

Inspection and Load Rating of P-T Segmental Bridges

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1 Abstract

The interchange of the Veterans Memorial Tollway (I-355) and the Ronald Reagan Memorial Tollway (I-88) in Downers Grove, Illinois includes four post-tensioned (P-T) segmental concrete box girder bridges erected with different techniques. Built in 1988, they range in length from 170m (558') to over 610m (2,000') on horizontally curved alignments. To maintain the integrity of this vital infrastructure, the Illinois Tollway tasked Ciorba Group to perform full in-depth inspection, material testing, assessment of the P-T condition, and load rating. As part of this project we performed non-destructive testing of the P-T strands at select locations using ground penetrating radar and impact echo technology.

After the detailed inspection, the bridges were load rated taking into account the deterioration noted and using a time dependent Finite Element Analysis. We re-calculated all stresses as "locked-in" during bridge erection. The ramp bridges were load rated for the current single lane configuration as well as a potential future two lane configuration. An overall load rating and condition report was prepared which evaluated various bridge repairs and strengthening options including the use of UHPC structural overlay.

Keywords: load rating, post-tensioning, segmental box girder bridges, bridge inspection, non-destructive testing, Ultra-High-Performance Concrete, UHPC