Recycled Thermoplastic Composite Bridge

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Overview

- The purpose of this project was to demonstrate that a thermoplastic composite I-beam bridge could be constructed to accommodate a M-1 battle tank.
- This effort determined the engineering and construction of such a structure was possible and be cost competitive to a wood timber bridge
- The materials are virtually maintenance-free and not subject to degradation from moisture, rot, insects and weather.

Background

- The Office of Under Secretary of Defense for Acquisition, Technology and Logistics Corrosion Prevention and Control Program funded a Technology Innovation Demonstration Project at Ft. Bragg to test the strength and durability of Thermoplastic timber in the application of a bridge to support 71 Ton Abrams Tank traffic.
- The bridge, the first of its kind, was initiated by the U.S. Army Construction Engineering Research Laboratory (USACERL) while ACSIM's ITTP funded and paid for construction and initial load testing
- The Army Bridge Inspection Team (ERDC-GSL), with contract support from Bridge Diagnostics, Inc., performed continuous load testing and recorded measurements from strain and deflection gauges as well as video cameras mounted on the bridge to continue remote monitoring.

Highlights

- A bridge designed and optimized with Axion pilings and I-beam construction similar to the tank bridge built at Fort Bragg will be approximately 32.9% lower cost per sq ft to construct than a traditional wood timber bridge and 54.8% lower cost than steel/concrete for a bridge designed to carry the same load.
- A concrete and steel bridge of similar size will cost approximately 16.5% greater per sq ft to construct than a traditional wood timber bridge.
- Bridges built with concrete poured on site must allow 28 days between cure cycles, however, bridges constructed with Axion material can be rapidly built without interruption.

Current Activities

- Army submitting thermoplastic composite bridge design criteria through AASHTO
- The guidance will be patterned after the *National Design Specification for Wood Construction* published by the American Forest and Paper Association and *Timber Bridges: Design, Construction, Inspection, and Maintenance* published by the U.S. Forest Service.
- Inclusion of drawings, engineering guidance, and material specifications into TM 5-302 "*Army Facilities Components System*" – Reference in Chapter 3 Bridges of UFC 3-320-05A / TM 5-809-6 "*Structural Design Criteria for Structures Other than Buildings*"
- Winner R&D Magazine Top 100 New Technologies in 2011