Cost and Constructability

An assessment of cost and constructability is being undertaken as part of the analysis of access road, plaza and crossing alternatives for the Detroit River International Crossing (DRIC) study. "Cost and Constructability" is one of the seven major evaluation factors for the study. 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 the third round of Public Information Open Houses (PIOHs) in March 2006 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. Costing for items unique to tunnels was obtained from other tunnelling projects in North America. Percentages were added for minor items, engineering and contingencies leading to the 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).

Findings to Date - Constructability

Practical Alternatives

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 intensive than other alternatives due to the necessity to build the tunnel box, ventilation, electrical and communication systems. These complexities pose additional risk to the project schedule and associated costs.

Plaza Alternatives

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

Crossing Alternatives

In consultation with the Canadian and U.S. Coast Guards and representatives from the shipping industry, it has been determined that the placement of a pier in the Detroit River would have negative impacts on navigation and marine safety. Therefore, the recommended options clear span the river, and do not have piers in the water. The resulting navigation envelopes satisfy requirements of the U.S. and Canadian Coast Guards. Criteria used to evaluate the constructability include duration of construction, risk, disruption, major utilities, contaminated sites, foundation compatibility and technical challenges. Suspension and cable stay bridges are being considered for Crossing B and C. The clear span at Crossing A is over 1.2 km (0.7 miles), which is too long for a cable stay bridge. Therefore, only a suspension bridge is being considered for Crossing A. The bridge types being considered in the study are constructible. In general, the longer spans within each bridge type (cable stayed and suspension) represent increasing construction risk with increasing spans. In addition, the construction risk for cable stay bridges is somewhat higher than suspension bridges for the same span length due to more complex construction requirements. Our analysis to date indicates that the crossings do not pose unprecedented technical challenges based on an assessment of scale, location, geology or site. We are awaiting the results of the geotechnical deep drilling program to confirm the integrity of the underlying bedrock at Crossings B and C.

Findings to Date – Cost

Access Road

Preliminary construction cost estimates (excluding property costs) for the access road from Highway 401 to Malden Road range from approximately $620 million to $3.8 billion (CDN). Specifically:

- The at-grade alternatives are in the order of $620 million to $920 million (CDN).
- The below-grade options are about $1.0 billion to $1.4 billion (CDN).
- The tunnel is estimated at $3.6 billion to $3.8 billion (CDN). 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.

Plaza Alternatives and Connection to Access Road

Preliminary construction cost estimates (excluding property costs) for the access road from Malden Road to the plaza and the plaza itself range from $180 million to $280 million (CDN) depending on which plaza alternative is chosen. This does not include substantial costs associated with the relocation of the Keith Transformer Station, which would be required for Plaza C.

Crossing Alternatives

Due to the international nature of the crossing, a common currency (US dollar) was selected. Preliminary construction cost estimates (excluding property costs) for the crossing including the approach roadway range from $430 million to $920 million (USD). Specifically:

- Crossing A is in the order of $770 million to $920 million (USD).

- Crossing B is in the order of $430 million to $540 million (USD).
- Crossing C is in the order of $450 million to $580 million (USD).

Remaining Activities

The completion of the geotechnical deep borehole program will confirm the integrity of the underlying bedrock and any impacts from past salt mining activities in the area for Crossings B and C.

The current estimates provide a reasonable basis for a construction cost comparison of alternatives and will provide useful input to the assessment and evaluation. 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. The completion of the Conceptual Design Phase for the international bridge will provide more insight into bridge costs.