

## INVESTIGATING INNOVATIVE RESEARCH OPPORTUNITIES RELATED TO HIGHWAY INFRASTRUCTURE DESIGN AND MAINTENANCE

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This project aimed at proactively addressing the nation's failing infrastructure through innovative and practical research. Many Departments of Transportation have been looking for new methods and technologies to better build and maintain highway infrastructure. Creative ideas are necessary to ensure that 1) new designs are adequate to meet the heavy demands and 2) longevity of new infrastructure is assured. Due to the depth and breadth of this work, it has been necessary to develop partnerships and relationships with multiple DOTs, research institutes and academic institutions.

The primary tasks for this project focused on promoting research opportunities that identify highway infrastructure field instrumentation related to design and maintenance, creating partnerships with several state departments of transportation to foster state-of-the-art research related to geosynthetic pavement design, and initiating new research that utilizes technological solutions and high performance materials in design.

To accomplish this work, WTI has diligently pursued funding and partnerships from a variety of sources, including: National Science Foundation (three proposals related to geosynthetic material properties pertinent to pavement reinforcement); a multi-state supported pooled fund study to investigate geosynthetic material properties for highway design involving MT, WY, WA, CA, TX, MO and NY; private industry (Tensar Technologies Inc., Ryan R. Berg & Associates, Inc., Christopher Consultants); universities (University of Illinois – Champaign-Urbana, University of Maryland); and FHWA (proposal through Federal Business Opportunities – FBO). Representatives from this program area also initiated and orchestrated several meetings with the Montana Department of Transportation to determine and address specific research needs. Multiple projects have resulted from these meetings. Research findings were disseminated through conference attendance and paper submissions, appropriately fostering research partnerships.

Significant effort was also made to formally develop these ideas into a distinct and strong program area within the Western Transportation Institute. Several faculty members within the Civil Engineering Department at Montana State University have been instrumental in this development. In particular, Associate Professor Steve Perkins was hired as a joint appointment between the Civil Engineering Department and the Western Transportation Institute to help cultivate additional research related to geosynthetic reinforced pavement design. A full SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis was performed to determine the strategic direction of the Infrastructure Maintenance and Materials program area. These efforts lead WTI to appoint Eli Cuelho as the manager of this program area. A full time Research Associate was also hired to broaden our expertise (Michelle Akin). During this effort, a 1000 square-foot laboratory dedicated to materials-related research was also planned and constructed. This laboratory is currently being furnished with several pieces of equipment dedicated to conduct geosynthetic and other materials-related experiments.

Finally, researchers were also involved in several service activities to learn the direction of transportation-related materials research and to promote WTI as a resource for doing this type of research. Specifically, Eli Cuelho became the chair of an ASTM committee dedicated to establishing standard test methods for geosynthetics pertinent to reinforced pavements. Mr. Cuelho also became a member of two Transportation Research Board (TRB) committees (AFF40

– Dynamics and Field Testing of Bridges and AFS70 – Geosynthetics). WTI anticipates significant growth in this area as a result of these efforts.

**SIGNIFICANCE:** This project has enhanced the Infrastructure Maintenance and Materials program area at the Western Transportation Institute by fostering new partners, strengthening partnerships that currently exist and becoming involved in service activities that strategically position WTI as a resource for future infrastructure-related research.