**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)**

**Program Director:** Billy Connor, Director of AUTC

 Email: bgconnor@alaska.edu; Phone: 907-474-5552

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**Recipient Organization:** University of Alaska Fairbanks

 PO Box 755900, Fairbanks, AK 99775-5900

**Project Grant Period:** December 7, 2016 – September 30, 2022

**Reporting Period End Date:** March 31, 2021

**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:

*Email list, website, and social media*

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*

Zoom functionality for meetings and webinars has replaced gotomeeting and gotowebinar once current subscriptions end. The access to Zoom is provided by the University of Alaska Fairbanks at no cost to the Center.

*E-newsletters*

The Center distributed its eleventh and twelfth quarterly newsletters in November 2020 and March 2021. The newsletter is available under the *Publications* section of the website. <http://cset.uaf.edu/publications/>

*Research projects*

Twenty-five projects continued during this reporting period under three primary areas: knowledge gathering, outreach, and baseline data collection. One report was submitted to TRID during the reporting period. Seven new projects were approved from submissions to the year 5 request for proposals. 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*

The project, *Investigation of Cost-Effective Technologies for Quick Response to Traffic-Related Crash in RITI Communities*, developed educational/training materials for both fire departments and high school students about drone related technologies to help them get a drone license and to operate it successfully in the future. These materials will be used for training workshop/courses about drone related knowledge and operation skill.

*Active student internships*

None developed during this period.

*Teacher training and curriculum development activities*

None developed during this period.

*Data collection tools developed*

* + The University of Idaho CSET project, *Promoting Positive Traffic Safety Culture in RITI Communities through Active Engagement: Barriers and Opportunities*, completed development of a survey tool that will be used in the in-depth interviews with community leaders. The project has already used it to conduct two in-depth interviews (via zoom video conference) with the leaders of two communities.

*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 in-person meetings were canceled or turned into virtual meetings via online tools due to COVID-19. CSET representatives participated in the following professional events:

* The 2020 Region 10 Transportation Conference held virtually on October 16, and 19 to 22, 2020.
* The Heritage Connectivity Trails Steering Committee meeting hosted by HollyAnna Littlebull, Traffic Safety Coordinator of the Yakima Nation on November 5, 2020.
* The 2021 TRB Annual Meeting held virtually during January 2021.

*Outreach –*

* Online training session with students from Ocosta Junior-Senior High School, Westport, Washington for drone-related education.

**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 thirteenth and fourteenth quarterly newsletters will be distributed during the months of June and September. The newsletters 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 5 proposals will be processed for funding.

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.

1. **Participants & Collaborating Organizations**

**What organizations have been involved as partners?**

*Collaborative research and financial support*

Newtok Village Council, Newtok Alaska,

 Kawarek, Inc., Nome Alaska

*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 has 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.

1. **Outputs**

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

*Publications*

* *Journal Publications*
* *Reports*
* Metzgar, Jonathan. *Dust Pallative Mean Particle Residence Time Calculator*. CSET Project Reports, December 2020.

*Conference papers*

* *Presentations*
	+ Yuntao Guo, Hao Yu, and Guohui Zhang, *Understanding the Relationship between Travel-related Behavior and COVID-19 Spread within the Communities*. 2021 TRB Annual Meeting. TRBAM-21-02244.
	+ Tianpei Tang, Yuntao Guo, Guohui Zhang, and Quan Shi. *Understanding the interaction between cyclists’ traffic violations and enforcement strategies*. 2021 TRB Annual Meeting. TRBAM-21-00533.
	+ Chang, K. and Hodgson, C. *Using Drone Technology to Collect School Transportation Data*. Transportation Research Board Conference; virtual 2021.

*Other Products*

* University of Alaska Fairbanks M.S. thesis entitled, *An evaluation of GPR techniques for analyzing the safety of interior Alaska ice roads under varying river ice conditions* by Elizabeth Richards, 2021.

*Website Updates*

* The CSET website is live at [cset.uaf.edu](file:///C%3A%5CUsers%5Cjaalloway%5CDesktop%5CCSET%20Reports%5CLetterhead%5Ccset.uaf.edu).
* Events deemed noteworthy have a brief summary and photo displayed on the website.

*Lectures/Seminars/Workshops/Invited Talks*

* A public seminar hosted by American Water Resources Association Alaska section included a presentation on GPR measurements for Ice Road safety given by Elizabeth Richards on March 17, 2021, 12-1 pm via WebEx. This seminar was attended by more than 50 participants.
* UAF in collaboration with the Institute of Tribal Environmental Professionals at the Northern Arizona University developed and presented the fourth in a series of 4 webinars on dust management in tribal communities on November 11, 2020. The webinar series covered topics including assessment of current roads, improvements in road designs, creation of dust management plans and community engagement. The webinars were recorded and are available at <https://www7.nau.edu/itep/main/training/Webinars_air2020>.

*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*, refined and finalized a new Bayesian vector autoregression-based data analytics approach to enable mixed-frequency rural crash data interpretations with missing values and finalized a finite mixture random parameters model to explore driver injury severity patterns in low-visibility-related crashes.

*Inventions, patents and/or licenses*

* + The UAF project, Improved Safety for Winter Travel along Minimally Improved Routes, developed prototype trail markings and paced along a trail near Nome, Alaska. The reflective markings have been attached to poles using a machine developed by 3M. The markings appear to be working well.
1. **Outcomes**

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

Previous research efforts at UAF have established that dust palliative performance may be compared using a calculation called the mean particle residence time  (tau, or MPRT). The MPRT value is computed using linear regression techniques to determine the time when the dust palliative loses its effectiveness. A technician tests the palliative using a dustfall column and a nephelometer to measure the concentration of PM10 over time. The technician needs to manually process this raw data with an Excel spreadsheet making dust palliative MPRT reports time-consuming and prone to error. Finally, the certifying technician prints and files the report for future reference which limits future dissemination. A CSET project developed a web-based calculator, called UAFDUST, to automate the process of producing the MPRT report. UAFDUST combines a web app front end using Google's Angular library with a PHP and SQL database backend. This database enables a laboratory to record metadata about the dust palliative including the dustfall column testing date and technician, certification date, and certifying technician. The app calculates the MPRT and produces accompanying linear regression plots. The UAFDUST app stores dust palliative MPRT tests in a public database and trained laboratory technicians may contribute new data.

1. **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?*

*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.

CSET projects at the University of Washington continue to work closely with tribal leaders in the state, including the Yakima Nation, on issues of concern to the tribal leaders.

1. **Changes/Problems**
* Impacts on the Center from COVID-19
	+ The CSET project, *Development of Grass-Roots Data Collection Methods in RITI Communities*, reported that some of the planned data collection activities, originally scheduled for earlier this year, were affected by the COVID pandemic. Although this will not affect the final report submission timeframe, the impacts of this change in plan will be documented in the final report.
	+ Multiple projects requested no-cost extensions due to COVID impacts. The reasons included lack of access to lab facilities due to campus closures, delays in the arrival of graduate students, and inability to conduct field work for data collection.
	+ CSET year 5 projects have experienced start up delays due to contract processing issues due to COVID restrictions on campus.