

Project: Corrosion Research and Education Transportation Test-bed (CRET)

Executive Summary: Corrosion presents unique challenges for our infrastructure and transportation systems. The direct cost of corrosion to the U.S. infrastructure and transportation system was estimated at \$52.3 billion annually. More economic loss can be attributed to indirect costs, such as traffic delays and lost productivity. It is in the nation's interest to achieve better understanding of corrosion and its control, thus reducing the astronomical costs and safety risks associated with corrosion. This is especially important in light of the nation's aging and deteriorating transportation infrastructure. Nonetheless, transportation professionals are not commonly exposed to or trained in the science of corrosion and protection.

To bridge the gap between increasing industry needs and the deficiency in educational programs, the project will provide testing facility, develop training courses and certification programs for a broad spectrum of students, especially targeting current and would-be transportation practitioners. Public-private partnerships will also be built to support corrosion research for enhanced durability of transportation systems with a focus on preventative strategies.

The Corrosion Research and Education Transportation Test-bed at Western Transportation Institute, Montana State University (*CRET*) would lead the nation in understanding and addressing corrosion and materials integrity issues pertinent to key components of the infrastructure and transportation system, such as concrete bridges, steel bridges, metal-reinforced geotechnical systems, culverts, pipelines, motor vehicles, aircraft and airfield infrastructure. The project would:

- Develop a test-bed facility with individual research and demonstration in Montana and other cold-climate states or countries.
- House a diversified group of scientists, engineers and educators to provide a multi-disciplinary approach to understanding and addressing issues related to durable and sustainable infrastructure.
- Maintain a clearinghouse for corrosion research information and a dynamic peer exchange forum for transportation professionals.
- Provide training courses and certification programs for a broad spectrum of students and target especially the current and would-be transportation practitioners.
- Improve education and training of transportation professionals in recognition of corrosion control.
- Pool resources from different partners to answer both fundamental and applied research questions related to durable and sustainable infrastructure.
- Identify knowledge gaps and research needs through a close relationship with various stakeholders, and serve as a bridge between industry and academia.
- Improve corrosion control technologies through research, development, and implementation.

Congressional Action Needed: A total appropriation of \$2.4 million over three years (\$0.8 million/year) to support the research, development, and deployment for a *Corrosion Research and Education Transportation Test-bed (CRET)*. The project will develop a test-bed and demonstration projects in Montana and other cold region climates in order to generate an improved understanding and best practices to control materials corrosion and extend the service life of both new and existing transportation infrastructures, via workforce development, training, research and transfer of latest technologies.

Importance to the Nation and Montana: 25% of the nation's bridges are structurally deficient or functionally obsolete, according to the latest FHWA National Bridge Inventory survey. Montana has 4,980 bridges, of them 473 of them are structurally deficient and 541 of them are functionally obsolete as of December 2007. Developing this project at WTI for corrosion education and research would generate substantial cost savings and environmental benefits for the U.S. and Montana transportation system by minimizing the premature rehabilitation or failure of highway bridges and other infrastructures. The project will bring out-of-state students and jobs to the State of Montana, by offering a nationally unique program addressing the corrosion issues with significant economic and safety implications.

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Talking Points

- A historic congressional study in 2002 estimated metallic corrosion to cost the U.S. economy a staggering \$276 billion per year, of which 25~30% could be saved by employing best available corrosion management practices.
- Each year, corrosion of our highway bridges hits the U.S. economy with a hefty price tag. The direct cost of corrosion to the U.S. infrastructure and transportation system was estimated at \$52.3 billion annually. More economic loss can be attributed to indirect costs, such as traffic delays and lost productivity.
- “Durability is a cornerstone of sustainability”. Corrosion is a serious and costly problem for the nation, as it often leads to the premature failure of structures or increased need for inspection and maintenance.
- It is in the nation’s interest to achieve better understanding of corrosion and its control, thus reducing the astronomical costs and safety risks associated with corrosion. This is especially important in light of the nation’s aging and deteriorating transportation infrastructure. In addition to the need for increased awareness and education, there is an urgent need to advance the knowledge base of corrosion via cutting-edge research.
- In the U.S., there are no test-beds for research, comparison and testing of best practices for corrosion protection. Secondly, there are currently very few universities offering a transportation corrosion curriculum, as it is a highly inter-disciplinary field.
- There is a urgent need to minimize the corrosion impacts on assets, environment and people, and WTI-MSU is the only University Transportation Center (UTC) that has invested in a Corrosion and Sustainable Infrastructure Laboratory featuring a multi-disciplinary team and solution-oriented research approach.
- This project will help implement cost-effective corrosion control strategies leading to safe and reliable structures for the traveling public.