November 16, 2017

City of London

Technical Backgrounder

Blackfriars Bridge Rehabilitation Project

Blackfriars Bridge Historical Significance

Blackfriars Bridge is the only known wrought iron bowstring arch-truss bridge of its origin in Canada and the longest such bridge remaining in North America. It was fabricated by the Wrought Iron Bridge Company of Canton, Ohio and assembled under the supervision of Isaac Crouse, a known bridge builder in the London area. Blackfriars Bridge is recognized as a nationally-significant cultural heritage resource. It is a rare example of a wrought iron bowstring arch-truss bridge.

Blackfriars Bridge is a heritage-designated property under Part IV of the Ontario Heritage Act and is included on the Ontario Heritage Bridge List, a list of provincially significant bridge structures. In 2016, Blackfriars Bridge was recognized as a National Historic Civil Engineering Site by the Canadian Society for Civil Engineering.

The Need for Rehabilitation

Built in 1875, Blackfriars Bridge has survived well beyond its expected life and is a good example of sustainable infrastructure. Given the existing condition of Blackfriars Bridge, major rehabilitation is required to help extend the life of this significant heritage structure by another 75 years.

The Rehabilitation Approach

The intent of the proposed structural rehabilitation design focuses on returning the Blackfriars Bridge, as much as possible, to its original 1875 design, while satisfying the current requirements of the Canadian Highway Bridge Design Code.

The safest and most economical approach to bridge rehabilitation is to remove the bridge, disassemble it, and complete the metal fabrication in a facility off site. Abutments, approaches and municipal works will be modified onsite in preparation for the rehabilitated superstructure to be returned and placed back on its supports.

The Benefits of Off-site Rehabilitation

Bridge removal and off-site rehabilitation provides benefits including a longer life expectancy and improved worker and public safety. Off-site rehabilitation will create a safer worksite, ensure better quality control, reduce the need for environmental protection measures and take advantage of the winter months to complete much of the work. It will also allow for hot riveting to mimic the workmanship of 1875.

Bridge Lift Procedure

The procedure to carefully lift the bridge has been developed with safety as a priority. The steps are as follows:

- Remove non-structural items to reduce weight to be lifted.
- Prepare temporary steel framing and cables to provide an apparatus for the lift.
- Set up two cranes for the lift, one on each side of the river. Two additional cranes will be set up for worker access.
- Lift bridge off the abutments and lower it down to an area above the river for improved worker access, while continuing to support it from the cranes at all times.
- Cut bridge at the mid-span with torches while supported by the cranes.
- Lift each half of the bridge to the nearest side of the river.
- Dismantle and inventory the bridge for delivery off site for rehabilitation.
- Remove cranes.

What to Expect During the Removal

Bridge removal by cutting and dismantling involves torches, hammering, and noise that can be alarming to those unaccustomed to the process. However, these activities are common in steel erection and dismantling and should not be a cause for concern.

Once the bridge is removed and set onto the lay down areas, the contractor will begin to carefully dismantle and transport it to an offsite facility for rehabilitation. Each member to be rehabilitated will be individually tagged and removed with the method of reassembly clearly in mind.

Reuse of Bridge Components

The rehabilitation process involves an assessment of the condition of the individual bridge parts with a combination of reuse, upgrades and the fabrication of replicas.

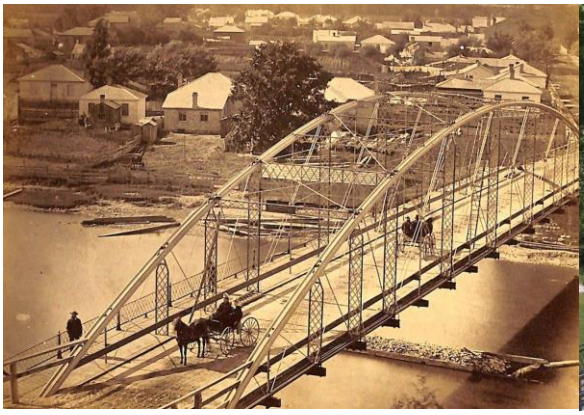
Much of the wrought-iron members are in good enough condition to reuse. For example, the pedestrian railing and lattice that exists in several locations on the bridge will be reused with local upgrades where corrosion is severe and bridge

design requirements dictate. The bowstring arch will also be reused and upgraded where its condition requires.

Other members that are beyond repair such as the severely corroded floor beams beneath the deck will be replaced with new similar looking beams to increase the longevity of the bridge. The deck boards that have required ongoing maintenance will also be replaced with a more durable material.

Reinstallation:

The reinstallation of the bridge is expected to occur in late 2018.



Blackfriars Bridge in 1875. Courtesy Department of Special Collections, Stanford University (MSS Photo 0409: Wrought Iron Bridge Photographs, 18721874).

Blackfriars Bridge in 2018.