

Center for Safety Equity in Transportation

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

March 2023

CSET Research Showcase

Development of an Acoustic Method to Collect Studded Tire Traffic Data

Vehicular travel during winter months is a concern in the Pacific Northwest due to the regular occurrence of snow and ice during freezing and sub-freezing conditions. For many travelers and commuters alike, vehicle traction in the form of studded tires serves to provide an added level of driving confidence when such weather conditions are present. However, studded tire usage causes damage to the roadway infrastructure in the form of rutting due to surface wear. This damage contributes to challenging and potentially dangerous driving conditions in the form of standing water and the increased potential for hydroplaning. While many drivers may not seem to be particularly concerned with the impacts associated with studded tire usage, transportation agencies recognize that the roadway damage caused by studded tires will accelerate the need for pavement surface maintenance or replacement. For this reason, there is an inherent benefit to accurately determine studded tire usage on highways or roadways. This information can help to support life cycle cost analysis and assign appropriate maintenance and roadway resurfacing timelines.

Current estimates for studded tire usage are typically based on parking lot counts or household surveys. The lack of real-world traffic volume data limits the precision

of roadway deterioration models that measure roadway performance and estimate infrastructure life. As a response to this need, this study explored the use of off-the-shelf sound meters to serve as an effective way to collect studded tire volumes in the field.

Based on the study results, it was determined that while vehicles with studded tires generate a higher decibel reading when matched with comparable vehicles without studded tires, the decibel reading alone could not be relied upon to definitively determine whether or not a vehicle was using studded tires. Some pickup trucks and semi-trucks generated similar decibel readings due to factors such as engine noise and tire-pavement interaction. There were also incidences when more than one vehicle passed the sound meter at the same time, or when multiple vehicles passed the sound meter in quick succession as a platoon. In these cases, isolating the sound generated by each individual vehicle was not always possible.

The use of video as a supporting medium allowed a predictive model to be developed. For this study, during targeted time windows, the sound meter collected data while a video simultaneously recorded activity at the study site. This pairing allowed the research team to identify the cause or causes whenever decibel readings changed. Using this logged data, a model was developed and applied to longer time periods when video was not recorded. The accuracy of the model was then compared with actual Idaho Transportation Department volume data.

continued on page 2

Announcements

CSET has positions open for post-doctoral researchers, graduate and undergraduate students interested in RITI transportation equity and safety research. Please contact us at cset.utc@alaska.edu.

A CSET Webinar is scheduled for March 23, 2023 at 12 pm PDT. The title is **Deep Learning-based Traffic Object Recognition using Light Detection and Ranging (LiDAR) Technology**. The webinar will be presented by Shanglian Zhou and Guohui Zhang of the University of Hawai'i Manoa. **Please join us on zoom for the presentation.**



Sound Meters field setup used for data collection.

CSET has been funded through the 2016 University Transportation Center Program by the US Department of Transportation as part of the FAST Act at approximately \$1.4 million in each of the next five years.

Ice Roads Workshop

The Artic Infrastructure Development Center (AIDC) and CSET hosted a workshop focused on the design, construction and maintenance of ice roads on febraury 15, 2023 in Fairbanks, Alaska. The workshop was a follow up to the Symposium presented in Bethel, Alaska in November 2022. Funding for the event was provided by FHWA. The workshop focused on the Ice Roads Manual developed by the AIDC with funding from FHWA. The version of the manual distributed at the workshop was revised based on the input provided at the Bethel symposium. The workshop focused on the safe construction and operation of ice roads on fresh water lakes and rivers. Attendees learned how to determine the safe ice thickness, ice repair strategies, appropriate geometric standards and setting safe speed limits.



Billy Connor presents a workshop on the design, construction and maintenance of Ice Roads on February 15, 2023 on the University of Alaska Fairbanks campus.

Studded Tires Con't

Based on the results, the study outcomes yielded results that were similar to previously established methods (e.g., parking lot surveys to determine approximate studded tire vehicle percentages). The study concluded that the use of off-the-shelf sound meters alone was not sufficient to definitively collect volume data. However, the insights from this study will support future research efforts that provide new data-driven solutions for local transportation officials, planners, and engineers responsible for managing highways and roadways.



"OPEN SEASON!"

Credit: Jamie Smith, CSET Project "Road Safety Nuggets"



Ice Road on the Tanana River, February 29, 2020. Photo by Nathan Belz.

UAF Come study with us!

The University of Alaska Fairbanks is actively seeking graduate students interested in research related to rural, isolated, tribal and indigenous transportation safety. Civil engineering is preferred, but also looking for interdisciplinary and Alaskan Native students. For more information contact Nathan Belz at npbelz@alaska.edu.