

## 2. Flexural Strengthening of Corrosion-damaged RC Bridge Piers Using Ultra-High-Performance Concrete Layers: An Experimental Study

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In this study, a cross-sectional repair method was developed for corrosion-damaged RC bridge piers where the corroded concrete cover was removed and reinforced with UHPC layers. The purpose of this study was to verify the effectiveness of this method through experiments with combined axial (1 MPa) and reverse cyclic loading using five specimens. Out of the five test specimens, two specimens underwent an average of 10% rebar corrosion (Group 1), another two specimens underwent an average of 15% rebar corrosion (Group 2), and one specimen acted as the control specimen. One specimen from each group was retrofitted with 50 mm thick ultra-high-performance concrete (UHPC) layers. The experimental outcomes showed that reinforcement corrosion reduced ductility and maximum load-carrying capacity (MLC) significantly. The ductility and MLC of the specimen with 15% rebar corrosion was decreased by 17% and 9.2%, respectively, compared to the reference specimen. However, the 15% corroded specimen strengthened with UHPC layers displayed superior structural performance, for example, the MLC was increased by 24% compared to the sound specimen. Experimental results revealed that the proposed approach can be very effective in strengthening corrosion-damaged RC Bridge piers.

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