MarTREC UTC Project Information Form
USDOT Tier 1 University Transportation Center
Agency ID or Contract Number 69A3551747130

Project Title: Using CSA Cement for Novel Waterway Repair Materials
Project Abstract (Brief Description): The health and performance of maritime transportation infrastructure is critical to the nation's economic and social prosperity. Much of this infrastructure has well exceeded its 50-year design life and is often in need of repair. Because waterway transportation structures are difficult to detour, the time taken by repairs is of critical importance. The fastest repair techniques should be developed in order to minimize the time out of service. The objective of this research is to investigate the properties and behavior of Calcium Sulfoaluminate-Belite (CSA) cement mixtures for waterway repair applications. CSA cement is a rapid setting, low-shrinkage cement which can be used to form advanced new materials capable of quickly repairing the nation's maritime infrastructure. CSA cement maintains many of the beneficial qualities of portland cement but it can reach structural strengths in only a few hours and its low shrinkage makes it an ideal repair material. Despite the benefits of CSA cement, it has been studied little in the United States (U.S.). The potential advantages and drawbacks of CSA cement must be studied to determine what applications it is most suited to. For underwater repair applications, where construction time is of the essence, CSA cement may be the best option, but mixtures must be developed that can produce the necessary properties. The goal of this work is to develop new mixtures utilizing CSA cement that can be applied to waterway repairs. A grout mixture capable of setting up rapidly underwater will be developed, and a soil-cement mixture will be developed that can rapidly stabilize slopes and waterway structures.
Describe Implementation of Research Outcomes Samples using BCSA cement developed higher early strengths. The PC soil-cement specimens had higher 1-day (10% moisture content only) and 7-day compressive strengths. The soil-cement samples should be made using water.
Impacts/Benefits of Implementation *Lower moisture contents do not allow the BCSA soil-cement specimens to fully hydrate. The soil-cement specimen maximum compressive stress had between 3% and 25% variability. PC and BCSA samples did not reach their ultimate strengths within 7 days.*
Web Links: martrec.uark.edu
Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): $75,315 from MarTREC and $69,932 from Engineering Research office and Vice Provost for Research office. Total $145,247
Project Start and End Dates: 08/13/18-09/30/21. Project complete.
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