

## Data Validation of FRP Materials Used in Strengthening Bridge Beams in Louisiana

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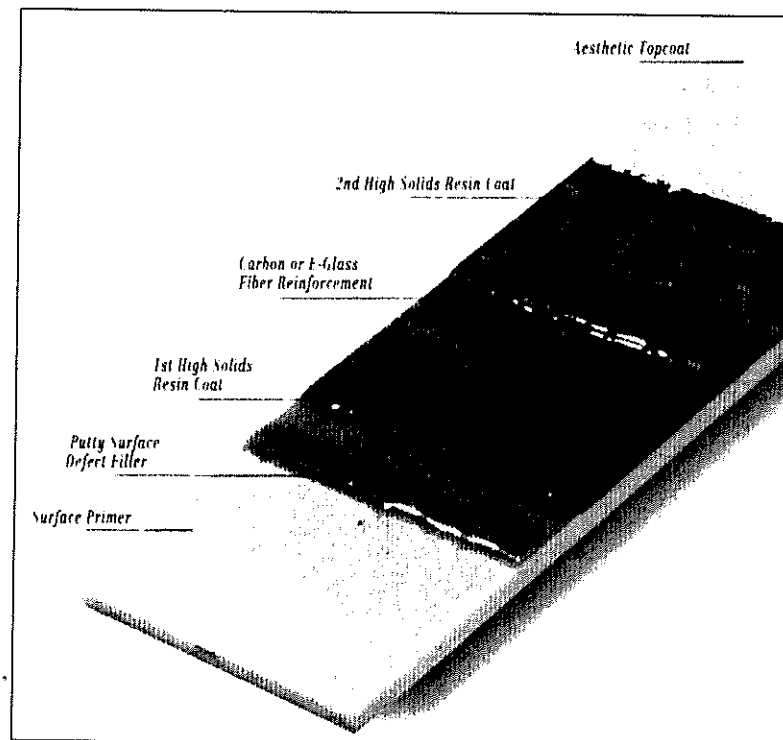
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### Problem

As part of the current LTRC project titled "Strengthening of Bridge Beams Using Fiber Reinforced Polymers (FRP)" (LTRC Project No. 03-4ST), investigators will suggest two FRP systems for field repair of candidate bridges.

An FRP system is produced by its end user with raw materials, namely resin and fiber. Although manufacturers provide performance data for their materials, sound engineering practice necessitates that this information be validated.

The quality of the final FRP product ultimately depends on quality control procedures and worker skill level. The material manufacturer's claimed strength or stiffness is often unattainable. Without experimental validation of its component parts, the FRP system may not be successful. In order to ensure the quality of the repair and provide basic design information, the FRP systems must be tested before they are recommended for practical use.



Components of an FRP strengthening system



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## Objective

Through the use of lab-scale tests, investigators will validate the physical properties of the FRP systems selected for Project 03-4ST: "Strengthening of Bridge Beams Using Fiber Reinforced Polymers (FRP)."

## Description

The procedure for preparing the FRP test specimens will precisely follow the manufacturer's recommendations and will be performed by workers possessing a skill level similar to those who will be repairing the candidate bridges.

Investigators will purchase the resin and fiber tow sheet based on the FRP systems and raw material manufacturers identified in Project 03-4ST. After the FRP sheets are prepared as laminated plates, they will be cut to the specific dimensions required by corresponding ASTM standards.

The following mechanical properties have been identified as essential and, as such, will undergo ASTM-based experiments: tensile strength and stiffness, flexure, and interfacial bonding strength with the concrete substrate. In addition, some of the FRP specimens tested for mechanical properties will also be conditioned in an environmental chamber to evaluate the effect of hygrothermal ultraviolet radiation and seawater attacks.

## Implementation Potential

The Louisiana Department of Transportation and Development and the investigators of Project 03-4ST will receive a final report detailing the test results for the selected FRP systems and the evaluation of their suitability for field-level repair. The data will then be used to design and implement the FRP repairs for Project 03-4ST.