**SCAN TEAM REPORT**

NCHRP Project 20-68A, Scan 13-03

# ADVANCES IN FIBER-REINFORCED POLYMER (FRP) COMPOSITES IN TRANSPORTATION INFRASTRUCTURE


Requested by the
American Association of State Highway and Transportation Officials

Prepared by Scan 13-03 Team
Wayne Frankhauser, Jr. – Scan Team Chair
Jerome O'Connor – Subject Matter Expert



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# Executive Summary

This document summarizes NCHRP 20-68A U.S. Domestic Scan 13-03, Advances in Fiber-Reinforced Polymer (FRP) Composites in Transportation Infrastructure. FRP is not a product; it is a class of material that can be tailored and deployed in different ways to solve infrastructure problems. This report also describes new opportunities that will arise because of FRP's unique properties. To assess the state of practice, in 2015, a team of Department of Transportation structural engineers visited states that have been using FRP for highway structures. These agencies described successful applications; however, they also noted the challenges of deploying a technology without national standards. Project summaries, plans, and specifications were shared and will be made available as a result of this scan.

The team identified cost-effective uses that are ready for deployment on a wider basis, on both existing infrastructure and for new elements and systems. On existing bridges, FRP is becoming a valuable tool for repairing and strengthening concrete members. Particularly appealing to owners is the ability to use FRP when it can provide a relatively quick solution in time-sensitive situations, such as when concrete girders have been hit by an over-height truck. In these cases, repairs can be made within a week or two of the incident. Similarly, a bridge determined to be deficient can be strengthened to avoid closing or load-restricting it, if only for the interim while developing a longer term solution. The team also identified a particular advantage relative to historic bridges, which is that FRP can often be used to extend the service life without significantly altering the appearance of these heritage structures. Thirteen applications for existing bridges were identified.

Being lightweight and corrosion-resistant is an incentive for using FRP for new structural components or even entire bridge systems. Twenty-one types of successful applications were identified and are listed herein.

The team also identified areas where practice could be improved. For example, the team suggests that a means for inspecting FRP as a bridge element be developed so that an inventory and performance history can be generated. Information sharing will benefit others who are interested in the technology. Detailed information about research and past projects can be shared via the web to elevate state-of-the-practice nationwide. Additional training is provided for designers, bridge inspectors, and the maintenance staff who are responsible for oversight and operation of the in-service bridges. Perhaps most important, the key to for owners and their engineers to fully unlock the potential of composite materials are American Association of State Highway and Transportation Officials (AASHTO) guidelines, commentary, and examples for design, construction, inspection, and maintenance. This report includes a preliminary roadmap to show what the scan team thinks is necessary to make more FRP applications practice ready.