

Strengthening Evaluation of Steel Girder Bridge under Load Rating Analysis: Case Study

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Abstract : A case study about the load rating and strengthening evaluation of the six-span of steel girders bridge in Colton city of State of California is investigated. To simulate the load rating strengthening assessment for the Colton Overhead bridge, a three-dimensional finite element model built in the CSiBridge program is simulated. Three-dimensional finite-element models of the bridge are established considering the nonlinear behavior of critical bridge components to determine the feasibility and strengthening capacity under load rating analysis. The bridge was evaluated according to Caltrans Bridge Load Rating Manual 1st edition for rating the superstructure using the Load and Resistance Factor Rating (LRFR) method. The analysis for the bridge was based on load rating to determine the largest loads that can be safely placed on existing I-girder steel members and permitted to pass over the bridge. Through extensive numerical simulations, the bridge is identified to be deficient in flexural and shear capacities, and therefore strengthening for reducing the risk is needed. An in-depth parametric study is considered to evaluate the sensitivity of the bridge's load rating response to variations in its structural parameters. The parametric analysis has exhibited that uncertainties associated with the steel's yield strength, the superstructure's weight, and the diaphragm configurations should be considered during the fragility analysis of the bridge system.

Keywords : load rating, CSiBridge, strengthening, uncertainties, case study

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