Program Progress Performance 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

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Project Title: Tier 1 University Transportation Center for Environmentally Sustainable Transportation in Cold Climates (CESTiCC)

Program Director: Dr. Jenny Liu, P.E., Associate Professor in Civil Engineering Email: jliu6@alaska.edu; Phone: 907-474-5764

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Recipient Organization: University of Alaska Fairbanks PO Box 755900, Fairbanks, AK 99775-5900

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Report Term: Semi-annual PPPR #2

Signature: 

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1. Accomplishments

● What are the major goals and objectives of the program?

The major goals and objectives of CESTiCC program are to systematically engineer environmentally sustainable transportation infrastructures in cold climates, considering the entire life cycle of transportation planning, design, materials selection, construction, maintenance and operations, preservation, and recycling through the collaboration of academia, industry and other stakeholders by cross-disciplinary research, education, and technology transfer activities.

● What was accomplished under these goals?

During the past six months of the project:

■ Website redesign
  The CESTiCC website was completely redesigned using a new software called Umbraco to better publicize the Consortium’s research projects and various activities. The website has improved significantly with better navigation and functionality.

■ Regular email announcements and website update
  A CESTiCC emailing contact list was created categorized by partners, the advisory board, peer UTCs, researchers and students, etc. The Center announcements have been distributed through emails and then forwarded to professionals in the transportation and engineering communities by CESTiCC partners such as the Environmental UTC Network, Infrastructure & Climate Network, TRB committees, ASCE committees, DOTs’ Research, Development, & Technology Transfer section, etc. Center activities have been posted to the website in a timely fashion as reflected by News, Webinars, and other links on the website.

■ Monthly seminar series
  Starting in September, CESTiCC has hosted monthly webinar that invites internationally recognized researchers to discuss Environmentally Sustainable Transportation in Cold Climates. The seminar series is free and open to all transportation professionals and engineering communities. September’s topic was “Use of Wicking Fabric to Dehydrate Road Embankment under Unsaturated Conditions”.

■ Research projects
  Twelve research projects were selected through a peer-reviewed process during this quarter. These projects cover all five research thrusts of the Center, and they are:
  - Development of Guidelines for Synthetic Fluid Dust Control Palliative Application
Due to the staff change and associated changes of scope of work and budget (subawards) as explained in Changes section, all selected projects were finally launched up at the end of this reporting period or in October.

- International Symposium
  CESTiCC will be hosting the International Symposium on Systematic Approaches to Environmental Sustainability in Transportation on August 2-5, 2015 at Fairbanks, AK. During the reporting period, the Center has been working with various partners on planning and organizing this event. The first call-for-participation was announced through CESTiCC emailing list and communities of various TRB and ASCE committees and other professional societies. Brochures were also distributed through other conferences and professional meetings.

- CESTiCC has actively participated in numerous outreach activities and technology transfer to promote environmental sustainability in transportation. Details are provided next in this section and next sections of Products and Impacts.

- Meetings with state agencies, industry experts, private sectors, and other institutions were held to discuss ideas and collaborate on research, education, workforce development, and outreach activities.

- What opportunities for training and professional development has the program provided?

  - The ASCE Inland Empire Section’s one-day seminar on Pervious Pavements on April 25, 2014: Dr. Liv Haselbach (as one of panelists) presented research and field practice of Pervious Concrete in Pullman.
  - Introduction to LCA and Applications for Pavements Workshop on June 23rd to 27th, 2014 at Beijing University of Technology in Beijing, China: Dr. Liv Haselbach led this workshop as the invited speaker.
A lecture to the participants of NSF Research Experience for Undergraduates (REU) program at Western Transportation Institute in July, 2014: Dr. Xianming Shi gave a lecture on *Six Key Elements of Writing High-Quality Journal Papers*.

AKDOT&PF Research, Development, & Technology Transfer workshop on *Micro-Deval Test for Assessing Alaska Aggregates* on July 9th, 2014: Dr. Jenny Liu was the invited speaker.

A workshop held in Las Vegas, NV on “*Use of H2Ri Wicking Fabric to Dehydrate Unsaturated Embankment*” to engineers from Tencate Geosynthetics and other industries on July 25th to 26th, 2014: Dr. Xiong Zhang was the invited speaker.

CESTiCC’s September webinar on “*Use of Wicking Fabric to Dehydrate Road Embankment under Unsaturated Conditions*” on September 29th, 2014.

- How have the results been disseminated? If so, in what way? (Please provide links or examples for website use.)

CESTiCC staff and researchers have been actively involved in various professional meetings and outreach activities to promote the UTC program, enhance public understanding and increase interest in learning and transportation careers. Some examples include:

- **Kids2College program at UAF in April**
  CESTiCC Director Dr. Jenny Liu and her students hosted an engineering session for twenty-six 5th graders from Denali Elementary School. Dr. Liu gave a presentation to show students the unique engineering challenges of transportation infrastructure in cold regions and research and practice in advancing innovative sustainable materials and design and reducing environmental impacts during construction, operations and preservation for transportation infrastructure use in cold regions. The students then had the opportunity to see equipment and testing specimens to simulate real world situations.

- **Imagine Tomorrow High School Competition from May 30th to June 1st, Pullman, Washington**
  CESTiCC (as one of the executive sponsors) supported the Imagine Tomorrow High School Competition (http://imagine.wsu.edu/) held annually in Pullman, WA in which 9th through 12th graders seek new ways to support the transition to alternative energy sources and solve other energy issues.

- **GeoShanghai 2014 International Conference from May 25th to 28th, Shanghai, China**
  The conference hosted over 500 professionals from more than 30 countries. Dr. Xiong Zhang served as Secretary General of the conference, and Dr. Jenny Liu served as Session Chair of the keynote lectures session. In addition, CESTiCC researchers and students presented and published five papers at the conference. Dr. Jenny Liu and her former Ph.D. student received the “Best Paper Award” at the
conference for their paper entitled “Predictive Model for Nonlinear Resilient Modulus of Emulsified Asphalt Treated Base.”

- Research Experience for Undergraduates (REU) program at Montana State University in summer of 2014
  Michelle Akin and Dr. Xianming Shi mentored two undergraduates Rochelle Starrett and Alison Su in research of Moisture Susceptibility of Multi-scale Modified Asphalt Binder through REU program in summer of 2014.

- Alaska Summer Research Academy (ASRA) program at UAF in July
  CESTiCC students hosted a tour of paving materials lab to nine high school students during their 2-week Civil Engineering module of the ASRA program. High school students learned what transportation engineering is all about, typical Alaska road issues and problems and how engineers create solutions for these problems.

- Biomass 2014: Growing the Future Bioeconomy from July 29th - 30th, Washington D.C.
  As one of five panelists in the session entitled "Engaging Key Audiences in Bioenergy", Dr. Liv Haselbach gave a presentation on the Imagine Tomorrow model for engaging young people in working on solutions to real-world biofuels challenges at this 7th annual conference of the U.S. Department of Energy Bioenergy Technologies Office (http://www.energy.gov/eere/bioenergy/biomass-2014-growing-future-bioeconomy).

- The 2nd International Symposium on Winter Road Maintenance from August 19th – 22nd, Harbin, China
  CESTiCC co-sponsored this International Symposium (http://2ndwrm.chts.cn/) which provided a forum for transportation professionals to discuss and share innovative ideas and latest advances in the planning, maintenance, management and operations of transportation systems under adverse winter weather conditions.

- The 17th Annual National Tribal Transportation Conference from September 22nd – 25th, Anchorage, AK
  CESTiCC co-sponsored the 17th Annual National Tribal Transportation Conference (http://www.ttapnttc.com/). By working with Alaska Tribal Technical Assistance Program (AKTTAP), CESTiCC aimed to promote transportation issues for environmental sustainability to tribes and rural communities through education, training, and technology transfer.

- INE Research showcase on September 30th, Anchorage, AK
  The UAF Institute of Northern Engineering (INE) Center Directors and the Dean of College of Engineering & Mines had a meeting with industry leaders to discuss how research in the College can help address industry needs on September 30th at the BP Energy Center (Anchorage). CESTiCC presented posters and shared brochures to increase industry awareness of our research capabilities.
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 CESTiCC funded research, education, and outreach activities move forward as scheduled.

- Research projects
  In the early stage of the next reporting period, research project descriptions will be submitted to the TRB’s Research in Progress (RiP) database and uploaded to the Center’s website. Technical advisory committees will be established for each research project. Teleconference calls or Gotomeetings between PIs and technical advisory committees will be regularly held, and quarterly reports are required to keep the projects in good progress.
  - A Gotomeeting with CESTiCC Advisory Board will be held in November to report the program progress so far and receive comments and feedback from advisory board members.
  - CESTiCC will proactively identify critical environmental sustainability related transportation issues deserving research and work with public and private collaborators to develop new research need statements for Year Two research.
  - CESTiCC will play an active role during the 2015 TRB Annual Meeting by co-hosting a reception with PacTrans and actively supporting UTC related activities. CESTiCC researchers and students will present their research at TRB as well.
  - CESTiCC will continue monthly webinar series by working with partners such as Environmental UTCs Network, Infrastructure & Climate Network (ICNet), and Louisiana Transportation Research Center, etc. The seminar series will be open to all transportation professionals and presentations will be posted on the Center’s website after the seminar.
  - CESTiCC will continue to participate in various activities on outreach, technology transfer and other activities to publicize the Center. An interview with CESTiCC at two radio programs is scheduled on December 10th to discuss Environmental Sustainability in Transportation Infrastructure. CESTiCC will continue to support Annual Engineering Open House at UAF.
  - Timely website update and development of an E-newsletter
  - Organizing the International Symposium
    During the next reporting period great effort will be spent on planning and organizing the International Symposium on Systematic Approaches to Environmental Sustainability in Transportation. The symposium website and brochure will be updated after finalizing members of International Advisory Committee and Technical Committee. Committees will be also busy with paper processing and peer-reviews.

2. Products

- Publications, conference papers, and presentations
Publications

Presentations
- “Transportation Infrastructure in Cold Climates” by J. Liu, Engineering session in Kids2College program, University of Alaska Fairbanks, April 2014.
- “Predictive Model for Nonlinear Resilient Modulus of Emulsified Asphalt Treated Base” by P. Li and J. Liu, GeoShanghai International Conference, Shanghai, China, May 2014.
- “Evaluation of Pavement Preservation Treatments Used in Alaska” by A. Mullin and J. Liu, GeoShanghai International Conference, Shanghai, China, May 2014.
- “Effect of Temperature and Water Content on Creep behavior of Grouted Anchors” by X. Zhang, GeoShanghai International Conference, Shanghai, China, May 2014.
- “Development of a New High-suction Tensiometer” by X. Zhang, GeoShanghai International Conference, Shanghai, China, May 2014.
- “Stabilization of Erodible Slopes with Geofibers and Nontraditional Liquid Additives” by X. Zhang, GeoShanghai International Conference, Shanghai, China, May 2014.
- “Imagine Tomorrow High School Energy Competition” by Q. Langfitt, National Energy Literacy Virtual Town Hall, August 2014.
• “Roadway Deicers on Concrete Bridge Decks” by X. Shi, 2014 APWA Western Snow & Ice Conference, Loveland, CO, September 2014.

• Websites
  ■ CESTiCC website: http://ine.uaf.edu/cesticc/
  ■ CESTiCC Facebook Page: https://www.facebook.com/cesticc

• Lectures/Seminars/Workshops/Invited talks
  ■ Seminar: “Pervious Concrete in Pullman” by L. Haselbach, ASCE Inland Empire Section one-day seminar on Pervious Pavements, April 25, 2014.
  ■ Lecture: “Six Key Elements of Writing High-Quality Journal Papers” by X. Shi, Research Experience for Undergraduates (REU) program at Western Transportation Institute, July 2014.
  ■ Seminar: “Use of Wicking Fabric to Dehydrate Road Embankment under Unsaturated Conditions” by X. Zhang, CESTiCC monthly webinar series, September 29th, 2014.
3. Participants & Collaborating Organizations

● What organizations have been involved as partners?

  ■ Collaborative research and financial support
  Twelve research projects were selected and funded by CESTiCC and the following agencies:
  - Alaska Department of Transportation and Public Facilities
  - Minnesota Department of Transportation
  - Nevada Department of Transportation
  - Washington State Department of Ecology
  - Clear Roads Pooled Fund
  - TenCate Geosynthetics
  - Midwest Industrial Supply, Inc., Canton, OH

● Have other collaborators or contacts been involved?
  Tele-conferences and Gotomeetings were held during the reporting period to discuss research ideas and broad collaborations on research, education, workforce development, and outreach activities between CESTiCC and various collaborators:

  ■ Research collaborators:
  - Apun LLC, Anchorage, AK
  - Alaskans for Litter Prevention and Recycling (ALPAR)
  - Insulfoam
  - Central Environmental Inc.
  - University of Tennessee

  ■ Education and outreach collaborators:
  - Alaska Tribal Technical Assistance Program Center
  - Environmental UTCs Network
    - CESTiCC
    - National Center for Sustainable Transportation
    - Marine Engine Testing and Emissions Laboratory
    - Electric Vehicle Transportation Center
    - Mid-Atlantic Transportation Sustainability (MATS) Center
  - PacTrans
  - Infrastructure & Climate Network (ICNet)
  - Louisiana Transportation Research Center

  ■ Collaborators for organizing International Symposium:
  - ASCE Construction Institute
  - University of Kansas
  - University of Tennessee
  - Tongji University
  - Chinese Society of Civil Engineering
  - International Association of Chinese Infrastructure Professionals
  - Chinese Academy of Engineering
  - TRB standing committees
    - ADD40 Transportation and Sustainability
- AFB30 Low-Volume Roads
- AFD90 Surface Properties - Vehicle Interaction
- AFK20 Characteristics of Asphalt Materials
- AFK50 Characteristics of Asphalt Paving Mixtures to Meet Structural Requirements
- AFN10 Basic Research and Emerging Technologies Related to Concrete
- AFP50 Seasonal Climatic Effects on Transportation Infrastructure
- AFP60 Engineering Behavior of Unsaturated Soils
- ASCE standing committees
  - Bituminous Materials Committee
  - Highway Pavements Committee

4. Impact

- Society beyond science and technology

5. Changes

- The UTC grant was modified in spring 2014 and a revised budget was submitted and approved by U.S. DOT OST-R.
- The previous program assistant left CESTiCC in May. Efforts were spent on the recruiting and hiring process of a half-time program assistant. Mrs. Melissa Sparks started her job as our new program assistant on September 2nd.
- Dr. Xianming Shi, prior Associate Director of CESTiCC at Montana State University (MSU), started his new position with the Washington State University (WSU) in August. Ms. Laura Fay then replaced Dr. Shi as the associate director at MSU for the CESTiCC program. The request for changes of MSU scope of work and associated budget (subawards) revision were submitted to, reviewed and approved by U.S. DOT OST-R.
- Due to the above change, some proposals (led by Dr. Shi) submitted originally from MSU had to be resubmitted from WSU, which caused more time and effort from all consortium universities to complete the required paperwork and procedures for setup of projects. All selected projects were finally launched up at the end of this reporting period or in October.