MILE POINT INDEX // RESEARCH HIGHLIGHT BULLETIN

Can Carbon Fiber Save a Splitting Timber Bridge?

Two rural timber bridges over branches of Crow Creek near Toston, Montana

The Challenge. Broadwater County grew from 5,612 residents in 2010 to 6,774 in 2020, and peak traffic on S285 near Toston reaches 4,902 vehicles a day. Of four bridges within five miles, one is Poor and three are Fair, all fifty years old or more. A split girder means weight limits, closure, or emergency replacement. The study tested whether allowable-stress equations, plus a perfect-bond assumption for the retrofit, predict capacity.

The Research. The team salvaged twenty-two Douglas-fir and larch girders, six by eighteen and eight by eighteen inches, some split, some cracked, some sound. Coupons of the glass channels and carbon-glass strips were pulled to failure first. Beams were then tested in four-point bending, set up for shear and for flexure, with string potentiometers, a load cell, an extensometer, bearing plates, lateral bracing, and calipers.

Key Findings. The verdict was conservative: every beam carried more than its calculated capacity. Glass channels added 11.3% and 23.1% shear on narrow beams, 11.5% and 48.5% on wide. Carbon-glass crack repair raised moment capacity 29.9% and 50.5%. A six-foot channel restored narrow split beams to 97.1% of control and wide beams reached 112.2%. Installation took 1.5 hours and 30 minutes; seven months later, nothing showed.

Engineering Impact. Designers should match the repair to the damage: carbon-glass for broken or badly cracked girders, strips alone for minor cracks. Treat allowable-stress predictions as conservative, not exact. Specifications need surface preparation, strip end anchorage, confinement, and cure time for cold mornings. Inspectors should tap the channels, check strip ends for moisture, and keep monitoring, since fatigue, freeze-thaw, and long-term durability remain unproven.



Timber bridge



Frp install



Frp strip

REPORT DOI
milepointindex.com/

CASE FILE
milepointindex.com/2026-11-07_sr-285-bridge/

Scan to open the published primary research report and full Mile Point Index Case File. The bulletin condenses the verified research brief; the four classroom handouts behind it carry the load path, the data table, five worked problems, and the grading rubric.