

Naris Graisor 2013: Performance Evaluation of Concrete Bridges Strengthened with CFRP Composites. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering. Thesis Advisor: Assistant Professor Piya Chotickai, Ph.D. 304 pages.

The main objective of the study was to evaluate the behavior and performance of concrete bridges by using a rating factor (RF) method as specified in the AASHTO specifications. The load carrying capacities of 10 reinforced concrete bridges and 2 prestressed concrete bridges were determined and compared with the maximum bending moment and shear forces required by the 1.3HS20-44 standard design vehicle. The rating factors of the structures were found to be in a range of 0.57 to 1.02. The structures with rating factor less than 1.0 were strengthened with CFRP composite. The overall performances of the all structures were then evaluated using a diagnostic load test with 25-ton Thai trucks. The finite element models were developed to investigate the distribution of wheel loads for various positions on the bridge spans and compared with the values provided by the AASHTO specifications. The results obtained from the field testing and FEM models revealed that the wheel load distribution was slightly altered due to the CFRP strengthening system. In addition, the performance of the bridge structures could considerably be enhanced by the strengthening system. The rating factors of all strengthened structures were found to increase and had a value greater than 1.0.

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Thesis Advisor's signature