

Ruttapoomh Pumma 2009: Condition Assessment and Strength Evaluation of Deteriorated Reinforced Concrete Bridges. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering. Thesis Advisor: Assistant Professor Piya Chotickai, Ph.D. 215 pages.

The research study presents the procedure for condition assessment and strength evaluation of deteriorated of deteriorated reinforced concrete bridges. Eleven reinforced concrete bridges deteriorated due to environmental effects and traffic loadings were chosen in the study. The damage conditions of the structures were evaluated using various nondestructive evaluations, including visual inspection, ultrasonic pulse velocity (UPV), and rebound hammer. The condition ratings of the bridge structures were determined based on the criteria suggested by FHWA and found to be in a range of 4 and 9. Additionally, one of the bridge structures was selected for an in-depth investigation using the diagnostic load test and material testing. The load-carrying capacity of the bridge structures was determined by using the rating factor (RF) in accordance with the AASHTO Standard Specifications. The experimental results indicate that the UPV testing can provide an estimate of the structural condition better than the rebound hammer testing. The chloride concentration at reinforcing steels in the piers was found to be greater than the threshold value of 1.2 kg/m^3 . This agreed with the existing condition of the piers, which had extensive cracking and spalling of concrete cover. Additionally, the results obtained from the analysis and load test were used to evaluate the dynamic amplification factor (DAF), equivalent width (E), and RF of the investigated bridge structure. The analytical results reveal that the simplified equations provided in the AASHTO Standard Specifications can overestimate the equivalent width of the investigated structure. The RF was found to be greater than 1.0; therefore, the structure can safely resist the load utilized during the design process. The procedure presented in the study may be employed for evaluating the damage condition and load-carrying capacity of other deteriorated reinforced concrete bridges.

Student's signature

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