Case Study of Application of FRP Composites in Strengthening the Reinforced Concrete Headstock of a Bridge Structure

Location: Gatton Helidon Rd. over Tenthill Creek in Gatton, Queensland, Australia.

General assessment: This simple three span reinforced concrete, prestressed beam structure was built in the 1970s. The bridge is 82.15 m long and about 8.6 m wide and is supported by a total of 12 prestressed 27.38 m long beams over three spans of 27.38 m. The beams are supported by two abutments and two headstocks.

Problem: The Tenthill Bridge has been observed to require immediate strengthening to avoid heavy load routing systems.

Solution: The flexural strength of the beam at midspan can be increased from 3,800 to 5,392 kN m by bonding four FRP unidirectional strips of 1.4 mm thickness to the tension face of the beam section.
The shear strength of the headstock can be increased from 2,065 to 2,722 kN by complete wrapping of the beam with two layers of 0.13 mm thick carbon fibers oriented along the transverse axis of the beam section

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