2015 CANADIAN CONSULTING ENGINEERING AWARDS

MILTON MADISON BRIDGE REPLACEMENT PROJECT

BUCKLAND & TAYLOR

BUCKLAND & TAYLOR | COWI

BURGESS & NIPLE

5085 Reed Rd. | Columbus, OH 43220 | 614.459.2050

Canadian Consulting Engineer
80 Valleybrook Drive
Toronto, Ont. M3B 2S9

-Re- Canadian Consulting Engineering Awards 2015, Prime Consultant Letter of Permission and Verification for the Milton Madison Bridge Replacement Project Submittal

April 17, 2015

Dear CCE Awards 2015 Judging Panel,

This letter is to grant permission to Buckland & Taylor Ltd. to submit the Milton Madison Bridge Replacement Project in the Canadian Consulting Engineering Awards 2015 competition.

Buckland & Taylor Ltd. was a subconsultant on the winning project team that includes contractor Walsh Construction Company and the lead engineering firm Burgess & Niple. Buckland & Taylor's scope included both design and construction engineering for the steel main spans of the bridge.

If you have any questions, please contact me.

Sincerely,

Thomas A. Bolte

Thomas A. Bolte, PE
Bridge Group Director

INDIANA DEPARTMENT OF TRANSPORTATION

100 North Senate Avenue
Room Nxxx
Indianapolis, Indiana 46204

PHONE: (317) xxx-xxxx
FAX: (317) xxx-xxxx

Michael R. Pence, Governor
Karl B. Browning, Commissioner

April 20, 2015

Canadian Consulting Engineering
80 Valleybrook Drive
Toronto, Ontario. M3B 2S9
Attention: Bronwen Parsons

RE: 2015 Canadian Consulting Engineering Awards (CCE), Owner Letter of Permission and Confirmation for the Milton Madison Bridge Replacement Project Submittal

Dear CCE Judging Panel,
This letter is to grant permission to Buckland & Taylor to submit the Milton Madison Bridge Replacement Project for the 2015 CCE Award in the category of Transportation.

Buckland & Taylor was part of the winning project team that includes contractor Walsh Construction Company and the lead engineering firm Burgess & Niple Engineers. Buckland & Taylor's scope included both design and construction engineering for the steel main spans of the bridge.

This letter also confirms that the Milton Madison Bridge Replacement Project was opened to traffic in its final location on April 17, 2014.

B&T and the project team exceeded INDOT's expectations when proposing to eliminate the need for a year-long bridge closure and round-the-clock ferry to transport bridge users, and instead recommended and designed an alternative to replace the bridge with two relatively short closures instead. This alternative cut the cost of the ferry services out of the equation and helped keep the project within the budget. This plan also helped minimize disruption to the public.

If you have any questions, please contact me.

Sincerely,

Kevin Hetrick
Design Director
INDOT Office of Innovative Project Delivery
khetrick@indot.in.gov
Cell: 317-847-0879

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PROJECT INFORMATION

Project Information

Project Name
Milton-Madison Bridge Replacement Project

Location
Over Ohio River, between Milton, Kentucky and Madison, Indiana

Year Completed
2014

Category
B. Transportation

Entering Firms
Buckland & Taylor
101 - 788 Harbourside Drive, North Vancouver, BC, V7P 3R7

Role of Entering Firm
Subconsultant - Engineer of Record and the Erection Engineer for the permanent design and the construction of the main span for the new Milton Madison Bridge.

Project Leaders
Peter Taylor, P. Eng - Project Principal
Murray Johnson, P.Eng. - Lead Construction Engineer
Nedim Alca, P. Eng - Project Manager

Three Contact Names
Philip Chan - Communications/Marketing (Submittal inquiries)
Murray Johnson, P.Eng. - Project Principal (Engineering inquires)
Hannah Price - Marketing Administration (Gala inquiries)

WINNING PROJECT TEAM:

- **Contractor:** Walsh Construction Company
- **Engineer:** Burgess & Niple, (Engineer of Record and Erection Engineer for approaches, temporary ramps, and pier rehabilitation)
- **Engineer:** Buckland & Taylor (Engineer of Record and Erection Engineer for the main spans)

THE OLD, NARROW
MILTON-MADISON BRIDGE

B

PROJECT OUTLINE

Executive Summary

The Owners of the functionally and structurally obsolete Milton-Madison Bridge (Kentucky Transportation Cabinet and Indiana Department of Transportation) required a replacement bridge. Buckland and Taylor provided a cost effective solution that required only a few weeks of traffic interruption (rather than the predicted 365 days) and culminated in the world's longest lateral bridge slide. This approach reduced the impact to the local economy and travelling public, cut costs and resulted in a wider, safer crossing.

PROJECT HIGHLIGHTS

Innovation

The old Milton-Madison Bridge has provided a vital link between the communities of Milton and Madison since its construction in 1929 – carrying an Average Daily Traffic of approximately 11,000 vehicles. However, it was narrow, deteriorating and required replacing. The joint owners of the bridge determined that the most cost-effective and least disruptive solution was to replace the bridge on the same alignment with a completely new superstructure on rehabilitated piers.

ERECTION OF THE TRUSSES FOR THE NEW MILTON-MADISON BRIDGE

The work was tendered as a Design-Build project with a maximum bridge closure period of one year allowed, during which time a round-the-clock ferry service would be operated to carry as much traffic as possible. The challenge for the Design-Build team was to find an innovative solution that avoided this long bridge closure, eliminated the need for a ferry and reduced construction risks associated with schedule.

Our team developed a solution that kept the existing bridge open to traffic during pier rehabilitation, while a new bridge was constructed alongside on temporary piers. Once the new structure was completed in its temporary position, traffic was diverted onto it using temporary access ramps. We then demolished the old superstructure and pier tops and completed the pier rehabilitation. Finally, the bridge was closed for a few days and the entire new superstructure slid laterally into its final position, the longest such bridge slide ever made.

Sliding a bridge laterally into place and superstructure replacement on rehabilitated piers are not without precedent. At the Milton-Madison Bridge Project however, the combination of these techniques on a substantially larger scale than normal, with clever sequencing of traffic access to the bridge, greatly expanded the boundaries of these engineered construction techniques.

The net result of our approach was a drastic reduction in the total closure of the bridge and a tender price that was more than $20 million under the original estimate. The successful application of these techniques has demonstrated the viability of this method on a large scale. This provides another construction tool for the large number of bridges that require replacement in the USA and Canada while traffic demands upon those bridges grow heavier by the day.

DEMOLITION OF THE OLD MILTON-MADION BRIDGE NEXT TO THE NEW STRUCTURE

Complexity

This project used unique Accelerated Bridge Construction techniques, which required innovation and technical excellence. These included:

› **Schedule:** Developing and delivering a solution that was cost effective and met a tight design schedule.

› **Materials:** Meeting a challenging schedule for procurement of materials (most of the steel for the bridge was ordered within the first three months of commencing the project design work).

› **Deck joints:** Developing technically challenging solutions to achieve a bridge without any deck joints for 741m.

› **Quality:** Helping coordinate the design, design review, shop drawing production, fabrication, and construction consistent with our ISO 9001 certified Quality and Project Management Procedures. This included building temporary piers to support the same loading conditions as permanent piers, including: live and wind loads, thermal effects, and resistance to accidental impact from the heavy barges using the river.

› **River:** Building a major bridge over the fast flowing Ohio River, and accommodating its barge traffic.

› **Assembly:** Pre-assembly of the two main river truss spans on barges along the shoreline, then lifting these into place as single units in a few short hours during short river closures.

› **The Slide:** The sliding approach used for the 741m long main span superstructure. It was moved 16m upstream to its new position, pulled by strand jacks linked to a computerized, displacement-monitoring control system. One adjacent approach span was separately slid into place, and then expansion joints were completed at the bridge ends. This is a major scaling-up of this technique, which is more often used for much smaller spans.

LIFTING THE NEW MAIN SPAN TRUSS NEXT TO THE EXISTING MILTON-MADISON BRIDGE

Social and/or Economic Benefits

The Milton-Madison Bridge is the only crossing in a 115km stretch of the Ohio River and is vital to the communities it serves, so minimal disruption to the public was crucial. As our team's approach allowed this vital artery of the local infrastructure to remain open, an impressive feat not originally considered by the Owners, the benefits of our approach for bridge users was immediate.

Buckland & Taylor's solution reduced the impact to the local economies. Keeping the bridge open greatly mitigated the negative economic effect to the local community of having the bridge closed and having much of the traffic routed onto detours that bypassed towns. Some businesses found trade actually increased as many visitors came to town to see the construction of such an innovative large-scale project.

The new deck provides wider, safer lanes, shoulders, and – for the first time ever at this crossing – a sidewalk. The existing walkways along the Ohio River on the Madison aside are now connected to the bridge with ADA (American Disabilities Act) compliant ramps, allowing all to cross the bridge.

Environmental Benefits

The Milton-Madison Bridge Replacement project was environmentally mindful in a number of ways, including:

- **Footprint:** Building within the footprint of the existing bridge minimized the physical impact to the riverbed. Also, reusing the existing piers reduced the amount of concrete required for the project, reducing environmental impacts of concrete production.

- **Piers:** The project promotes sustainability with the rehabilitation of the existing piers. The feasibility of reusing, strengthening, and widening the existing main span piers was initially explored by KYTC, INDOT and their engineers. The primary strategies employed in accomplishing these improvements were to increase the stability of the piers, increase the bending strength of the stems,

THE NEW TRUSSES BEING FLATED IN NEXT TO THE EXISTING MILTON-MADISON BRIDGE

and provide new caps to support the new bridge, which was approximately double the width of the existing bridge.

- **Materials:** The old steel truss was recycled and the new bridge uses more environmentally friendly coatings that were not available at the time of old bridge's construction. Building the superstructure to achieve a 100 year service life will save on time, materials, transportation and disruption to surrounding wildlife in the future.

- **Wildlife:** The team worked with the KY Department of Fish and Wildlife Resources to accommodate a pair of Peregrine falcons and their chicks that were nesting on the bridge. Their artificial nesting box was successfully relocated from Pier 8 to Pier 5 to reduce the impact of the construction work and their behaviour closely monitored. The falcons successfully re-nested in this spot, and returned to nest again the next season.

Meeting the Client's Needs

The client's main goal was to build a safer, wider bridge at an economical cost and with minimal impact to the public. The work was conducted under a Design-Build contract, and our team worked closely with the Owner to attain project goals.

The Owner and Owner's Engineer reviewed the bridge design and erection methodology as work progressed. The design-build team had meetings with the Owner and Owner's Engineer. Buckland & Taylor had frequent discussion with the Owner's Engineer and compared findings as the design progressed. A combination of formal and informal collaborative meetings proved to be useful in resolving issues and addressing concerns. As this was a "hard bid" project, the Owner's budget was fixed and no adjustments made.

The project exceeded the Owner's goals as the inconvenience to bridge users was minimal.

The project construction schedule was ultimately longer than originally intended, due to the river being above flood stage for many more days than originally

THE COMPLETED NEW STRUCTURE ONTEMPORARY PIERS, READY TO SLIDE ONTO REHABILTATED CONCRETE PIERS

anticipated. However, because of the construction techniques used, this did not adversely affect the bridge users, as the bridge was still open whenever the work on the river was halted.

The project's success has benefitted our client, the Contractor, who have since won two additional major Design-Build bridge projects over the Ohio River for the same Owners as the Milton-Madison Bridge. Our expertise and experience in providing innovative solutions helped improve our Client's profile and allowed them to compete for types of bridges that they had built in the past.