

## **Cost and Constructability**

An assessment of cost and constructability is being undertaken as part of the impact assessment for the Detroit River International Crossing (DRIC) study. This assessment includes the access road, plaza areas and the international bridge. The assessment includes engineering design sufficient to define the alternative at a concept level of detail, development of construction staging to determine overall feasibility, traffic management requirements, and consideration of operation and maintenance costs.

### **How the Analysis was Done**

Construction costs for the access road and plaza have been estimated based on the engineering concepts presented at PIOH 3 with refinements based on the results of consultation to date. Quantities for major construction items were estimated from the plan, profile and cross-section drawings. Unit costs were taken from the Ontario Ministry of Transportation's inventory of costs from recent highway construction projects and other sources, as appropriate. Percentages are added for minor items, engineering and contingencies leading to development of an overall construction cost. Costs for operations and maintenance, as well as property acquisition are considered separately.

The costs for the international bridge are being developed jointly with the U.S. team. Engineers from both Canadian and U.S. teams are undertaking a Bridge Type Study that is considering numerous options for cable stayed and/or suspension bridges at each crossing location. The study is considering optional locations for piers, anchor blocks and touchdown points, as well as elements that affect the width of the bridge (lane widths, shoulder areas, medians, sidewalks and protection of the cables). Consultation is ongoing with the Canadian and U.S. Coast Guards and Great Lakes Shippers to consider the possibility of placing piers in the river, which would result in a shorter main bridge span and could reduce the cost of the main structure.

### **Results to Date**

#### **Access Road Alternatives - Construction**

The construction staging and constructability reviews to date confirm that all the alternatives are constructible, and that traffic flow can be reasonably maintained in the Highway 3/Huron Church Road corridor throughout the construction period. It is clear that access road construction is complicated by the high water table and relatively poor ground conditions, particularly towards the north and west ends of the project. These problems increase with the depth of construction. Complex construction staging will also be required for alternatives at the Grand Marais Drain/Turkey Creek. Construction of the tunnel alternative is more complex and time consuming than other alternatives due to the necessity to build the tunnel box, ventilation, electrical and communication systems.

#### **Plaza Alternatives - Construction**

With respect to the plaza locations, the major differences in cost and constructability are associated with plaza C. Construction of plaza C would require the relocation of the Keith Transformer Station, which would add considerable time and cost to the project.

#### **Crossing Alternatives - Construction**

Construction staging and constructability issues for the international bridge alternatives often relate directly to the main span and the overall length of approach between the bridge and the plaza. The detailed Bridge Type Study currently in progress will identify these matters more explicitly.

#### **Access Road Alternatives - Cost**

Preliminary construction cost estimates for the access road from Highway 401 to Malden Road from approximately \$620M to \$3.8B. Specifically:

- the at-grade alternatives are in the order of \$620M – \$920M
- the depressed options are about \$1.0B - \$1.4B
- the tunnel is estimated at \$3.8B. The increased costs for the tunnel relate directly to the increase in excavation and concrete required to build the tunnel, as well as the ventilation, electrical, drainage, communications and other Emergency Management Systems.

Practical Alternative		Estimated Access Road Costs \$CDN 2011
Access Road	Plaza	Highway 401 to Malden Road
1A	A	\$920,000,000
1B	A	\$1,360,000,000
2A	A	\$790,000,000
2B	A	\$1,200,000,000
3	A	\$3,780,000,000
1A	B & C	\$750,000,000
1B	B & C	\$1,190,000,000
2A	B & C	\$620,000,000
2B	B & C	\$1,030,000,000
3	B & C	\$3,610,000,000

#### Plaza Alternatives - Cost

Cost for the access road from Malden Road to the plaza, the plaza itself and the approach roadway to the international bridge range from \$180 - \$280M depending on which plaza alternative is chosen (not inclusive of costs associated with the potential relocation of the Keith Transformer Station under plaza C).

#### Crossing Alternatives - Cost

The international bridge costs are being developed in collaboration with the U.S. team and are not yet available; however, it is clear that longer span structures will be significantly more costly.

#### Remaining Activities

The current estimates provide a reasonable basis for a construction cost comparison of alternatives and will provide useful input to the assessment and evaluation. Further work will be done to refine construction, operating and maintenance costs.

Cost and constructability estimates will continue to be updated in concert with any refinements to the alternatives or the development of any new combination alternatives. In addition, the completion of the Bridge Type Study will provide more insight into bridge costs. The Bridge Type Study is expected to short-list the most practical bridge types for each proposed crossing location.