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Assessing the Condition of Fire-Damaged Prestressed Concrete Bridge Girders

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Abstract

Although bridge fires are not frequent events, they still pose impacts on safety, traffic flow, and the economy as repairs or replacements can be costly. There is currently a lack of information and the tools needed to evaluate fire damage to concrete bridges or to aid decisions for both immediate and long-term use of the bridge. This report will assist in providing more technical information with respect to fire-damaged girders to help bridge owners to develop for assessment and repair.

A fire beneath the Interstate 29 northbound bridge, a single span pretensioned, prestressed concrete beam bridge over Perry Creek Conduit in Sioux City, Iowa, was exacerbated when a propane tank used in a homeless encampment exploded on October 30, 2019. The average ground clearance of the bridge was minimal (approximately 6 ft.) in comparison to most other bridges which increased the effects of the fire on the bridge girders and deck.

Despite the unfortunate incident, an opportunity to learn more about the residual condition and strength of the bridge girders through a research study was provided. The Iowa Department of Transportation elected for the removal and replacement of the bridge which allowed for certain components to undergo further testing. Three fire-damaged girders were selected from the bridge, carefully removed, and transported to the Iowa DOT Maintenance Garage in Ames, Iowa. Each was visually assessed and selected based on the apparent level of damage incurred; one low-level, one mid-level, and one higher-level. The goal was to compare and contrast apparent levels of damage and assess the impacts each had on the serviceability and strength of the girder. This report provides the results and recommendations resulting from the completed load testing.