
CESTiCC



Center for Environmentally Sustainable Transportation in Cold Climates

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Message from the Director



Time flies! As we wrap up the 2015 fall semester with students' final exams starting next week at the University of Alaska Fairbanks, I am pleased to bring you this E-newsletter, which highlights CESTiCC's research, technology transfer, and other accomplishments from this fall.

I invite you to visit our [website](#) as well as our [Facebook](#) page to stay up-to-date with CESTiCC's many activities.

Best wishes to you all for a wonderful holiday season and a new year filled with peace, happiness, and success.

Warm Regards,
Jenny Liu

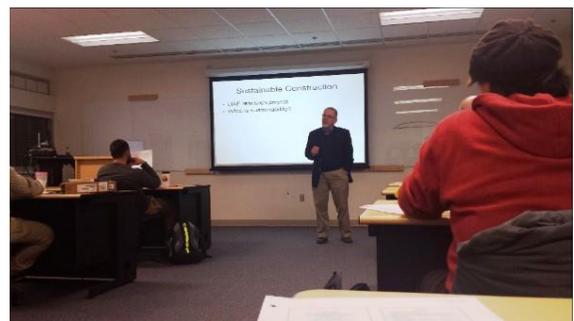
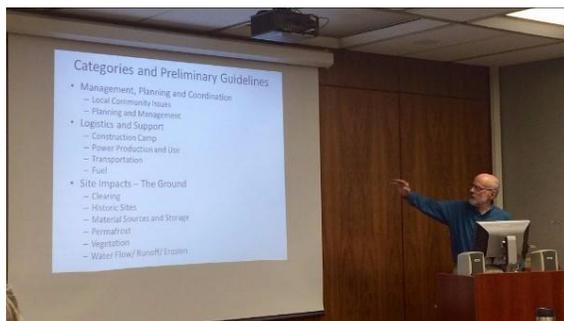


Research Highlight

Sustainable Construction in Remote Cold Regions

How can construction contractors operating in remote cold regions carry out their operations in a sustainable, environmentally-responsible manner? That is the basic question dealt with in a recent study funded by CESTiCC and the University of Alaska Fairbanks. Professor Robert Perkins, P.E., Professor of Civil and Environmental Engineering at UAF, and Larry Bennett, P.E., Emeritus Professor of Engineering Management at UAF, collaborated on the project, with Perkins as Principal Investigator. Rather than deal with the entire field of sustainable construction, the investigation focused on the environmental sustainability aspects of field construction and the maintenance operations and their related logistics for horizontal projects such as roadways, airfields, pipelines and boardwalks in remote cold regions.

Two major segments comprised the project: 1.) the development of a set of guidelines and 2.) the transfer of knowledge and lessons learned. The first segment began with an extensive literature search that uncovered literally thousands of bits of related information. Those findings were then filtered for relevance and organized into a preliminary taxonomy for further study. The researchers then conducted a series of in-person interviews with over 20 experts, including construction contractors, agency personnel, consultants, and project owners, to solicit their suggestions for environmentally sustainable guidelines for contractors operating in remote cold regions. These suggestions were then melded with the literature findings to form a set of guidelines numbering about 230, organized into 16 categories. The categories for these “tips, suggestions, and ideas for increasing the net benefit of Alaskan construction projects”.



A major effort associated with the project is the “technology transfer” segment. Practical research projects can be successful only if the findings are made available to contractors, engineers, planners, owners, agency personnel, and others

who build in remote cold regions. To that end, Bennett and Perkins have been disseminating the study through various venues and professional occasions. Some of them included presentations at the Alaska Department of Transportation and Public Facilities (AKDOT&PF) Central Region's Quarterly Design Meeting, a workshop with AKDOT&PF personnel, a seminar held at the Fairbanks office of the Associated General Contractors, and presentations at the 2015 International Symposium on Systematic Approaches to Environmental Sustainability in Transportation (ISSAEST). A syllabus for a module on sustainable construction, suitable for a university construction course, has been developed, including a case study based on a real-life construction project in rural Alaska. This case study was presented, and the project's findings were discussed, at a class on Construction Project Management at the University of Alaska Community and Technical College.

For further information, contact Professor Bob Perkins, P.E., PhD, at [907-474-7694](tel:907-474-7694)/raperkins@alaska.edu.

Educational Outreach

The Who and What of CESTiCC at the ASCE Fairbanks Chapter October Meeting

On October 21, 2015, director Dr. Jenny Liu was invited to give a presentation at the ASCE Fairbanks Chapter October meeting. During the meeting, Dr. Jenny Liu provided an overview of CESTiCC and its role in enhancing outreach, technology transfer, and workforce development for professional societies. Attendees expressed great interest in CESTiCC's monthly webinar series and the Summer Transportation Institute and appreciated CESTiCC's contributions to the engineering community.

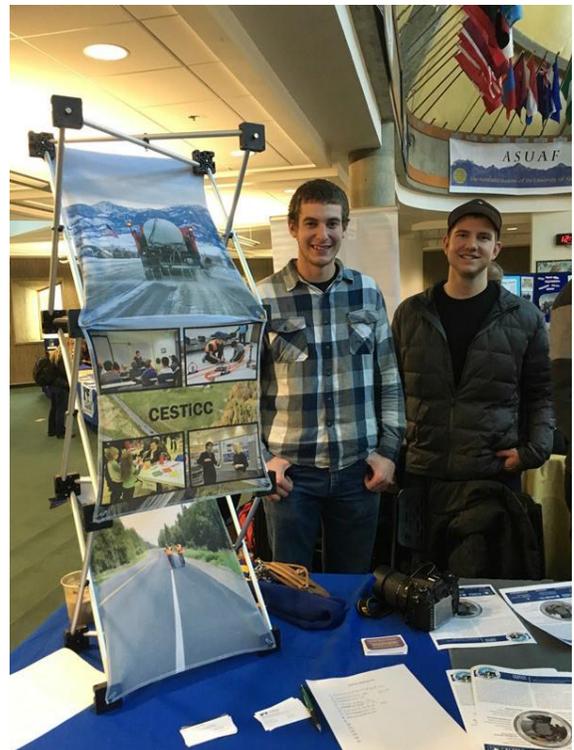


Major Mania

The University of Alaska Fairbanks boasts over 160 programs, but sometimes

having that many options can feel a little overwhelming. Major Mania, hosted by the UAF Academic Advising Center, gives students the opportunity to access resources that will help them make informed decisions when choosing their major. On October 23, 2015, current and prospective UAF students gathered in the Wood Center to connect with faculty, staff, and students from the majors they were personally interested in.

CESTiCC met with numerous students during the event that were interested in civil engineering to discuss the positive impacts one can make in the field. And of course, CESTiCC always appreciates the chance to discuss our innovative research with the university community and inform students of the unique research opportunities CESTiCC provides.



[Technology Transfer](#)

Webinar Series

This fall, CESTiCC hosted four webinars focusing on a range of research topics. The webinars were recorded and are available for download on our website.

[Sustainable Construction in Remote Cold Regions: Methods and Knowledge Transfer](#)

In September, Drs. Robert Perkins and Larry Bennett discussed the use of sustainable methods techniques in cold, remote areas. The research identifies and codifies environmentally sustainable construction practices for use by contractors operating in remote cold regions. Since these areas are typically relatively undeveloped, a large proportion of construction work is related to developing the transportation infrastructure – roadways, airfields, boardwalks, pipelines, and the like. The research also involves knowledge transfer tasks that will make the findings available to contractors, owners, and others responsible for construction in remote, cold regions and to students of construction management.

Measurements and Modeling of Vehicle Cold Start Emissions

In October, Drs. Serena Chung and Tom Jobson explained the many negative effects of vehicle cold start emissions and their work on measurements and modeling. Exposure to vehicle exhaust emissions is a major cause of cardiovascular disease and a cancer risk factor. Vehicle emissions models, such as the US EPA's Motor Vehicle Emissions Simulator (MOVES) suggest that in cold climates, the majority of pollutant mass emitted by vehicles occurs during engine cold starts and idling and not when the vehicle is moving along the road. They are measuring chemical composition of cold start emissions to evaluate the temperature dependence of cold start emissions. They are also using high time resolution measurements of carbon monoxide (CO), nitrogen oxides (NO_x), and volatile organic compounds (VOCs) to measure pollutant mass emitted during engine cold starts from gasoline and diesel engine vehicles. This work lays the foundation to evaluate and improve MOVES' ability to simulate cold start emissions and their impact on air quality.

Pervious Concrete Performance

In November, Dr. Liv Haselbach talked about the performance of pervious concrete in Eastern Washington and Southern Brazil. The foci in Eastern Washington were on long-term infiltration capabilities and surface evaluations, including winter conditions and as related to the areas of associated run-on. The focus in Southern Brazil was with respect to soil clogging based on laboratory analyses on small slabs and cylinders. All of the studies were then compiled to effect a nondestructive method to estimate slab porosity from initial surface infiltration rates.

Evaluation of Effectiveness and Cost-Benefits of Woolen Roadside Reclamation Products

In December, Mr. Rob Ament presented his research on the potential woolen

roadside reclamation products using waste wool as a principal fiber. Potential woolen roadside reclamation products have many promising attributes that may make them superior to existing standard materials, such as higher water retention rates, biodegradability and nutrient composition – sheep wool consists of 15-17 percent nitrogen and has other plant nutrients that become available as it decomposes. This project is developing and testing, in conjunction with Montana wool mills and a Minnesota erosion control blanket (ECB) manufacture, potential woolen ECBs, silt fencing and using wool as an additive to compost. The project is measuring vegetative establishment and/or soil erosion using putative U.S. wool products in comparison to standard roadside reclamation analogs such as coconut straw ECBs, plastic silt fence and wood fiber compost. Eventually, after two growing seasons, the project will conduct cost-benefit analyses to see whether it is sensible to further develop any successful woolen products or if any are ready for immediate deployment.

Assistant Director Rob Ament Addressed Ecology and Transportation Issues

In late September, researchers, biologists, engineers, project managers, policy makers and more gathered in Raleigh, North Carolina for the [International Conference on Ecology and Transportation \(ICOET\)](#). Experts from the field collaborated on the most current research information, quality applications, and best practices to enhance the development and ecological sustainability of transportation systems. One of those experts was CESTiCC Assistant Director Rob Ament.

Rob's research addresses conservation and ecosystem management in respect to environmentally sustainable transportation, one of the five research thrusts of CESTiCC. Along with his Western Transportation Institute colleagues, Rob gave a number of presentations on sustainable transportation ecosystems such as estimating the future impacts of exurban growth and traffic demand on wildlife connectivity, cost reduction opportunities associated with design and construction of wildlife overpass structures, and the long-term response of grizzly bears to wildlife crossing structures.

The conference was co-hosted by the North Carolina Department of Transportation, with support from the U.S. DOT Federal Highway Administration. CESTiCC is proud to have sponsored this conference.

CESTiCC Participates in U.S. DOT FHWA Eco-Logical Webinar

On November 12, 2015, the U.S. DOT Federal Highway Administration's Eco-Logical webinar series featured CESTiCC Assistant Director Rob Ament as one of their speakers and panelists. The webinar discussed Crucial Habitat Assessment Tools (CHAT) and Wildlife Data and addressed questions such as: What are the Crucial Habitat Assessment Tools (CHAT)? How can the CHAT be integrated into the transportation planning process? How does CHAT link to the Eco-Logical approach?

Dr. Liv Haselbach Presents on Pervious Concrete Research all over the World

Dr. Haselbach has been actively communicating her research on pervious concrete in local and international settings. Pervious pavements are increasingly being considered by a variety of agencies and municipalities as best management practices and potential low impact design elements. In October, Dr. Haselbach traveled to Brazil to give the keynote speech on Pervious Concrete at the 57th Brazilian Conference on Concrete. Nearly 1000 people gathered for this conference. Dr. Haselbach was also invited by the ASCE Inland Empire Branch Meeting in Spokane, Washington and by the City College of New York in Manhattan to present on pervious concrete.



Dr. Xiong Zhang Presents at the 6th Asian Pacific Conference on Unsaturated Soils

The 6th Asian-Pacific Conference on Unsaturated Soils was held from October 23-26, 2015 in Guilin, China. The conference had a strong emphasis on both the theoretical aspects and practical significances of unsaturated soil mechanics in the region. The conference provided a forum for researchers and practitioners in the region and beyond to present their latest developments and exchange ideas in the subject, with strong relevance to problems in the region such as heave/desiccation shrinkage, collapse, rainfall-induced slope instability, contaminant transport etc. The

latest developments in unsaturated soil mechanics led to a much better understanding and solution of many emerging problems such as soil/ atmosphere interaction, thermal & chemical influence, and climate change. CESTiCC PI, Dr. Xiong Zhang, presented on [“Problems Associated with Determination of Yield Curves for Unsaturated Soils”](#) and [“Failure of Divide-and-Conquer Approach in the Characterization of Unsaturated Soils.”](#) Dr. Zhang also chaired a technical session entitled *Engineering Applications*.

Our Students

Ph.D. Student Chuang Lin Presents Research at Zhejiang University, China

On August 31, 2015, Dr. Xiong Zhang’s Ph.D. student, Chuang Lin, was invited to present his research at Zhejiang University in China. Chuang presented and discussed typical hazards in cold regions, applications of wicking fabric to mitigate frost heave issues, and the possibilities of introducing wicking fabric to high speed railway construction procedures. Chuang also toured the research facilities at Zhejiang University's engineering department and researchers showed great interest of further collaborations in the future.



Beaux Kemp and Sophia Tidler Receive Coral Sales Scholarship

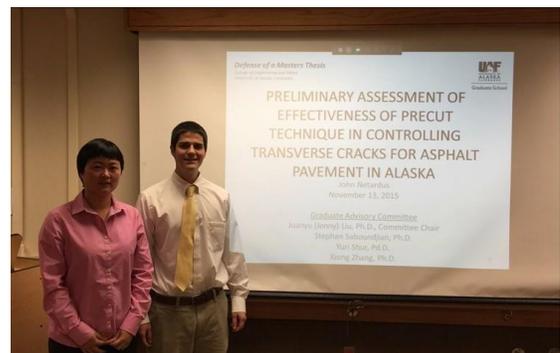
Congratulations to Beaux Kemp and Sophia Tidler, awardees of the 2015 Coral Sales Scholarship! Beaux Kemp is a CESTiCC graduate student under the supervision of Dr. Jenny Liu. Sophia Tidler is a senior undergraduate student in Civil Engineering. On November 2, 2015, Tom MacFarlane and Damian Casados from Coral Sales Co. visited Fairbanks to give scholarships to two awardees. CESTiCC faculty Drs. Robert Perkins and Jenny Liu attended the scholarship reception along

with several other Civil Engineering students. Coral Sales Co., with its headquarters located in Portland, Oregon, specializes in supplying high quality safety and maintenance products to the transportation industry in the Pacific Northwest, and has been supporting transportation engineering students at universities in the Pacific Northwest since 1987. We appreciate their constant support!



John Netardus Passes His Master Thesis Defense

Congratulations to John Netardus! On November 13, 2015, John Netardus passed his master thesis defense. His thesis topic is “Preliminary Assessment of Effectiveness of Precut Technique in Controlling Transverse Cracks for Asphalt Pavement in Alaska.” John is currently working for the Design section of AKDOT&PF Northern Region. He has been involved in a recently completed project entitled “Evaluate Presawn Transverse Thermal Cracks for Asphalt Concrete Pavement” funded by AKDOT&PF and PacTrans. He is very excited to continue his role with DOT in a new CESTiCC project on continued field monitoring of precut technique.



Upcoming Events

- **Transportation Research Board 95th Annual Meeting:** January 10-14, 2016. This information packed program attracts more than 12,000 transportation professionals from around the world. CESTiCC will be active in showcasing the Center's research and outreach through various venues at TRB such as lectern, poster, and workshop sessions, and professional meetings. We look forward to meeting you there!
- **CESTiCC February Webinar-Sustainability Practices in Highway Winter Operations: A Renewed Perspective:** February 17, 2015, 11:00 AM AKST. CESTiCC Assistant Director, Dr. Xianming Shi's research on environmentally friendly winter maintenance has been highlighted by journalists all over the nation. We will be repeating this webinar due to popular demand. [Register here.](#)
- **ASCE CI Summit:** March 9-12, 2016. The theme of the 4th CI Summit is Innovations in Construction. The Summit's technical program will provide insights on the latest techniques, technologies, and strategies used by owners, engineers, and contractors to manage risk and to successfully deliver their projects. Dr. Jenny Liu will be chairing a technical session entitled *Advances in Pavement Design, Construction, Preservation, and Assessment* and also serving on the panel of this session.
- **Imagine Tomorrow:** May 20-22, 2016. Imagine Tomorrow challenges 9th through 12th graders to seek new ways to support the transition to alternative energy sources. Students research complex topics related to renewable energy, then innovate technologies, designs, or plans to mobilize behavior. Join us at this CESTiCC outreach event!
- **2016 Transportation Research Congress Conference:** June 6-8, 2016. TRC aims to provide an international platform for universities, research institutes, industries, associates and governments to incubate, lead, demonstrate and implement innovations, and ultimately evolve into a think tank for transportation innovations. The 2016 TRC is the first TRC conference that covers a variety of topics in areas such as Materials, Pavement Structure, Subgrade and Geotech, Tunnel, Bridge, Traffic and Planning. CESTiCC is pleased to be co-sponsoring and organizing this conference.



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