traffic Safety Problems at Popular Rural Tourist Attractions*, Paper 20-02953, 99th Annual Meeting of TRB, Washington, D.C., January 2020.
 - Yuan, Runze, Hao Yu, Zhenning Li, Guohui Zhang, and David Ma. *Investigate Factors Affecting Driver Injury Severity in Snow-Related Rural Single-Vehicle Crashes*. The 99th Annual Meeting of Transportation Research Board, Washington, D.C., Jan. 2020.
 - Yu, Hao, Runze Yuan, Zhenning Li, Guohui Zhang, and David Ma. *Driver Injury Severity Prediction Using Highway Single-Vehicle Crash Data: A Fusion Convolutional Neural Network Approach*. The 99th Annual Meeting of Transportation Research Board, Washington, D.C., Jan. 2020.
 - Li, Zhenning, Hao Yu, Guohui Zhang, David Ma, and Jun Wang. *Mixed-Frequency Traffic Safety Data Interpretations: A Bayesian Vector Autoregression Approach*. The 99th Annual Meeting of Transportation Research Board, Washington, D.C., Jan. 2020
 - de Melo Barros, Rafaela and Panos D. Prevedouros, *Equity in Transportation Safety and Preliminary Assessment in Hawaii*, PacTrans Conference 2019, Univ. of Washington, Seattle, October, 2019.
 - Prevedouros, Panos D., Eftihia, Nathanail, Md. Mintu Miah and Rafaela D. De Melo Barros, *Predicting Behavior of Professional Drivers while Text-Reading Using Cluster Modeling*, Paper 185, Conference on Road Safety & Simulation (rss2019.org), Iowa City, Iowa, USA, October 14-17, 2019.
 - de Melo Barros, Rafaela, Prevedouros, Panos D., Eftihia, Nathanail and Guohui Zhang, *Emergency Response and Other Traffic Safety Equity Perceptions in Hawaii*.

ASCE ICTD 2020, Seattle, Washington. (Meeting has been postponed or canceled due to COVID-19 restrictions).

- Prevedouros, Panos. *Traffic Safety Analysis for Minorities in Urban and Rural Regions*. ETIC 2020, Johor, Malaysia. (Meeting has been postponed or canceled due to COVID-19 restrictions).
- *Other Products*
- *Website Updates*
 - The CSET website is live at cset.uaf.edu.
 - Year 3 project information is available on the website.
 - Events deemed noteworthy have a brief summary and photo displayed on the website.
- *Lectures/Seminars/Workshops/Invited Talks*
 - Dust management was provided to tribal representatives from the Lower Kuskowim River tribes in Bethel Alaska on March 3, 2020. There were about 50 people in attendance.
 - *Use of Ground Penetrating Radar on Ice Roads* provided to tribal representatives from the Lower Kuskowim River tribes in Bethel Alaska on March 3, 2020. There were about 50 people in attendance.
- *New methodologies, technologies or techniques*
 - A project at the University of Hawai'i, *Extracting Rural Crash Injury and Fatality Patterns Due to Changing Climates in RITI Communities Based on Enhanced Data Analysis and Visualization Tools*, developed 3D rural crash data visualization modules to dynamically interpret and visualize the rural crash data. The project also developed a new Bayesian vector autoregression-based data analytics approach to enable mixed-frequency rural crash data interpretations with missing values and developed a finite mixture random parameters model to explore driver injury severity patterns in low-visibility-related crashes
 - Students at UAF, as part of the CSET project *Developing a Safe and Sustainable Transportation System in Mertarvik – Phase II CSET Outreach and Partnership with the Newtok Relocation Project*, developed templates and plans to produce 3D printed models of roads that include the various layers of materials that go into road construction in the arctic. The models also depict deformation that occurs in roads because of melting permafrost and other temperature related changes to the substrate. The team is currently working on developing handouts and informational cards to accompany the models as mass production of the basic models is just beginning. Materials were received to manufacture the boxes and the padding for the 3D models. However, the COVID19 restrictions have made it impossible to allow students access to the lab to work on them.
- *Inventions, patents and/or licenses*
 - Four STL files for 3D printing of road models have been generated and are available for distribution on request. The 3D model work was presented at the 2019

PacTrans Conference by undergraduate research assistants Jordan Zellhuber and Monroe Morris.

4. Outcomes

- *What outcomes has the program produced? How are the research outputs described in section 3 being used to create outcomes?*

The researchers involved in the CSET Project, *Drones for Improving Traffic Safety of the RITI Communities in Washington State*, aided the community of Westport, Washington in drafting the "Transportation, Circulation, and Telecommunication Element" (Chapter 5) for Westport Community Comprehensive Plan which is now pending approval by Westport's City Council. They also recommended drone application into the draft Comprehensive Plan Update: In Policy #15, p.28:"The City should review applicable regulations to allow use of drones for emergency preparedness and management, including as enhancements to situational awareness (e.g.detecting and reporting traffic conditions, condition of roads and bridges, people in need of assistance, and aids in finding and following optimal evacuation routes), delivery of emergency supplies, telecommunication, etc."

5. Impact

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

- *Other Disciplines –*

CSET is a multidisciplinary Center, and will therefore have an impact in fields outside of the traditional areas of transportation research. In future reports, this section will serve to answer the following questions.

- *What is the impact on the development of transportation workforce development?*
- *What is the impact on safety in RITI communities?*

The researchers involved in the CSET Project, *Drones for Improving Traffic Safety of the RITI Communities in Washington State*, indicated that the adoption of the drone related language to the updated Comprehensive Plan of the Westport community (pending approval) will help improve safety of the residents during normal and emergency situations.

The CSET Project, Initial Assessment of Transportation Safety Equity for Hawaiians, part-Hawaiians and Pacific Islanders in RITI Communities, released a report Driver Testing and Distraction that was circulated widely in Hawaii's taxi industry, bus operators (tour and transit operators) and selected politicians. This was done in late February, about one week before the Covid-19 crisis started in the US. They plan to repeat this effort when attention returns to regular subjects as impact was limited as a result of the crisis.

- *What is the impact on physical, institutional, and information resources at the university or other partner institutions and communities?*
- *What is the impact on technology transfer?*
- *What is the impact on society beyond science and technology?*
- *In what ways have researchers and students who are part of or who focus on native or federally recognized tribes and communities been involved?*

CSET continues to work with tribes to reduce dust in their communities. The focus is moving from institutional controls to application of calcium chloride with minimal equipment.

6. Changes/Problems

- Nothing to report.