

## Fyfe Company Technical Report Abstract AT-9

### The use of Mechanical Anchorage in FRP Strengthening of Reinforced Concrete Beams

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When reinforced concrete beams are rehabilitated for flexure by bonding fiber reinforced polymer plates, an increase in strength is achieved. However, these beams often experience a loss of ductility. In the event of failure, flexural cracks form in the concrete and then propagate along the FRP plate until the plate debonds. Loss in load can occur abruptly, making failure potentially dangerous. Anchorage at the ends of the FRP plate can be used to inhibit the failure process by holding the FRP intact. A set of 23 FRP-plated concrete beams was tested with the intention of comparing the effectiveness of different anchorage schemes. The concrete beams were strengthened by two FRP systems (Tyfo SCH & UC Systems); beams strengthened by wet lay-up of carbon fiber fabric were anchored by embedded steel anchors, fiber bundle anchors, and fabric wrap anchors. Beams strengthened by adhesive bonding of pultruded carbon FRP strips were anchored by embedded steel anchors only. The test results show that the strengthened beams by wet lay-up and anchors experienced steel yielding at higher loads than the control beams without strengthening and the strengthened beams without anchors. Therefore, by using anchors with the same amount of FRP reinforcement, the beam can be designed to carry more live load.