MIG ENGINEERING (2011) LTD.
453 CHRISTINA ST. N.
SARNIA, ONTARIO
CANADA N7T 5W3
TEL: (519) 337-8000
FAX: (519) 337-8001
EMAIL: sarnia@migeng.com
WEBSITE: www.migeng.com

Project No. 10568.00
October 12, 2012

City of Sarnia
255 Christina Street North
P.O. Box 3018
Sarnia, Ontario
N7T 7N2

Attention: Mr. Mike Berkvens, C.E.T. – Development Manager

Re: Old Lakeshore Road / Cull Drain Bridge

Dear Sir:

MIG Engineering (2011) Ltd. has been retained by the City of Sarnia to provide preliminary cost estimates for the removal, rehabilitation and/or replacement of the pedestrian bridge on Old Lakeshore Road over the Cull Drain (Perch Creek). We have visited the site and have also met with City staff to discuss alternatives. We have prepared preliminary cost estimates for each of the alternatives, which are discussed in further detail below.

EXECUTIVE SUMMARY

MIG Engineering (2011) Ltd. has been retained by the City of Sarnia to provide preliminary cost estimates for the removal, rehabilitation and/or replacement of the pedestrian bridge on Old Lakeshore Road over the Cull Drain (Perch Creek). Three (3) alternatives were considered and are summarized below along with the estimated cost for each

The three alternatives considered were:

1. REMOVE THE EXISTING STRUCTURE – Estimated Cost $51,000 + HST;
2. REHABILITATE EXISTING STRUCTURE – Estimated Cost - $411,000 + HST;
3. REPLACE WITH NEW STRUCTURE – Estimated Cost - $243,000 + HST.

The cost estimates for each of the alternatives are presented for consideration by City of Sarnia Council & staff. The alternatives are described in further detail below.

BACKGROUND

The Old Lakeshore Road / Cull Drain bridge is a single-30m (100ft) span, half-through (pony) truss superstructure on concrete abutments. The trusses are configured in what is known as the “Warren” pattern. It is believed that the structure was constructed in 1910.

.

Vehicular traffic over the structure was greatly reduced with the construction of the New Lakeshore Road bridge in the 1950's, however, the bridge remained open to vehicular traffic until the early 1970's. The structure has been used as a pedestrian bridge until structural deficiencies were identified in a recent biennial inspection of the City's bridges and culvert. The inspection recommended that the structure be closed to pedestrian traffic.

The issues identified in the inspection report that lead to the closure of the structure were:

1. Severely corroded / missing floor beams
2. Section loss of areas of the main trusses
3. Delaminated concrete on the underside of the deck that could fall;
4. Severe cracks in the abutment walls

MIG Engineering (2011) Ltd. was retained by the City of Sarnia to provide preliminary cost estimates for the removal, rehabilitation and/or replacement of the structure. We have visited the site and have also met with City staff to discuss alternatives. Three (3) alternatives were considered and are discussed in greater detail below along with the estimated cost for each.

The three alternatives considered were:

1. REMOVE THE EXISTING STRUCTURE;
2. REHABILITATE EXISTING STRUCTURE;
3. REPLACE WITH NEW STRUCTURE.

DISCUSSION

ALTERNATIVE 1: REMOVE THE EXISTING STRUCTURE

The first alternative involves complete removal of the structure without any type of replacement structure. Included with the cost for removal are sediment and erosion control measures, dewatering, site restoration and engineering. The engineering component is related mainly for applications for the required approvals, preparation of contract documents and project management.

The estimated cost for the removal of the existing structure is $51,000 plus HST.

ALTERNATIVE 2: REHABILITATE THE EXISTING STRUCTURE

The second alternative involves a major rehabilitation of the existing structure to repair the deficiencies identified and provide an additional 25 years to the life of the structure.

The first major item would be the repair the main trusses of the structure. The majority of the deterioration appears to be at the joints of the structure where dirt and debris tend to get trapped and retain moisture, leading to corrosion. The iron used for this type of structure is not easily weldable so we would propose reinforcement of the trusses with mild steel channels, angles, etc. The rivets, where required, would be replaced with structural steel bolts.

The second major item would be the replacement of the concrete deck and the steel floor beams. While several of the floor beams are severely corroded, it is anticipated that most, if not all, of the floor beams would be damaged during the removal of the deck. We would propose to replace the deck and floor beams similar to the original design but would recommend that the design process, if this alternative is chosen, explore other decking materials such as composite decking, voided slabs, lightweight concrete, etc. There would be advantages in trying to reduce the dead weight on the structure but it should also be pointed out that this type of structure relies on the concrete deck for lateral support.

The third major item to address would be the severe cracks in the abutment walls. During our site visit we did not see any signs of settlement behind the abutment that would suggest that soil is eroding through the cracks, however, we would recommend that an external reinforcement system be fastened to the abutments to try to prevent the cracks from opening.

Finally, we would also recommend that a pedestrian railing, compliant with current standards, be installed and that the structural steel be prepared and painted to help prolong its useful life. We would also recommend regular maintenance of the structure including washing and paint touch ups.

The engineering component of the estimate includes a thorough structural analysis, design, approval applications (St. Clair Region Conservation Authority, Department of Fisheries and Oceans, Ministry of Natural Resources, Transport Canada – Navigable Waters and the Ministry of Culture & Tourism), tender documents, tendering, contract administration and project management.

The estimated cost for the rehabilitation of the existing structure is $411,000 plus HST.

ALTERNATIVE 3: REPLACE THE EXISTING STRUCTURE

The third alternative involves the removal of the existing structure and replacing it with a pre-engineered pedestrian bridge.

After the removal of the existing structure, we would propose new concrete abutments, possibly on helical screw piles, depending on the soil conditions encountered. The steel super-structure would typically consist of two halves that are constructed in a factory, shipped to the site and bolted together before being lifted in place by a crane. The super-structures can be ordered with a specified camber to give the structure an arch-effect and can also be ordered with any of the classical truss patterns. In this case we would propose the warren-pattern to reflect the heritage of the existing structure.

We would propose the use of atmospheric corrosion steel for the super-structure. Atmospheric corrosion steel has a rusty look which is actually a protective coating, therefore the structure does not need to be painted. We would also propose atmospheric corrosion steel deck treads rather than cedar since they are maintenance free and do not need replacing.

The engineering component of the estimate includes a thorough structural analysis, design, approval applications (St. Clair Region Conservation Authority, Department of Fisheries and Oceans, Ministry of Natural Resources, Transport Canada – Navigable Waters and the

Ministry of Culture & Tourism), tender documents, tendering, contract administration and project management.

The estimated cost for the replacement of the existing structure is $243,000 plus HST.

We thank you for the opportunity to assist the City of Sarnia in this matter and hereby submit our report for review and discussion.

Sincerely,

Ken Graham, P.Eng.
Consulting Engineer
Sr. Project Manager
MIG Engineering (2011) Ltd.

KG/