

8 PRACTICAL ALTERNATIVES FOR CROSSINGS, PLAZAS AND ACCESS ROADS

The term “practical alternative” is used to describe the more refined alternatives that emerge from the assessment and evaluation of the broader level conceptual alternatives, i.e. the illustrative alternatives. This terminology was adopted on both sides of the border to promote the coordinated approach between the two EA processes.

As described in more detail in **Chapter 6**, the assessment and evaluation of the illustrative crossing, plaza and access road alternatives led to the development of an Area of Continued Analysis (ACA). The development of the practical crossing, plaza and access road alternatives within the ACA was based upon the corresponding illustrative alternatives that were carried forward. For ease of reference, the relationship between the illustrative alternatives carried forward and the practical alternatives discussed in this chapter is summarized in **Exhibits 8.1 to 8.3** in **Section 8.1.2**. Each exhibit corresponds to a particular practical crossing alternative, and shows the associated practical plaza alternatives. The corresponding illustrative crossing and plaza alternatives are also noted on the plans.

This chapter provides an overview of the generation, assessment and evaluation of the practical crossing, plaza and access road alternatives. For further details, the reader is referred to the following reports:

- *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative – Access Road Alternatives (December 2008);*
- *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative – Plaza and Crossing Alternatives (December 2008);*
- *Assessment of Practical Access Road Alternatives Memorandum – Improve Regional Mobility (May 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Air Quality Impact Assessment (May 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Noise and Vibration Assessment (May 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Social Impact Assessment (April 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Economic Impact (May 2008);*
- *Draft Practical Alternatives Evaluation Assessment Report – Existing and Planned Land Use (May 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Archaeology (April 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Cultural Heritage (April 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Natural Heritage (April 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Stormwater Management Plan (March 2008);*
- *Draft Practical Alternatives Evaluation Working Paper – Waste and Waste Management (May 2008);*
- *Draft Practical Alternatives Evaluation - Constructability Report for Plaza & Crossing Alternatives (December 2008);*
- *Draft Structural Planning Report for Practical Alternatives (May 2008);*

- *Draft Preliminary Construction Cost Estimate Report for Practical Alternatives (Access Road and Inspection Plazas) (May 2008); and,*
- *Draft Level 2 Traffic Operations Analysis of Practical Alternatives (December 2008).*

8.1 Practical Canadian Plaza and Crossing Alternatives

This section documents the factors considered in generating practical alternatives (bridge crossing, inspection plaza) as well as descriptions of the specific alternatives considered, an assessment of impacts and benefits associated with these alternatives, and the evaluation leading to the identification of a technically and environmentally preferred alternative (TEPA). For further details, refer to the *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative – Access Road Alternatives, December 2008*.

The U.S. team published its Draft Environmental Impact Statement (DEIS) in February 2008. The DEIS contains technical analysis of the crossing alternatives, and the U.S. plazas. This section of the report provides a summary of the analysis undertaken by the Canadian Team, as well as a summary of the analysis undertaken by the U.S. team, based on the information in the DEIS, and ongoing collaboration with the U.S. team. The U.S. team announced its final decision through their Final Environmental Impact Statement (FEIS) on December 5, 2008.

8.1.1 Generation of Plaza and Crossing Alternatives CROSSINGS

The Canadian and U.S. study teams considered the following technical objectives in generating the practical crossing alternatives:

- Maintain navigational clearances on the Detroit River;
- Locate crossing in area of sound bedrock;
- Avoid as much as possible areas sensitive to traffic impacts of crossing (e.g., noise, vibration, air quality) such as residential neighbourhoods;
- Minimize length of crossing;
- Maximum grade of approach to crossing is 5 per cent; and
- Provide for six traffic lanes.

These technical objectives were derived based on consultation with agencies, municipalities, specialists (including traffic, highway design, foundations and structural specialists), and the public.

As noted in **Chapter 6**, the Detroit River is an important waterway for marine traffic on the Great Lakes. As such, bridges are required to span the river at a clearance of at least 46 m at the shipping channel as defined by the U.S. Coast Guard and Transport Canada – Navigable Waters Division. The height requirements and potential span lengths on the Detroit River suggest that any bridge on the Detroit River within the Area of Continued Analysis will need to be either a suspension bridge or a cable-

stayed bridge. Additional consultation with U.S. and Canadian government agencies and shipping operators led to the decision to not place any piers in the Detroit River for a new span. Piers in this section of the Detroit River were considered too hazardous to marine navigation.

The Canadian and U.S. teams developed three practical crossing alternatives. The practical crossing and plaza alternatives are discussed in more detail in **Section 8.1.2**, and illustrated schematically in **Exhibits 8.1 to 8.3**.

PLAZAS

The following key considerations served as a basis in generating practical plaza alternatives:

- **Proximity to Border:** Canada Border Services Agency (CBSA) and U.S. Customs and Border Protection (CBP) require that the plazas be located as close to the border (i.e. bridge crossing) as possible, to reduce security / monitoring requirements for border agencies. Where plazas cannot be directly connected to the bridge, secure connections would be required to prevent goods and travellers from avoiding inspection. In Canada, a secure roadway of 1500 m was considered the guideline for a maximum reasonable distance, subject to consideration of land use and line of sight.
- **Site Area:** The site must provide adequate space to accommodate projected traffic demand, as well as turn-around opportunities for drivers and the installation of equipment systems prior to and after inspection points, on-site secondary inspection, some storage capacity for traffic queues on the plaza, and the ability to expand in the future.

For the Detroit International Crossing study, inspection plaza areas of approximately 30 to 40 ha were considered for new crossings, based on the preliminary assumption that international truck traffic will be distributed equally between the new crossing and the Ambassador Bridge.

To minimize visual and noise impacts and provide acceptable access for emergency vehicle services (fire, police, etc.), it was determined that the plaza elevation should not vary significantly from elevations of the adjacent lands and roadways.

Plaza layouts and locations were influenced by proximity to the new international bridge and/or other bridges over existing highways or rail lines. As an example, the vertical clearance requirements for shipping extend to the edge of the Detroit River. The distance over which an approach structure would descend from the river crossing (assumed to be approximately 46 m above the riverbank to meet navigational clearance requirements) would be approximately one kilometre with a maximum grade of 5 per cent.

Geotechnical conditions were also considered in siting plaza alternatives. Specifically, the plaza alternatives were sited away from the known salt extraction areas north of Prospect Avenue.

- **Adjacent Land Use:** Locate the plaza in an area where surrounding land uses would not be overly sensitive to the continuous operation, noise and lighting of "Port-Of-Entry" facilities. Alternatively, the plaza could be located in areas where additional land would be available to screen and buffer the Port-Of-Entry from existing sensitive land uses.

The site should be located away from residential areas, schools and other community uses. Sites should not be visible from neighbouring lands, but should provide good visibility to surrounding areas and approaches. Areas with significant development should also be avoided.

- **Environmental Issues:** Consideration should be given to the presence of toxic and/or hazardous materials, wetlands and/or endangered species; cultural, social and economic impacts.
- **Emergency Services and Access:** The site should be served by more than one roadway to allow for roadway interruption; consideration should be given to response time for medical and fire emergency services, and proximity to hospitals.
- **Existing Easements and Right-of-Ways:** Consideration should be given to gas lines, water and sewer lines, power and telecommunication lines, rail lines, and local and private roadways.
- **Water Availability:** Consideration should be given to water sources and protection from sabotage or other threats of contamination.

The siting of practical plaza alternatives was based on the results of the assessment of illustrative plaza alternatives, additional study within the Area of Continued Analysis (ACA) and consultation with border agencies, businesses, property owners and the public.

Input received at Public Information Open Houses in November 2005 and workshops in January 2006 (refer to **Chapter 3**) and correspondence with the public identified several specific community objectives that were considered in the generation of inspection plaza locations:

- Concern with impacts to Sandwich community; keep plaza south of Prospect Avenue;
- Keep away from natural features (Ojibway Prairie Area, Spring Garden ANSI, Black Oak Woods);
- Place plaza in the Brighton Beach industrial area;
- Keep plaza away from the sinkhole location;
- Place plaza on as much vacant land as possible; and
- Place plazas away from residential areas.

The study team developed three distinct plaza locations and four plaza alternatives which are described in detail in **Section 8.1.2**.

8.1.2 Description of Practical Plaza and Crossing Alternatives

A total of three practical crossing alternatives and four practical plaza alternatives were developed on the basis of the generation criteria discussed in **Section 8.1.1**.

PRACTICAL CROSSING ALTERNATIVES

Practical Crossing Alternative A

Practical Crossing Alternative A ('Crossing A') is within the X-10 corridor, and is illustrated in **Exhibit 8.1**. This crossing alternative connects to the south end of the plaza area on the U.S. side of the river. Due to the distance required to reach existing grade, the crossing connects only to Practical Plaza Alternative A ('Plaza A') on the Canadian side of the river.

Crossing A is the longest of the alternatives, with a main span of 1220 m. Piers within the river were not considered in the crossing alternatives. A clear span of 1220 m limits the type of bridge possible for Crossing A to a suspension bridge.

Crossing A completely avoids the known salt extraction wells in the area north of Prospect Avenue

Practical Crossing Alternative B

Practical Crossing Alternative B ('Crossing B'), illustrated in **Exhibit 8.2**, and is the other crossing within the X-10 corridor and connects to the south end of the plaza area on the U.S. side of the river. The crossing connects to Plaza A and Plaza B1 on the Canadian side of the river. Crossing B has a main span of 870 m. A clear span of 870 m can be provided by both suspension and cable-stayed bridge types.

On the Canadian side of the river, Crossing B is aligned over an existing aggregate operation (Southwestern Sales) and vacant land owned by Ontario Power Generation (OPG). From these OPG lands, an approach structure connects to Plaza B or Plaza A.

The Crossing B main structure is situated just south of Prospect Avenue, south of the area of known brine wells. The crossing and approach structure avoid the known brine wells area.

Practical Crossing Alternative C

Practical Crossing Alternative C ('Crossing C') is within the X-11 corridor, and is illustrated in **Exhibit 8.3**. This alternative featured four distinct crossing-plaza combinations, including two ways of connecting to Plaza A (via the Brighton Beach area or parallel to the Ojibway Parkway), a connection to Plaza B, and a connection to Plaza C. Crossing C has a main span of 760 metres. A clear span of 760 metres can be provided by both suspension and cable-stayed bridge types.

On the Canadian side of the river, Crossing C is aligned over an existing fueling depot (Sterling Marine Fuels). The approach to the main crossing passes over the known brine wells area between Prospect Avenue and John B. Street.

PRACTICAL PLAZA ALTERNATIVES

Practical Plaza Alternative A

Practical Plaza Alternative A ('Plaza A') is approximately 90 acres in size, and is bounded by Ojibway Parkway, E.C. Row Expressway, Malden Road and Armanda Street/Broadway Street. Plaza A connects to all three crossing alternatives via approach roads that are approximately 2.0 km to 3.5 km in length (corresponding to Crossing A and Crossing C, respectively).

The site consists of primarily open space, woodlots and residential units that consist of established and recently constructed houses. Practical Plaza Alternative A is illustrated in **Exhibits 8.1 to 8.3**.

Approximately 150 m south of Plaza A is Armanda Street, a neighbourhood consisting of single-family houses. Plaza A would require existing Matchette Road to be closed between E.C. Row Expressway and just north of Armanda Street. Based on consultation with the municipalities, this portion of Matchette Road would need to be realigned so that the current access provided by Matchette Road between Windsor and LaSalle can be maintained.

Practical Plaza Alternative B

Practical Plaza Alternative B ('Plaza B') is approximately 34 ha in size. Plaza B connects to Crossing C, and is illustrated in **Exhibit 8.3**. Plaza B connects to Crossing C via an approach road that is approximately 2.0 km in length.

There are few residential units directly within the site, however, the site is adjacent to primarily industrial area that includes the NemaK Plant (automotive manufacturing plant) to the east, the West Windsor Power Plant to the east and OPG Brighton Beach Power Station to the west. Potential impacts to these utilities and industrial uses were considered in the analysis and evaluation of Plaza B (refer to **Section 8.1.3**).

Practical Plaza Alternative B1

Practical Plaza Alternative B1 ('Plaza B1') is approximately 32 ha in size, and is a variation of Plaza B. Plaza B1 connects to Crossing B, and is illustrated in **Exhibit 8.2**. Plaza B1 connects to Crossing B via an approach road that is approximately 0.8 km in length. This alternative has a different layout and footprint than Plaza B due to the alignment of the connection of Crossing B at the north end of the plaza.

This site is also situated within the Brighton Beach Industrial Area, bounded by the Detroit River, Chappus Street, Ojibway Parkway and Broadway Street.

Practical Plaza Alternative C

Practical Plaza Alternative C ('Plaza C') is approximately 42 ha in size. Plaza C connects to Crossing C, and is illustrated in **Exhibit 8.3**. **Plaza C connects to Crossing C via an approach road that is approximately 1.2 km in length.**

Plaza C is located on vacant lands owned by OPG, Southwestern Sales (an existing aggregate operation) and on the Keith Transformer Station, which would require relocation.

The plaza is sited directly adjacent to the Detroit River shoreline. Along the north limit is Prospect Avenue; on the east side is Sandwich Street and a trucking operation and the West Windsor Power Plant; and to the south is Chappus Street and the Brighton Beach Industrial Area.

EXHIBIT 8.1 – PRACTICAL CROSSING ALTERNATIVE A AND CORRESPONDING PRACTICAL PLAZA ALTERNATIVES

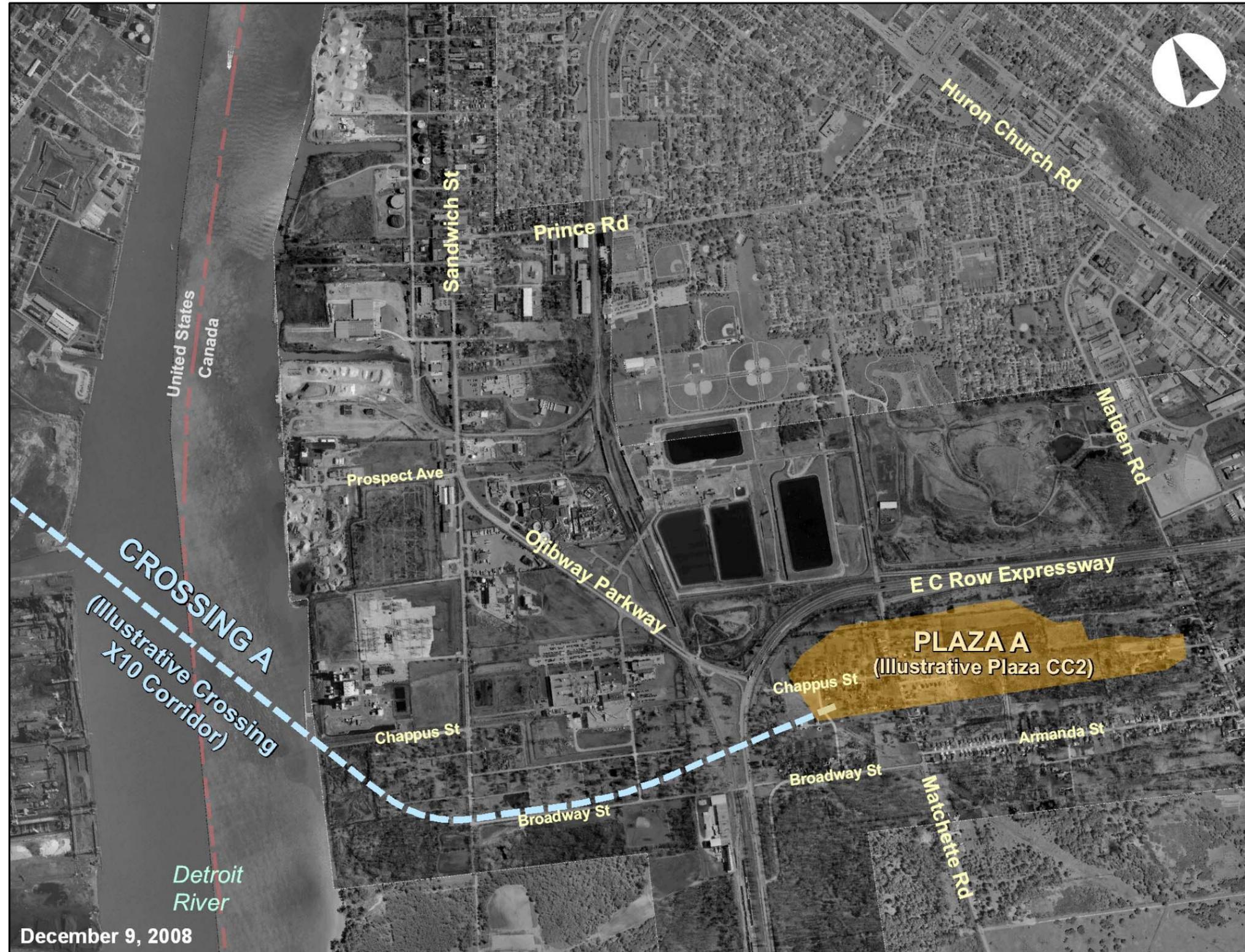


EXHIBIT 8.2 – PRACTICAL CROSSING ALTERNATIVE B AND CORRESPONDING PRACTICAL PLAZA ALTERNATIVES

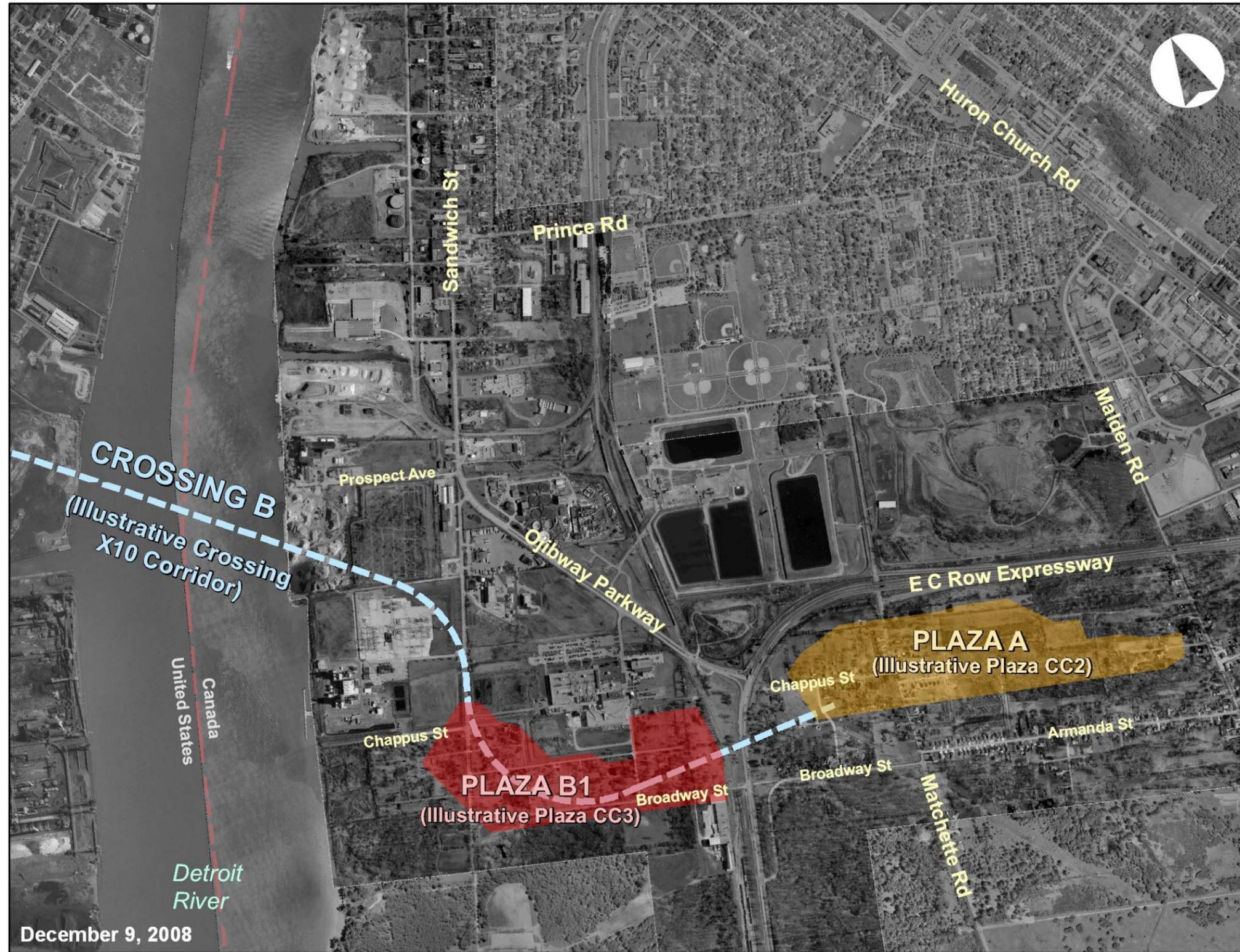
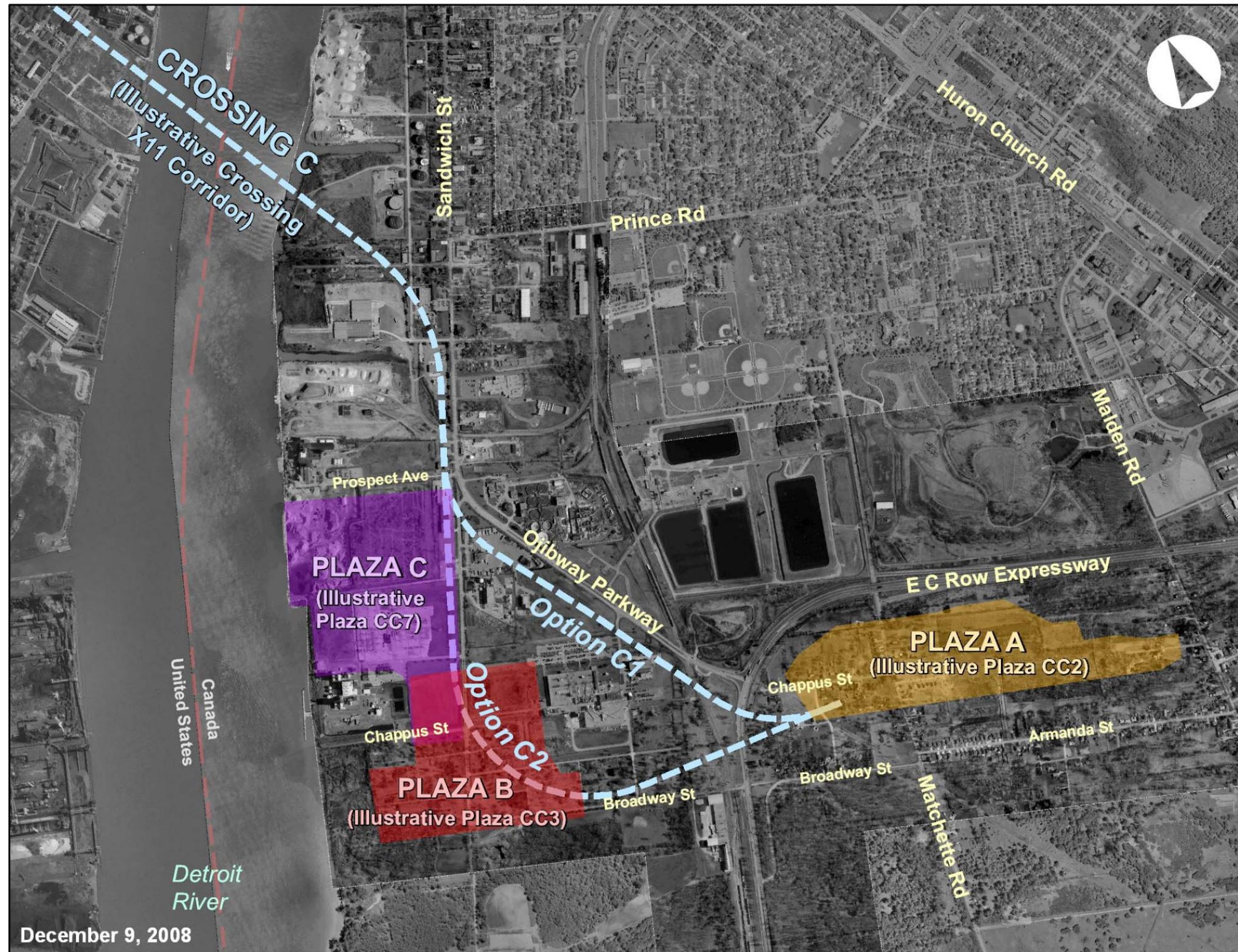


EXHIBIT 8.3 – PRACTICAL CROSSING ALTERNATIVE C AND CORRESPONDING PRACTICAL PLAZA ALTERNATIVES



8.1.3 Analysis and Evaluation

The Canadian study team examined each crossing/Canadian plaza combination to determine the preferred Canadian plaza site for each crossing.

In December 2006, the initial analysis of these seven crossing/plaza combinations was presented together with the U.S. plaza/crossing analysis at the fourth round of Public Information Open Houses (refer to **Chapter 3** for further details of this PIOH). The Canadian side information was updated over the summer of 2007 and presented at the fifth round of Public Information Open Houses in August 2007 (also summarized in **Chapter 3**).

For the purposes of the assessment, the alternatives were organized by crossing corridor to determine best plaza/crossing combination by corridor.

- Crossing A/Plaza A
- Crossing B/Plaza A
- Crossing B/Plaza B1
- Crossing C/Plaza A via Brighton Beach
- Crossing C/Plaza A via Ojibway Parkway
- Crossing C/Plaza B
- Crossing C/Plaza C

The approved EA TOR for the Detroit International Crossing study identified two evaluation methods to be employed in the evaluation process: reasoned argument method and arithmetic method. The assessment and evaluation of these alternatives was undertaken following both a reasoned argument method, and an arithmetic method (weighted scoring). The reasoned argument method was the primary method, while the arithmetic method was the secondary method, which served as a basis of comparison for the evaluation findings.

REASONED ARGUMENT METHOD

Crossing A Corridor Alternatives

The geometric constraints posed by the navigational clearances over the Detroit River, the grade separation requirement at the Ojibway Parkway and Essex Terminal Railway (ETR) corridors, and the maximum design grade of the crossing and approach roadways eliminated the possibility for Crossing A to connect into a plaza in the Plaza B area (i.e. west of ETR). Similarly, a connection from Crossing A to Plaza C was deemed too circuitous and inefficient to be considered a reasonable alternative. Therefore, Crossing A was evaluated solely in combination with Plaza A, and as such, was carried forward in the assessment.

Plaza A is located along the south side of the E.C. Row Expressway between Malden Road and Ojibway Parkway. This alternative falls within Windsor's Malden Planning District, which is largely a residential community integrated with a protected natural area. Some of the residential areas along Matchette Road, Beech Street, Chappus Street and Armanda Street date back to the 1930s. New residential development is also occurring on lands immediately south of E.C. Row Expressway.

Current residents describe the character of the community primarily as having a natural setting, with the feeling of living in the country while enjoying the amenities of the city.

Table 8.1 provides a summary of the analysis of Crossing A-Plaza A. Further details of the analysis of this alternative are provided in a document entitled *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative - Plaza and Crossing Alternatives*.

Crossing B Corridor Alternatives

Crossing B can connect to either Plaza A or Plaza B1. Plaza B1 is situated west of Ojibway Parkway on lands acquired by the City of Windsor for the purposes of establishing an industrial park. The Brighton Beach Industrial Park is named after the former Brighton Beach neighbourhood which previously occupied these lands. Over time, most of the residences have been acquired and removed so the area is generally vacant. The industrial area also includes the OPG Brighton Beach and West Windsor power plants, the Nemaq Automotive manufacturing plant, Keith Transformer Station, Windsor Salt, and aggregate storage facilities.

Table 8.2 provides a summary of a comparison of Plaza A and Plaza B1 alternatives with Crossing B based on the results of the analysis. Further details of the analysis of these alternatives are provided in a document entitled *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative - Plaza and Crossing Alternatives*.

Crossing C Corridor Alternatives

Crossing C can connect to Plazas A, B and C. The connection from Plaza A to Crossing C was assessed assuming two different routes. One route paralleled the alignment of Ojibway Parkway, passing between the Nemaq Plant and the City of Windsor's Lou Romano Water Reclamation Plant. The second route paralleled Broadway Street and Sandwich Street, passing through the Brighton Beach Industrial Area.

Plaza B is located in the Brighton Beach industrial area west of Ojibway Parkway and north of Broadway Street. Plaza C is located north of the Plaza B site, in the area west of Sandwich Street and south of Prospect Avenue. Residents of Sandwich have indicated to the study team that many consider Prospect Avenue as the southern limit of their community. Portions of the Plaza C site are currently occupied by the Brighton Beach Power Station, the Keith Transformer Station as well as vacant land. A portion of the plaza site is also occupied by Southwestern Sales Corporation, which stores and distributes aggregate and other construction materials.

The results of the geotechnical deep drilling program discussed in **Chapter 7** identified the need to incorporate a cable-stayed or suspension bridge for the approach to Crossing C to mitigate the considerable issues associated with the uncertain bedrock integrity. This would result in a significant cost premium (approximately \$325 million) as well as an impact to the construction schedule as compared to the other two crossing alternatives, which would feature more conventional approach structures.

Table 8.3 provides a summary of a comparison of Plaza A, B and C alternatives with Crossing C based on the results of the analysis. Further details of the analysis of these alternatives are provided in a document entitled *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative - Plaza and Crossing Alternatives*.

Evaluation of Crossing A, Crossing B and Crossing C Alternatives – Canadian Side

The results of the evaluations summarized in **Tables 8.1 to 8.3** identified that Crossing A-Plaza A, Crossing B-Plaza B1 and Crossing C-Plaza B are the plaza-crossing alternatives to be considered on the Canadian side. **Table 8.4** summarizes the characteristics, advantages and disadvantages of these three alternatives, as the decision on the preferred crossing is a bi-national decision. **Section 8.1.4** summarizes the overall assessment of the plaza and crossing alternatives.

Further details of the analysis of these alternatives are provided in a document entitled *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative - Plaza and Crossing Alternatives*.

ARITHMETIC METHOD

Crossing B Corridor Alternatives

In accordance with the evaluation process developed for this study, this assessment was also conducted using an arithmetic approach (weighted scoring), based on factor scores assigned by the factor specialists and factor weighting scenarios developed earlier in the study.

As described in **Section 6.2.3** with regard to the evaluation of the illustrative crossing, plaza and access road alternatives, in addition to weighting scenarios developed by the study team, weighting scenarios were also developed based on public input and input from the Community Consultation Group (CCG). These weighting scenarios were also utilized for the evaluation of the practical crossing, plaza and access road alternatives.

The results of this assessment are presented in **Table 8.5**. As can be seen in the table, the arithmetic results are consistent with the reasoned argument evaluation considering both the unweighted and weighted scores, as well as across all three weighting scenarios. Plaza B1 is the preferred Canadian plaza for Crossing B.

Crossing C Corridor Alternatives

The results of the arithmetic method assessment of the Corridor C alternatives are presented in **Table 8.6**. In reviewing the results of the two methods, the study team was satisfied that the results of the reasoned argument are valid and appropriate. To some degree, the limitations of the seven-point scoring system utilized for this study underemphasize the difference between the two alternatives in terms of cost and constructability impacts. At the same time, the differences between these two alternatives in terms of their impacts to natural features are adequately reflected in the impact scoring.

The magnitude and significance of the cost and constructability impacts between the alternatives are considered to be greater than the magnitude and significance of the differences in natural features impacts. The Plaza B alternative is therefore preferred over the Plaza C alternative.

Evaluation of Crossing A, Crossing B and Crossing C Alternatives – Canadian Side

The results of the arithmetic method assessment of the preferred Crossing A, Crossing B and Crossing C alternatives are presented in **Table 8.7**. The results indicate that Crossing B-Plaza B1 is the highest ranking alternative, followed by the Crossing A-Plaza A alternative, and the Crossing C-Plaza B alternative, respectively. These results are consistent with those of the reasoned argument method presented in this section.

TABLE 8.1 – SUMMARY OF ANALYSIS – CROSSING A - PLAZA A

Evaluation Factor	Measure	Crossing A – Plaza A
Changes to Air Quality	Changes in PM _{2.5} Concentration	Increases in PM _{2.5} within 250 m of crossing and plaza under certain conditions; potential to influence air quality in Armanda Street/Matchette Road area
	Changes in NO _x Concentrations	Increases in NO _x within 250 m of crossing and plaza under certain conditions; potential to influence air quality in Armanda Street/Matchette Road area
Protection of Community and Neighbourhood Characteristics	Effect on Local Access – Number of Roads Crossed / Closed / Connected	7 crossings / 7 closings / 4 connections – Matchette Road realignment; Minor out-of-way travel
	Noise receptors with change in noise levels >5 dBA (2035; with mitigation; compared to future do-nothing)	1
	Potential Acquisitions Households	62
	Potential Acquisitions Businesses/Industries	1
	Social Features (institutional) displaced	1 – Erie Wildlife Rescue
	Overall Effect on Community Character/Cohesion	Greater impact on community character for Armanda Street/Matchette Road neighbourhood compared to other alternatives due to proximity of new plaza to this residential area;
Maintain Consistency with Existing and Planned Land Use	Consistency	Plaza location not consistent with existing land uses of the Malden Planning District; impacts to existing and planned residential uses Crossing and approach are consistent as these are located in industrial area;
	Known Contaminated Sites Impacted – No./Area (ha)	4 sites/1 ha
Protect Cultural Resources	Designated built heritage features potentially displaced	1 Cultural Landscape Unit – Brighton Beach 1 Built Heritage Feature
	Direct impacts to Parks	Ojibway Park (0.7 ha)
	Potential archaeological sites affected	0 – pre-contact habitation site/Euro-Canadian homesteads 6 – pre-contact findspots
Protect the Natural Environment	Feature impacts	Loss of 2.98 ha of provincially rare vegetation communities Loss of 232 specimens/colonies of species at risk Approximately 7.38 ha of designated natural areas within the 120 m of proposed property limit
Improve Regional Mobility	2035 Average Daily Car and Truck Volume	Canadian plaza and crossing sized to accommodate average daily traffic of 39,000 vehicles (cars and trucks) in 2035.
	Distance from plaza to international border	2.5 km
	Canadian Plaza Operational Considerations	Good accessibility to/from local road network Good access to local utilities for site services Distance from border to plaza > 1.5 km is less desirable; requires on-going security monitoring; 700 m section of at-grade roadway through vacant lands also a security/monitoring concern Plaza provides sufficient size for addressing needs to 2035 and beyond; while there is flexibility to address new/expanded inspection functions within the plaza site, expansion of plaza beyond the identified footprint may be problematic due to existing land uses adjacent to the plaza site.
Cost and Constructability	Is it constructible?	Yes
	Key Issues	Length of main span (approx. 1200 m) means suspension bridge is only practical bridge type; Risk and additional cost associated with project timeframe is high due to magnitude of required construction and longer main-span.
	Construction cost, 2011 CDN \$	\$830 million (Malden Road to international border, including one-half of crossing construction cost)

TABLE 8.2 – SUMMARY OF ANALYSIS – CROSSING B ALTERNATIVES

Evaluation Factor	Measure	Crossing B – Plaza A	Crossing B – Plaza B1
Changes to Air Quality	Changes in PM _{2.5} Concentration	Increases in PM _{2.5} within 250 m of crossing and plaza under certain conditions	
	Changes in NO _x Concentrations	Increases in NO _x within 250 m of crossing and plaza under certain conditions	
Protection of Community and Neighbourhood Characteristics	Effect on Local Access – Number of Roads Crossed / Closed / Connected	4 crossings / 9 closings / 4 connections – Minor out-of-way travel; Matchette Road realignment	4 crossings / 12 closings / 4 connections – Minor out-of-way travel
	Noise receptors with change in noise levels >5 dBA (2035; with mitigation; compared to future do-nothing)	2	0
	Potential Acquisitions Households	65	36
	Potential Acquisitions Businesses/Industries	1	1
	Social Features (institutional) displaced	1 (Erie Wildlife Rescue)	
	Overall Effect on Community Character/Cohesion	Negative effect on community character for Armanda Street/Matchette Road neighbourhood due to displacement of homes and proximity of neighbourhood to new plaza	Negative effect on community character for Matchette Road/Chappus Street neighbourhood due to displacement of several homes to accommodate interchange connection at E.C. Row/Ojibway Pkwy
Maintain Consistency with Existing and Planned Land Use	Consistency	Plaza location not consistent with existing land uses and zoning in Malden Planning District Crossing and approach are located in portland industrial area and are considered to be consistent	Plaza located in industrial area; more consistent with existing land uses and zoning Crossing and approaches are located in portland industrial area and are considered to be consistent
	Known Contaminated Sites Impacted – No./Area (ha)	11 sites/5 ha	17 sites/24 ha
Protect Cultural Resources	Designated built heritage features potentially displaced	1 Cultural Landscape Unit - Brighton Beach 2 Built Heritage Features – house	1 Cultural Landscape Unit - Brighton Beach 3 Built Heritage Features – houses
	Direct impacts to Parks	Ojibway Park (0.7 ha)	Ojibway Park (0.7 ha)
	Potential archaeological sites affected	0 – pre-contact habitation site/Euro-Canadian homesteads 6 – pre-contact findspots	2 – pre-contact habitation site/Euro-Canadian homesteads 4 – pre-contact findspots
Protect the Natural Environment	Feature impacts	Loss of 2.70 ha of provincially rare vegetation communities Loss of 223 specimens/colonies of species at risk Approximately 2.38 ha of designated natural areas within 120 m of proposed property limit	Loss of 1.09 ha of provincially rare vegetation communities Loss of 185 specimens/colonies of species at risk Approximately 10.96 ha of designated natural areas within 120 m of proposed property limit
Improve Regional Mobility	2035 Average Daily Car and Truck Volume	Canadian plaza and crossing sized to accommodate average daily traffic of 39,000 vehicles (cars and trucks) in 2035.	
	Distance from plaza to international border	2.9 km	1.4 km
	Canadian Plaza Operational Considerations	Distance from border to plaza > 1.5 km is less desirable; requires on-going security monitoring; 700 m section of at-grade roadway through vacant lands also a security/ monitoring concern	Distance to plaza < 1.5 km is preferable; good (direct) sight lines between plaza and crossing
Cost and Constructability	Is it constructible?	Yes	
	Key Issues	No issues affecting cost and constructability identified	
	Construction cost, 2011 CDN \$	\$687 million to \$751 million (Malden Road to international border, including one-half of crossing construction cost)	\$648 million to \$712 million (Malden Road to international border, including one-half of crossing construction cost)

Evaluation Factor	Measure	Crossing B – Plaza A	Crossing B – Plaza B1
Summary of Assessment	<p>Both alternatives have similar effects on air quality and cultural resources and similar cost estimates. The Plaza A alternative displaces more residences and is considered to have a greater negative effect on the residential neighbourhood of Matchette Road/Armanda Street. These greater effects are due to the proximity of the residential neighbourhood to the plaza. In addition to higher direct effects, the Plaza A alternative is determined to have higher indirect and nuisance effects related to noise, dust, etc. Plaza B1 is located in an industrial park, and is therefore considered to have less community impacts and greater consistency with land use. The Plaza A alternative also results in a greater impact to natural features than the Plaza B1 alternative.</p> <p>Operationally, both plazas will operate well under future peak travel demand. However Plaza B1 is preferred over Plaza A based on the shorter distance to the international border and the direct connection between the crossing and the plaza (less security/monitoring requirements).</p> <p>Based on this assessment, Plaza B1 provides more transportation and mobility benefits and fewer impacts.</p> <p>Plaza B1 is preferred to Plaza A for connecting to Crossing B.</p>		

TABLE 8.3 – SUMMARY OF ANALYSIS – CROSSING C ALTERNATIVES

Evaluation Factor	Measure	Crossing C – Plaza A (via Ojibway Parkway)	Crossing C – Plaza A (via Brighton Beach)	Crossing C – Plaza B	Crossing C – Plaza C
Changes to Air Quality	Changes in PM _{2.5} Concentration	Increases in PM _{2.5} within 250 m of crossing and plaza under certain conditions; potential to influence air quality in Armanda Street area and portion of Sandwich		Increases in PM _{2.5} within 250 m of crossing and plaza under certain conditions; potential to influence air quality in portion of Sandwich	
	Changes in NO _x Concentrations	Increases in NO _x within 250 m of crossing and plaza under certain conditions; potential to influence air quality in Armanda Street area and portion of Sandwich		Increases in NO _x within 250 m of crossing and plaza under certain conditions; potential to influence air quality in portion of Sandwich	
Protection of Community and Neighbourhood Characteristics	Effect on Local Access – Number of Roads Crossed / Closed / Connected	7 crossings / 4 closings / 4 connections – – minor out-of-way travel; Matchette Road realignment	7 crossings / 3 closings / 4 connections – minor out-of-way travel; Matchette Road realignment	7 crossings / 16 closings / 5 connections – minor out-of-way travel; Relocation of Broadway Street / Sandwich Street connection	5 crossings / 13 closings / 4 connections – minor out-of-way travel
	Noise receptors with change in noise levels >5 dBA (2035; with mitigation; compared to future do-nothing)	3	4	0	0
	Potential Acquisitions Households	64	66	38	35
	Potential Acquisitions Businesses/Industries	6	5	5	5
	Social Features (institutional) displaced	1 (Erie Wildlife Rescue)			
	Overall Effect on Community Character/Cohesion	Negative effect on community character for Armanda Street neighbourhood due to proximity of new plaza; Negative effect on community character for Sandwich Towne due to proximity of new crossing.			Negative effect on community character for Sandwich Towne due to proximity of new crossing.
Maintain Consistency with Existing and Planned Land Use	Consistency	Plaza location not consistent with existing land uses of the Malden Planning District; impacts to existing and planned residential uses Crossing and approaches located in occupied and vacant industrial areas; consistent	Plaza location not consistent with existing land uses of the Malden Planning District; impacts to existing and planned residential uses Crossing and approaches located in occupied and vacant industrial areas; consistent	Plaza location in occupied and vacant industrial areas; consistent Crossing and approaches located in occupied and vacant industrial areas; consistent	Plaza location in occupied and vacant industrial areas; consistent Crossing and approaches located in occupied and vacant industrial areas; consistent
	Known Contaminated Sites Impacted – No./Area (ha)	22 sites/12 ha	29 sites/24 ha	29 sites/24 ha	30 sites/50 ha
Protect Cultural Resources	Designated built heritage features potentially displaced	2 Cultural Landscape Units – Brighton Beach; unconfirmed tunnel 1 Built Heritage Feature - house	2 Cultural Landscape Units – Brighton Beach; unconfirmed tunnel 2 Built Heritage Features – houses	2 Cultural Landscape Units – Brighton Beach; unconfirmed tunnel 3 Built Heritage Features – houses	2 Cultural Landscape Units – Brighton Beach; unconfirmed tunnel 2 Built Heritage Features – houses
	Direct impacts to Parks	Ojibway Park (0.7 ha)	Ojibway Park (0.7 ha)	Ojibway Park (0.7 ha)	Ojibway Park (0.7 ha)
	Potential archaeological sites affected	0 – pre-contact habitation sites/Euro-Canadian homesteads 5 – pre-contact findspots	0 – pre-contact habitation sites/Euro-Canadian homesteads 6 – pre-contact findspots	3 – pre-contact habitation sites/Euro-Canadian homesteads 4 – pre-contact findspots	1 – pre-contact habitation sites/Euro-Canadian homesteads 3 – pre-contact findspots
Protect the Natural Environment	Feature impacts	loss of 2.70 ha of provincially rare vegetation communities loss of 186 specimens/colonies of species at risk Approximately 1.73 ha of designated natural areas within 120 m of proposed property limit	loss of 2.69 ha of provincially rare vegetation communities loss of 231 specimens/colonies of species at risk Approximately 1.48 ha of designated natural areas within 120 m of proposed property limit	loss of 2.02 ha of provincially rare vegetation communities loss of 195 specimens/colonies of species at risk Approximately 14.82 ha of designated natural areas within 120 m of proposed property limit	loss of 0.89 ha of provincially rare vegetation communities loss of 153 specimens/colonies of species at risk Approximately 7.77 ha of designated natural areas within 120 m of proposed property limit

Evaluation Factor	Measure	Crossing C – Plaza A (via Ojibway Parkway)	Crossing C – Plaza A (via Brighton Beach)	Crossing C – Plaza B	Crossing C – Plaza C
Improve Regional Mobility	2035 Average Daily Car and Truck Volume	Canadian plaza and crossing sized to accommodate average daily traffic of 39,000 vehicles (cars and trucks) in 2035.			
	Distance from plaza to international border	3.3 km	3.9 km	2.3 km	1.6 km
	Canadian Plaza Operational Considerations	Good accessibility to/from local road network Good access to local utilities for site services Distance from border to plaza > 1.5 km is less desirable; requires ongoing security monitoring; section of at-grade roadway through vacant land use also a security/monitoring concern Plaza provides sufficient size for addressing needs to 2035 and beyond; while there is flexibility to address new/expanded inspection functions within the plaza site, expansion of plaza beyond the identified footprint may be problematic due to existing land uses adjacent to the plaza site.	Good accessibility to/from local road network Good access to local utilities for site services Distance from border to plaza > 1.5 km is less desirable; requires ongoing security monitoring; section of at-grade roadway through vacant land use also a security/monitoring concern Plaza provides sufficient size for addressing needs to 2035 and beyond; while there is flexibility to address new/expanded inspection functions within the plaza site, expansion of plaza beyond the identified footprint may be problematic due to existing land uses adjacent to the plaza site.	Good accessibility to/from local road network Good access to local utilities for site services Distance from border to plaza > 1.5 km is less desirable; requires ongoing security monitoring; section of at-grade roadway through vacant land use also a security/monitoring concern Plaza provides sufficient size for addressing needs to 2035 and beyond; while there is flexibility to address new/expanded inspection functions within the plaza site, expansion of plaza beyond the identified footprint may be problematic due to existing land uses adjacent to the plaza site.	Good accessibility to/from local road network Good access to local utilities for site services Distance from border >1.5 km, however the road connection is elevated with direct connection to crossing; good (direct) sight lines between plaza and crossing Plaza provides sufficient size for addressing needs to 2035 and beyond; while there is flexibility to address new/expanded inspection functions within the plaza site, expansion of plaza beyond the identified footprint may be problematic due to existing land uses adjacent to the plaza site.
Cost and Constructability	Is it constructible?	Yes, but results of geotechnical investigations identified that there is a subsurface cavity caused by salt extraction activities in the vicinity of Sandwich Street and Prospect Avenue. Further settlements due to this cavity represent risks to the design and operation of the approach roadway connecting to Crossing C. It is not certain that further investigation will be successful in reducing or eliminating these risks.			
	Key Issues	Costs and risks associated with approach road crossing of brine well area Direct impact to Sterling Marine Fuels fueling depot	Costs and risks associated with approach road crossing of brine well area Direct impact to Sterling Marine Fuels fueling depot	Costs and risks associated with approach road crossing of brine well area Direct impact to Sterling Marine Fuels fueling depot	Costs and risks associated with approach road crossing of brine well area Costs and risks associated with relocation of Keith Transformer Station Direct impact to Sterling Marine Fuels fueling depot
	Construction cost, 2011 CDN \$	\$979 million to \$1,049 million (Malden Road to international border, including one-half of crossing construction cost)	\$985 million to \$1,055 million (Malden Road to international border, including one-half of crossing construction cost)	\$1,015 million to \$1,085 million (Malden Road to international border, including one-half of crossing construction cost)	\$1,142 million to \$1,212 million (Malden Road to international border, including one-half of crossing construction cost)
Summary of Assessment		<p>The Plaza A alternatives were considered to have higher overall impacts in comparison to the Plaza B and Plaza C alternatives. The Plaza A alternatives result in greater direct and indirect nuisance impacts to the residential and natural areas in the Matchette Road/E.C. Row/Armanda Street area due to the location of this plaza. In addition, the distance between the plaza and the border with the Plaza A alternatives is well beyond the desirable distance identified by Canada Border Services Agency, resulting in greater monitoring/security concerns compared to the other alternatives. Finally, the Plaza A alternatives offered no advantages over the Plaza B and C alternatives with the connection to Crossing C.</p> <p>The Plaza C alternative is noted as having slightly less impact on local air quality due to the layout of the plaza and greater buffer area provided around the apron area of the plaza in comparison to Plaza B. The Plaza C alternative was also found to have lower impacts to significant natural features than the Plaza B alternative. However, the Plaza C alternative carries substantially higher construction costs, and the potential to add several more years to the construction period than the Plaza B alternative due to the conflict with the Keith Transformer Station. It should be noted that all alternatives have similar constructability issues with regard to the existing brine well area, and the proximity to Sterling Marine Fuels.</p> <p>The differences in air quality impacts between the Plaza B and C alternatives noted above are of no consequence in this industrial area of West Windsor as no sensitive receivers are located within 250 m of either plaza. The difference in impacts to natural features between the Plaza B and C alternatives is predominantly related to terrestrial communities of high significance and provincially rare specimens/colonies. The Plaza B option impacts two additional areas of high significance habitat, resulting in approximately one hectare more area impacted, and 195 specimens/colonies compared to 153 with the Plaza C alternative. In either case, mitigation of impacts through integration, relocation and salvage will be required for the habitat of high significance and provincially rare specimens/colonies with either alternative.</p> <p>Providing increased capacity, improving border processing capabilities and providing reasonable and secure crossing options in this important trade corridor are the primary objectives of this study and are highly important to the local, regional and national economies on both sides of the river. Approvals and staging for the relocation of the Keith Transformer Station can delay completion of the new crossing several years; in the meantime, increased congestion and delays on the border crossing network, extended disruption to communities due to increased infiltration of international traffic onto local streets, and failure to attract new employment to the region could negatively impact the local communities.</p> <p>Given the need to mitigate the impacts to terrestrial communities for either plaza alternative, the schedule risks and additional costs associated with the relocation of the Keith Transformer Station associated with the Plaza C alternative were considered to be of greater importance than the increased impacts to natural features. Therefore, the Plaza B alternative was carried forward for further consideration.</p>			

TABLE 8.4 – EVALUATION OF CROSSING A, CROSSING B AND CROSSING C ALTERNATIVES – CANADIAN SIDE

Evaluation Factor	Measure	Crossing A – Plaza A	Crossing B – Plaza B1	Crossing C - Plaza B
Changes to Air Quality	Changes in PM _{2.5} Concentration	Increases in PM _{2.5} within 250 m of crossing and plaza under certain conditions; potential to influence air quality in Armanda Street/Matchette Road area	Increases in PM _{2.5} within 250 m of crossing and plaza under certain conditions;	Increases in PM _{2.5} within 250 m of crossing and plaza under certain conditions; potential to influence air quality in portion of Sandwich
	Changes in NO _x Concentrations	Increases in NO _x within 250 m of crossing and plaza under certain conditions; potential to influence air quality in Armanda Street/Matchette Road area	Increases in NO _x within 250 m of crossing and plaza under certain conditions;	Increases in NO _x within 250 m of crossing and plaza under certain conditions; potential to influence air quality in portion of Sandwich
Protection of Community and Neighbourhood Characteristics	Effect on Local Access – Number of Roads Crossed / Closed / Connected	7 crossings / 7 closings / 4 connections – Matchette Road realignment; Minor out-of-way travel	4 crossings / 12 closings / 4 connections – Minor out-of-way travel	7 crossings / 16 closings / 5 connections – minor out-of-way travel; Relocation of Broadway Street / Sandwich Street connection
	Noise receptors with change in noise levels >5 dBA (2035; with mitigation; compared to future do-nothing)	1	0	0
	Potential Acquisitions Households	62	36	38
	Potential Acquisitions Businesses/Industries	1	1	5
	Social Features (institutional) displaced	1 (Erie Wildlife Rescue)		
	Overall Effect on Community Character/Cohesion	Greater impact on community character for Armanda Street/Matchette Road neighbourhood compared to other alternatives due to proximity of new plaza to this residential area;	Less impact on community character compared to other alternatives; both plaza and crossing are situated in industrial area	Greater impact on community character of Sandwich compared to other alternatives due to proximity of new crossing to this residential area.
Maintain Consistency with Existing and Planned Land Use	Consistency	Plaza location not consistent with existing land uses of the Malden planning district; impacts to existing and planned residential uses Crossing and approach are consistent as these are located in industrial area;	Crossing and plaza are consistent as these are located in industrial area;	Crossing and plaza are consistent as these are located in industrial area;
	Known Contaminated Sites Impacted – No./Area (ha)	4 sites/1 ha	17 sites/24 ha	29 sites/24 ha
Protect Cultural Resources	Designated built heritage features potentially displaced	1 Cultural Landscape Unit 1 Built Heritage Feature (low significance)	1 Cultural Landscape Unit 3 Built Heritage Features (low significance)	2 Cultural Landscape Units 3 Built Heritage Features (low significance)
	Direct impacts to Parks	Ojibway Park (0.7 ha)	Ojibway Park (0.7 ha)	Ojibway Park (0.7 ha)
	Potential archaeological sites affected	0 pre-contact habitation sites/ Euro-Canadian homesteads 6 pre-contact findspots	2 pre-contact habitation sites/ Euro-Canadian homesteads 4 pre-contact findspots	3 pre-contact habitation sites/ Euro-Canadian homesteads 4 pre-contact findspots
Protect the Natural Environment	Feature impacts	Loss of 2.98 ha of provincially rare vegetation communities Loss of 232 specimens/colonies of species at risk Approximately 7.38 ha of designated natural areas within 120 m of proposed property limit	Loss of 1.09 ha of provincially rare vegetation communities Loss of 185 specimens/colonies of species at risk Approximately 10.96 ha of designated natural areas within 120 m of proposed property limit	Loss of 2.02 ha of provincially rare vegetation communities Loss of 195 specimens/colonies of species at risk Approximately 14.82 ha of designated natural areas within 120 m of proposed property limit

Evaluation Factor	Measure	Crossing A – Plaza A	Crossing B – Plaza B1	Crossing C - Plaza B
Improve Regional Mobility	2035 Average Daily Car and Truck Volume	Canadian plaza and crossing sized to accommodate average daily traffic of 39,000 vehicles (cars and trucks) in 2035.		
	Distance from plaza to international border	2.5 km	1.4 km	2.3 km
	Canadian Plaza Operational Considerations	<p>Good accessibility to/from local road network</p> <p>Good access to local utilities for site services</p> <p>Distance from border to plaza > 1.5 km is less desirable; requires ongoing security monitoring; 700 m section of at-grade roadway through vacant lands also a security/monitoring concern</p> <p>Plaza provides sufficient size for addressing needs to 2035 and beyond; while there is flexibility to address new/expanded inspection functions within the plaza site, expansion of plaza beyond the identified footprint may be problematic due to existing land uses adjacent to the plaza site.</p>	<p>Good accessibility to/from local road network</p> <p>Good access to local utilities for site services</p> <p>Distance to plaza < 1.5 km is preferable; good (direct) sight lines between plaza and crossing</p> <p>Plaza provides sufficient size for addressing needs to 2035 and beyond; while there is flexibility to address new/expanded inspection functions within the plaza site, expansion of plaza beyond the identified footprint may be problematic due to existing land uses adjacent to the plaza site. It was also noted that this plaza is in reasonable proximity to the waterfront, offering an opportunity to incorporate marine inspection functions at the plaza, if required.</p>	<p>Good accessibility to/from local road network</p> <p>Good access to local utilities for site services</p> <p>Distance from border to plaza > 1.5 km is less desirable; requires ongoing security monitoring; 400 m section of at-grade roadway through vacant lands also a security/monitoring concern</p> <p>Plaza provides sufficient size for addressing needs to 2035 and beyond; while there is flexibility to address new/expanded inspection functions within the plaza site, expansion of plaza beyond the identified footprint may be problematic due to existing land uses adjacent to the plaza site. It was also noted that these plaza is in reasonable proximity to the waterfront, offering an opportunity to incorporate marine inspection functions at the plaza, if required.</p>
Cost and Constructability	Is it constructible?	Yes	Yes	Yes, but results of geotechnical investigations identified that there is a subsurface cavity caused by salt extraction activities in the vicinity of Sandwich Street and Prospect Avenue. Further uncontrolled settlements due to this cavity represent risks to the design and operation of the approach roadway connecting to Crossing C. It is not certain that further investigation will be successful in reducing or eliminating these risks
	Key Issues	Length of crossing (approximately 1200 m) leads to cost and constructability risks	None identified	Costs and risks associated with approach road crossing of brine well area Direct impact to Sterling Marine Fuels fueling depot
	Construction cost, 2011 CDN \$	\$830 million (Malden Road to international border, including one-half of crossing construction cost)	\$648 million to \$712 million (Malden Road to international border, including one-half of crossing construction cost)	\$1015 million to \$1085 million (Malden Road to international border, including one-half of crossing construction cost)
Summary of Assessment		<p>Overall, the Crossing A-Plaza A was found to have many disadvantages and few advantages over the other alternatives. This alternative was found to have higher impacts to community and neighbourhood features, land use and natural features than the other alternatives. In addition, this alternative was found to provide lower benefits to regional mobility compared to the other alternatives. This alternative has lower cost and constructability impacts than Crossing C-Plaza B.</p> <p>The cost and constructability issues with the Crossing C-Plaza B alternative are a serious disadvantage of this alternative. This alternative was also found to have greater community and cultural feature impacts to Sandwich. Overall, Crossing C-Plaza B was found to have many disadvantages, and no advantages, over Crossing B-Plaza B1 alternative.</p> <p>Crossing B-Plaza B1 offers more advantages and has no notable disadvantages when compared to the Crossing A and Crossing C alternatives. The crossing and plaza are situated away from residential areas and sufficiently close to the international border. This alternative has the lowest impacts to natural and community features, and is comparable to the other alternatives in terms of its impacts to air quality, land use and cultural features. No alternative provides greater benefits to regional mobility and this alternative has the lowest cost.</p>		

TABLE 8.5 – RESULTS OF ARITHMETIC EVALUATION – CROSSING B ALTERNATIVES

Factor	Study Team Weighting				
	Weight	Plaza A		Plaza B1	
		Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	12.39	2	24.78	2	24.78
Protection of Community and Neighbourhood Characteristics	15.93	1	15.93	2	31.86
Maintain Consistency with Existing & Planned Land Use	12.39	2	24.78	3	37.17
Protect Cultural Resources	12.39	3	37.17	3	37.17
Protect the Natural Environment	15.93	1	15.93	2	31.86
Improve Regional Mobility	17.70	5	88.50	6	106.20
Cost and Constructability	13.27	2	26.54	2	26.54
Total	100.00	16	233.63	20	295.58
Rank	Unweighted	2		1	
	Weighted		2		1

Factor	Public Weighting				
	Weight	Plaza A		Plaza B1	
		Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	17.32	2	34.64	2	34.64
Protection of Community and Neighbourhood Characteristics	15.49	1	15.49	2	30.98
Maintain Consistency with Existing & Planned Land Use	12.89	2	25.78	3	38.67
Protect Cultural Resources	13.14	3	39.42	3	39.42
Protect the Natural Environment	16.34	1	16.34	2	32.68
Improve Regional Mobility	15.28	5	76.40	6	91.68
Cost and Constructability	9.54	2	19.08	2	19.08
Total	100.00	16	227.15	20	287.15
Rank	Unweighted	2		1	
	Weighted		2		1

Factor	Community Consultation Group Weighting				
	Weight	Plaza A		Plaza B1	
		Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	17.30	2	34.60	2	34.60
Protection of Community and Neighbourhood Characteristics	13.88	1	13.88	2	27.76
Maintain Consistency with Existing & Planned Land Use	13.69	2	27.38	3	41.07
Protect Cultural Resources	13.12	3	39.36	3	39.36
Protect the Natural Environment	17.11	1	17.11	2	34.22
Improve Regional Mobility	14.83	5	74.15	6	88.98
Cost and Constructability	10.07	2	20.14	2	20.14
Total	100.00	16	226.62	20	286.13
Rank	Unweighted	2		1	
	Weighted		2		1

Legend

Score	1	2	3	4	5	6	7
Benefit/Impact	High Impact	Medium Impact	Low Impact	Neutral/ No Impact	Low Benefit	Medium Benefit	High Benefit

TABLE 8.6 – RESULTS OF ARITHMETIC EVALUATION – CROSSING C ALTERNATIVES

Factor	Study Team Weighting								
	Weight	Plaza A (via Ojibway Parkway)		Plaza A (via Brighton Beach)		Plaza B		Plaza C	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	12.39	2	24.78	2	24.78	2	24.78	2	24.78
Protection of Community and Neighbourhood Characteristics	15.93	1	15.93	1	15.93	2	31.86	2	31.86
Maintain Consistency with Existing and Planned Land Use	12.39	2	24.78	2	24.78	3	37.17	3	37.17
Protect Cultural Resources	12.39	3	37.17	3	37.17	3	37.17	3	37.17
Protect the Natural Environment	15.93	2	31.86	1	15.93	2	31.86	3	47.79
Improve Regional Mobility	17.70	5	88.50	5	88.50	5	88.50	6	106.20
Cost and Constructability	13.27	2	26.54	2	26.54	2	26.54	1	13.27
Total	100.00	17	249.56	16	233.63	19	277.88	20	298.24
Rank	Un-weighted	3		4		1		1	
	Weighted		3		4		2		1

Factor	Public Weighting								
	Weight	Plaza A (via Ojibway Parkway)		Plaza A (via Brighton Beach)		Plaza B		Plaza C	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	17.32	2	34.64	2	34.64	2	34.64	2	34.64
Protection of Community and Neighbourhood Characteristics	15.49	1	15.49	1	15.49	2	30.98	2	30.98
Maintain Consistency with Existing and Planned Land Use	12.89	2	25.78	2	25.78	3	38.67	3	38.67
Protect Cultural Resources	13.14	3	39.42	3	39.42	3	39.42	3	39.42
Protect the Natural Environment	16.34	2	32.68	1	16.34	2	32.68	3	49.02
Improve Regional Mobility	15.28	5	76.4	5	76.4	5	76.40	6	91.68
Cost and Constructability	9.54	2	19.08	2	19.08	2	19.08	1	9.54
Total	100.00	17	243.49	16	227.15	19	271.87	20	293.95
Rank	Un-weighted	3		4		1		1	
	Weighted		3		4		2		1

TABLE 8.6 – RESULTS OF ARITHMETIC EVALUATION – CROSSING C ALTERNATIVES (CONT'D)

Factor	Weight	Community Consultation Group Weighting							
		Plaza A (via Ojibway Parkway)		Plaza A (via Brighton Beach)		Plaza B		Plaza C	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	17.30	2	34.60	2	34.60	2	34.60	2	34.60
Protection of Community and Neighbourhood Characteristics	13.88	1	13.88	1	13.88	2	27.76	2	27.76
Maintain Consistency with Existing and Planned Land Use	13.69	2	27.38	2	27.38	3	41.07	3	41.07
Protect Cultural Resources	13.12	3	39.36	3	39.36	3	39.36	3	39.36
Protect the Natural Environment	17.11	2	34.22	1	17.11	2	34.22	3	51.33
Improve Regional Mobility	14.83	5	74.15	5	74.15	5	74.15	6	88.98
Cost and Constructability	10.07	2	20.14	2	20.14	2	20.14	1	10.07
Total	100.00	17	243.73	16	226.62	19	271.30	20	293.17
Rank	Un-weighted	3		4		1		1	
	Weighted		3		4		2		1

Legend

Score	1	2	3	4	5	6	7
Benefit/Impact	High Impact	Medium Impact	Low Impact	Neutral/ No Impact	Low Benefit	Medium Benefit	High Benefit

TABLE 8.7 – RESULTS OF ARITHMETIC EVALUATION – CROSSING A, CROSSING B AND CROSSING C ALTERNATIVES – CANADIAN SIDE

Factor	Weight	Study Team Weighting					
		Crossing A – Plaza A		Crossing B – Plaza B1		Crossing C - Plaza B	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	12.39	2	24.78	2	24.78	2	24.78
Protection of Community and Neighbourhood Characteristics	15.93	1	15.93	3	47.79	2	31.86
Maintain Consistency with Existing and Planned Land Use	12.39	2	24.78	3	37.17	3	37.17
Protect Cultural Resources	12.39	3	37.17	3	37.17	3	37.17
Protect the Natural Environment	15.93	1	15.93	2	31.86	2	31.86
Improve Regional Mobility	17.70	6	106.20	7	123.90	7	123.90
Cost and Constructability	13.27	2	26.54	2	26.54	1	13.27
Total	100.00	17	251.33	22	329.21	20	300.01
Rank	Un-weighted	3		1		2	
	Weighted		3		1		2

TABLE 8.7 – RESULTS OF ARITHMETIC EVALUATION – CROSSING A, CROSSING B AND CROSSING C ALTERNATIVES – CANADIAN SIDE (CONT'D)

Factor	Public Weighting						
	Weight	Crossing A – Plaza A		Crossing B – Plaza B1		Crossing C - Plaza B	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	17.32	2	34.64	2	34.64	2	34.64
Protection of Community and Neighbourhood Characteristics	15.49	1	15.49	3	46.47	2	30.98
Maintain Consistency with Existing and Planned Land Use	12.89	2	25.78	3	38.67	3	38.67
Protect Cultural Resources	13.14	3	39.42	3	39.42	3	39.42
Protect the Natural Environment	16.34	1	16.34	2	32.68	2	32.68
Improve Regional Mobility	15.28	6	91.68	7	106.96	7	106.96
Cost and Constructability	9.54	2	19.08	2	19.08	1	9.54
Total	100.00	17	242.43	22	317.92	20	292.89
Rank	Un-weighted	3		1		2	
	Weighted		3		1		2

Factor	Community Consultation Group Weighting						
	Weight	Crossing A – Plaza A		Crossing B – Plaza B1		Crossing C - Plaza B	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Changes in Air Quality	17.30	2	34.60	2	34.60	2	34.60
Protection of Community and Neighbourhood Characteristics	13.88	1	13.88	3	41.64	2	27.76
Maintain Consistency with Existing and Planned Land Use	13.69	2	27.38	3	41.07	3	41.07
Protect Cultural Resources	13.12	3	39.36	3	39.36	3	39.36
Protect the Natural Environment	17.11	1	17.11	2	34.22	2	34.22
Improve Regional Mobility	14.83	6	88.98	7	103.81	7	103.81
Cost and Constructability	10.07	2	20.14	2	20.14	1	10.07
Total	100.00	17	241.45	22	314.84	20	290.89
Rank	Un-weighted	3		1		2	
	Weighted		3		1		2

Legend

Score	1	2	3	4	5	6	7
Benefit/Impact	High Impact	Medium Impact	Low Impact	Neutral/ No Impact	Low Benefit	Medium Benefit	High Benefit

8.1.4 Bi-national Evaluation of Practical Crossing and Plaza Alternatives

As discussed in Section 8.1.3, three crossing-plaza combinations were carried forward for consideration by the Canadian and U.S. study teams:

- Crossing X-10A, with U.S. Plaza P-a and Canadian Plaza A
- Crossing X-10B, with U.S. Plaza P-a and Canadian Plaza B1
- Crossing X-11C, with U.S. Plaza P-c and Canadian Plaza B

The analysis and evaluation of alternatives was based on the seven factor areas noted in the previous section. The following summarizes the findings documented in the U.S. *Draft Environmental Impact Statement (DEIS), February 2008*, and the Canadian *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative – Plaza and Crossing Alternatives, December 2008*.

AIR QUALITY

In Canada, the plazas and crossings are located in areas where no major transportation facilities presently exist; all plaza and crossing alternatives therefore result in increases in concentrations of pollutants over the “Do Nothing” alternative. The results of the air quality modelling of the plaza and crossing combinations indicate that the greatest changes to air quality occur around the plaza areas as opposed to the crossings. The plazas connected to the Crossing X-10B and X-11C alternatives are located in industrial areas away from sensitive receptors. With Crossing X-10A, Plaza A has a greater buffer area around the tolling/inspection plazas, where vehicles stopping/queuing/starting up will occur. Nonetheless, impacts to adjacent residences may occur under certain conditions. All three crossing-plaza alternatives were found to have moderate impacts due to the impacts being limited to within 250 m of the Plazas.

In the U.S., air quality will improve even under the “Do Nothing” alternative because of U.S. Environmental Protection Agency rules and regulations under the *Clean Air Act* and the *National Ambient Air Quality Standards*. Regional air quality will also improve because of the closings of old manufacturing plants due to the decline in the economy and a shift to more service-oriented industries. Local air quality conditions in the Mexicantown area at the Ambassador Bridge are expected to improve with opening of the *Ambassador Bridge Gateway Project* in 2009. All of the new crossing/plaza alternatives will aid in improving air quality by spreading the automotive traffic in Southwest Detroit and reducing the number of heavy-duty diesel trucks within the neighbourhoods. The Ambassador Bridge has Mexicantown as its neighbour to the east. The Delray neighbourhood is located to the west of the new plaza. Mexicantown is an expanding, neighbourhood. Splitting traffic between two bridges/plazas will reduce the pollution now concentrated in one area.

Overall, there was no preference for a particular Crossing/Plaza alternative based on the air quality factor.

COMMUNITY AND NEIGHBOURHOOD CHARACTERISTICS

In Canada, the Crossing X-10A impact to the Armanda Street/Matchette Road neighbourhood is considered of greater effect than the other alternatives. This assessment is based on there being a

higher degree of change in neighbourhood character from park-like residential to industrial with the introduction of the Plaza A site.

The results of community consultation on the crossing alternatives indicate concern that the crossing X-11C alternative would have a notable impact to community character in Sandwich Towne. These concerns are related to potential increases in traffic and nuisance impacts (noise, dust) and the relative proximity of the new crossing to Ambassador Bridge. In addition, the Crossing X-11C alternative also has the potential to impact approximately 100 homes in Sandwich Towne with noise increases greater than five decibels (dB) – a level of increased noise which requires mitigation be considered. A noise barrier to reduce changes in noise levels to below 5 dB is estimated to cost approximately \$CAD 20million.

Crossing X-10B, with the plaza and crossing located in the industrial lands west of Sandwich Street is not expected to have a substantial impact to the community and neighbourhood features in this part of the city.

In the U.S., the X-11C Crossing would have a greater number of impacts to active residential and business units as compared to Crossing X-10A and X-10B; albeit relatively few in comparison to the plaza and interchange.

Overall, from the perspective of protecting community and neighbourhood characteristics, the Crossing X-11C alternative was least preferred. Between the X-10 alternatives, X-10B is preferred based on lower residential impacts.

EXISTING AND PLANNED LAND USE

In Canada, the Crossing X-10A alternative was considered to have higher impacts to land use in comparison to the other alternatives. This is reflective of the existing land use in the Malden Planning District, which is primarily residential, integrated with natural features. This land use would be heavily disrupted by Plaza A, which would be located on generally undeveloped lands south of E.C. Row between Malden Road and Ojibway Parkway. The other crossing alternatives are located generally within industrial lands in the Windsor port area and carry less impact to land use.

In the US, with the “Do Nothing” alternative, trends indicate continued industrialization of the Delray area will occur at the cost of the residential area that now exists. Existing land use patterns are expected to continue with little change in the remainder of the ACA. However, forecasts by Southeast Michigan Council of Governments (SEMCOG) indicate losses in population and jobs in the region that could lead to abandonment of some currently active land uses.

If the proposed crossing is built, positive land use changes are possible in the U.S. The vision is to create a better place to live, with a new crossing system as its neighbour. The 60 ha+ plaza associated with Crossing X-10A, X-10B, or X-11C could be the separator of neighbourhood uses to the west and logistics/industrial uses to the east. A number of households and businesses will be displaced if the project is constructed. If any of them choose to relocate in the Delray area, that would help move the vision closer to reality. MDOT, in partnership with FHWA is exploring a number of concepts by which enhancements may be made to the Delray area if it becomes the “host community” for the project. These concepts are applicable with either an X-10A, X-10B or X-11C Crossing.

With regard to contaminated sites, several known or high potential sites were identified on both sides of the river. Recommendations in both the U.S. and Canadian studies include preliminary site investigations (PSI) for most of the medium- and high-rated sites. Further assessment of the regulatory

status and site conditions of other sites is also recommended. The PSIs will be completed for the preferred alternative and access can be obtained by provisions in applicable federal/state/provincial law.

Overall, the X-10A Crossing was identified as least preferred based on greater impacts associated with the Canadian plaza.

CULTURAL RESOURCES

In Canada, the alternatives impact six to seven archaeological sites which are either pre-contact habitation sites/ Euro-Canadian homesteads or pre-contact findspots, which are generally considered of low/medium significance. The Crossing X-11C alternative was noted as having a higher impact to the cultural landscape of the historic town of Sandwich. Although no significant portion of the historic town of Sandwich is directly affected, this crossing may impact the heritage sensitive area through introduction of physical, visual, audible or atmospheric elements that are not in keeping with the resources and/or their setting.

All of the alternatives have the same impact to Ojibway Park; a corner of the park (0.7 ha) is impacted near Ojibway Parkway/Broadway Street.

In the U.S., numerous areas were examined during the archaeological field study. Most locations produced little or nothing of archaeological value, because of the heavy degree of prior disturbance. No evidence of prehistoric or historic Native American land use was observed. It was determined that no prehistoric archaeological resources are affected by any of the practical alternatives. Three aboveground (built) heritage features are in, or partially in, the footprint of all practical alternatives and will require removal, resulting in an adverse effect to be mitigated.

In terms of parks and playgrounds in the U.S., South Rademacher Playground, South Rademacher Community Recreation Center and the Post-Jefferson Playlot are each located in the plaza area of every practical alternative and would be removed (used) by the plaza.

Overall, the Crossing X-11C alternative was least preferred.

NATURAL FEATURES

In Canada, all alternatives result in some loss of provincially rare specimens or colonies, impacts to ecological landscapes and impacts to terrestrial communities and ecosystems of high significance. The Crossing X-10A alternative has the greatest impact on provincially rare vegetation communities (2.98 ha impacted) and species at risk (232 specimens/colonies impacted). Given the regional importance of these natural features, the Crossing X-10A alternative was considered to be least preferred in terms of protecting the natural environment. Overall, the Crossing X-10B alternative was considered to have slightly lower impacts to natural features than Crossing X-11C.

In the U.S., Crossing X-11C would impact a total of 0.004 ha of low quality wetland at the edge of the Detroit River. Loss of this wetland will result in minimal impacts to wetland function and value.

Overall, Crossing X-10A was least preferred.

REGIONAL MOBILITY

In Canada, all three crossing alternatives are expected to work effectively under future (2035) peak travel demands and add additional border crossing and border processing capacity to the Detroit River border transportation network. The new crossing is expected to carry approximately 2,000 vehicles in

the PM peak hour from the U.S. into Canada (the peak direction of travel) in 2035, which would provide substantial relief to Huron Church Road and reduce the likelihood of congestion on this arterial roadway. The variance noted by the U.S. travel time analysis suggests the X-11 alternative could result in greater traffic volumes on Huron Church Road during peak travel periods to the point that intersections along Huron Church Road will remain congested as in the "Do Nothing" alternative, lowering the level of service on this key roadway link in the border transportation network. By comparison, the X-10 crossing alternatives are more likely to result in improved transportation levels of service on Huron Church Road over the Do Nothing condition as well as the X-11 Alternative, thereby providing greater benefits to regional and local mobility.

Crossing X-10A was noted as having several security/monitoring concerns, including undesirable distance from Plaza A to the international border (2.5 km), no direct line of sight between the border and the plaza, and a 700 m section of at-grade roadway that is out of the direct line of sight from the plaza in the Brighton Beach industrial area.

In the U.S., there may be an increase in traffic due to additional development stimulated by the new border crossing. But, negative congestion effects are not expected either on major arteries or local neighbourhood streets in the study area. Analyses that were part of the Detroit International Crossing study and the Detroit *Intermodal Freight Terminal Study* covering all of Southwest Detroit and East Dearborn indicate there is virtually no congestion now nor expected in the 25-year future. Further analysis undertaken by the U.S. study team pertaining to travel time comparisons between Crossing X-11 and Crossing X-10 alternatives suggests the volume of traffic using the X-10 crossings could be as much as 50 per cent more than the traffic using the X-11 crossing. This variance is reflective of differences in access and circulation between the U.S. plaza layouts serving crossings X-10 and X-11.

Overall, Crossing X-10B is preferred.

CONSTRUCTABILITY

Two major factors influencing the cost and constructability of the new international crossing are: soundness of the bedrock and bridge length of the crossing itself. The section of the Detroit River shoreline under consideration for the new international crossing has a history of salt mining activities. Each study team undertook extensive geotechnical testing of the bedrock conditions to a depth of approximately 500 m, i.e., below the salt producing layers. The purpose of this detailed geotechnical work was to determine whether there are any unknown brinewells in the area under consideration for future crossings, and to verify the limits of any subsurface influence of past salt mining activities.

In Canada, detailed geotechnical investigations in the area of Sandwich Street north of Prospect Avenue confirmed that there are underground conditions in this area, which could pose a risk to any roadway built in this vicinity. It is believed that the underground caverns left from previous brinewell activity in the area of Sandwich Street are interconnected with other caverns further west. These interconnected caverns are also believed to have caused a sinkhole to form immediately west of Sandwich Street. (In February 1954, the ground on the Windsor Salt property collapsed into a sinkhole about 8 m deep at the centre, 150 m in diameter). Several buildings and railroad facilities were irreparably damaged during this incident.)

The proposed approach roadway to Crossing X-11C passes over the eastern end of the former solution mining well field and a subsurface anomaly that is suspected to be a brine-filled cavity, rubble zone and disturbed rock mass. Initial estimates suggest that the rock mass above this anomaly could subsidence ranging up to values on the order of 3 m. The proportion of such subsidence that has

already occurred or may occur in the future cannot be quantified at this time because of uncertainties associated with the nature and position of the identified anomaly. Additional study will be required to refine the range of risks and orders of magnitude of future settlement that should be accommodated by design. The field exploration and testing program and historical data are not sufficient to clearly assess the three-dimensional extent, specific location, or potential limits of influence of this subsurface anomaly. The level of effort (investigation, testing, and analysis) that may be required to further refine these issues relative to the Crossing X-11C approach alignment is extensive and, if undertaken, may still be insufficient to consider supporting structures on the rock within and adjacent to the identified limits of solution mining influence within an acceptable degree of risk.

The Canadian study team has considered a 660 m long-span structure extending over the zone of influence of this brinewell area between Prospect Avenue and John B. Street. There still remains some risk as to the acceptability of this solution and the continual operation of this crossing, even with this mitigation. The constructability and maintenance risks associated with the approach roadway to Crossing X-11C were noted as significant disadvantages of the Crossing X-11C Alternative. This long-span structure will also have its own impacts on the character of the nearby community, as well as noise and aesthetic impacts. In addition, having two long-span structures on the Crossing X-11C alignment increases the construction and maintenance costs of this alternative.

In the U.S., the difference in impacts between Crossings X-10A and X-10B were indistinguishable except in how each can be built. The X-10A Crossing was developed to avoid the area around known historical brine mining in Canada. The alignment of the X-10A Crossing would start near the location of X-10B in the U.S. and land in Canada southwest of the Brighton Beach Power Station. Analyses determined that the only feasible structure type for Crossing X-10A is a suspension bridge with an unsuspended back span. The X-10A bridge is the longest of the alternatives with a main span of 1200 m. Although suspension bridges with main spans exceeding that length do exist, this would become the longest bridge of its type in the Americas. The bridge analyses conducted by the U.S. and Canadian study teams evaluated eight constructability factors. Of those, cost, risk to controlling cost, schedule duration, and risk to controlling the schedule were considered to be differentiating among the crossings. The estimated construction cost of the X-10A Crossing at \$920 million is significantly greater than the other suspension bridges at Crossings X-10B and X-11 (X-10B at \$550 million and X-11 at \$600 million). The construction duration of 62 months for Crossing X-10A is over one year more than the other alignments.

Overall, Crossing X-10B was preferred.

OVERALL ASSESSMENT

The overall assessment of crossing alternatives based on the seven major factor areas are summarized in **Table 8.8**.

TABLE 8.8 – OVERALL ASSESSMENT OF CROSSING AND PLAZA ALTERNATIVES

Factor	Crossing Alternative (including plazas)		
	X-10A	X-10B	X-11C
Air Quality	No preference		
Community & Neighbourhood Characteristics		Preferred	Least Preferred
Existing & Planned Land Use	Least Preferred		
Cultural Resources			Least Preferred
Natural Environment	Least Preferred		
Regional Mobility		Preferred	
Constructability		Preferred	

Overall, Crossing X-10B was identified as the preferred alternative in three of the six factor areas in which a preference could be expressed. Both the X-10A and X-11C alternatives were identified as least preferred in two factor areas. Crossing X-10B was not identified as the least preferred in any factor area.

The constructability issues with the Crossing X-11C alternative are a serious disadvantage of this alternative. Overall, Crossing X-11C was found to have many disadvantages, and no advantages, over Crossing X-10B alternative.

Similarly, the Crossing X-10A alternative was noted as having higher community and natural impacts on the Canadian side and greater cost and constructability risks with no advantages on the U.S. side.

In contrast, the Crossing X-10B alternative was found to have notable advantages on both sides of the river and no disadvantages in comparison to the other alternatives. Both the Canadian and U.S. study teams identified Improve Regional Mobility as the most important factor area. It is also worth noting that the ownership model (based on public agency control) and contractual arrangements for construction and operation of the new crossing and plazas has not been finalized by the partner governments undertaking this study. Joint agreement on the preferred alternative from a constructability perspective is an equally significant conclusion of this evaluation.

For the purposes of the environmental studies in both countries, both a suspension bridge and a cable-stay bridge are being carried forward. There are no substantive differences among these options. The final bridge type selection will be completed during subsequent stages of the project. Additional details of the two bridge options are provided in **Chapter 9**, and schematic illustrations of the two options are included in **Exhibit 9.5**.

8.2 Practical Access Road Alternatives

This section documents the factors considered in generating practical access road alternatives as well as descriptions of the specific alternatives considered, an assessment of impacts and benefits associated with these alternatives, and the evaluation leading to the identification of a Technically and Environmentally Preferred Alternative (TEPA).

8.2.1 Generation of Practical Access Road Alternatives

As discussed in Chapter 6, the evaluation of the illustrative plaza, crossing and access road alternatives led to the identification of an Area of Continued Analysis (ACA) that would be studied further to develop practical crossing, plaza and access road alternatives for a new international crossing (refer to Exhibit 8.4).

The ACA was presented through consultation activities and documented in the *Draft Generation and Assessment of Illustrative Alternatives Report (November 2005)*. In subsequent months, with technical parameters and in consultation with communities, municipalities, agencies and other stakeholders, the study team developed a set of practical alternatives for the Canadian plaza, crossing and access road. The initial practical alternatives were presented for comments at consultation activities held in March 2006 corresponding to the third round of PIOHs.

EXHIBIT 8.4 – AREA OF CONTINUED ANALYSIS



In general, the alternatives developed for the new access road were based on the premise that it would extend from Highway 401 at North Talbot Road to the new plaza. Based on the mobility needs of the project, as well as community/municipal consultation, the following objectives guided the generation of practical alternatives in the Huron Church Road/Highway 3 corridor.

- Separate international and local traffic;
- Maintain the local and regional function of the Huron Church Road/Highway 3 corridor;
- Keep the existing traffic within the existing corridor during construction to minimize traffic infiltration onto other city streets; and

- Minimize direct and indirect property impacts.

The study team considered four basic operational concepts:

- Integrated freeway with interchanges. Service roads provided, as needed, to maintain local access and circulation;
- Separate freeway paralleled by one-way service roads;
- Separate freeway paralleled by existing Highway 3/Huron Church Road;
- Tunnel below a rebuilt Highway 3/ Huron Church Road corridor.

The study team concluded that Concept 1 (an integrated freeway with local service roads only as required) would not adequately achieve the above-noted objectives. Specifically:

- This alternative does not separate local and international traffic. Any future back-ups or congestion associated with delays at the border could cause back-ups on the freeway and impact local/regional traffic;
- As the new freeway will be a fully controlled access facility, it will be impossible to achieve the same level of local and regional mobility as currently exists in the corridor;
- This concept does not offer any substantial advantages with respect to minimizing property impact along the right-of-way, however, it is clear that property impacts associated with interchanges at Todd Lane/Cabana Road West and Cousineau Road would create both direct and indirect impacts on the adjacent communities.

The remaining three concepts were developed into five cross-section alternatives that better met the objectives. On this basis, the study team developed the following five initial access road alternatives between Highway 3 and the Malden Road area.

- Alternative 1A – At-grade six-lane freeway with parallel one-way service roads on either side of the freeway;
- Alternative 1B – Below-grade six-lane freeway with parallel one-way service roads on either side of the freeway;
- Alternative 2A – At-grade six-lane freeway with parallel service roads on one side of the freeway;
- Alternative 2B – Below-grade six-lane freeway with parallel service roads on one side of the freeway;
- Alternative 3 – Six lane freeway in a cut and cover tunnel with service roads on the surface.

In addition, in the area of Howard Avenue to Huron Church Line, the at-grade and below-grade access road alternatives analyzed included two slightly different alignment options:

- Option 1 provides for widening the access road corridor primarily to the north (Windsor) side of Highway 3; and
- Option 2 provides for widening the access road corridor primarily to the south (LaSalle) side of Highway 3.

The study team developed the appropriate horizontal and vertical alignments for each of these five alternatives through consideration of the following issues:

- Minimizing direct property impacts; and
- Construction staging to maintain traffic within the corridor.

Once the horizontal and vertical alignments were developed, the appropriate right-of-way requirements were identified, considering the need for grading, drainage, utilities, berms/barriers and landscaping.

The access road alternatives were generated in accordance with Ontario Ministry of Transportation (MTO) geometric design guidelines. With the exception of the tunnel alternative, geometric design considerations (such as minimum radii, maximum grade and lane widths) consistent with a posted speed of 100 km/h (design speed of 120 km/h) were applied in generating the access road alternatives. The minimum radius applied to these alternatives was 650 m and the maximum grade was 3 per cent. For the tunnel alternative, geometric design considerations were based on a posted speed of 80 km/h (design speed of 90 km/h). Although the minimum radius and maximum grade of the tunnel were the same as for the other alternatives, human factor considerations, and stopping sight distance requirements led to the reduction in posted speed.

For the section west of Huron Church Road to the river, all alternatives considered an access road at-grade with overpasses at Malden Road and Matchette Road, which roughly matched the profile of the E.C. Row Expressway. This was required as a result of the poor soil conditions in this area, the proximity and profile of the E.C. Row Expressway, and other geometric constraints.

Typical cross-sections of the Practical Access Road Alternatives are shown schematically in **Exhibit 8.5**. All alternatives include a six-lane freeway and four-lane service road system.

EXHIBIT 8.5 – TYPICAL PROPOSED CROSS-SECTIONS – PRACTICAL ALTERNATIVES (NOT TO SCALE)



1A One-way service roads on either side of 6-lane freeway at-grade.



1B One-way service roads either side of 6-lane freeway below-grade.



2A Six-lane freeway at grade, parallel to Highway 3/Huron Church Road corridor.



2B Six-lane freeway below-grade, parallel to Highway 3/Huron Church Road corridor.

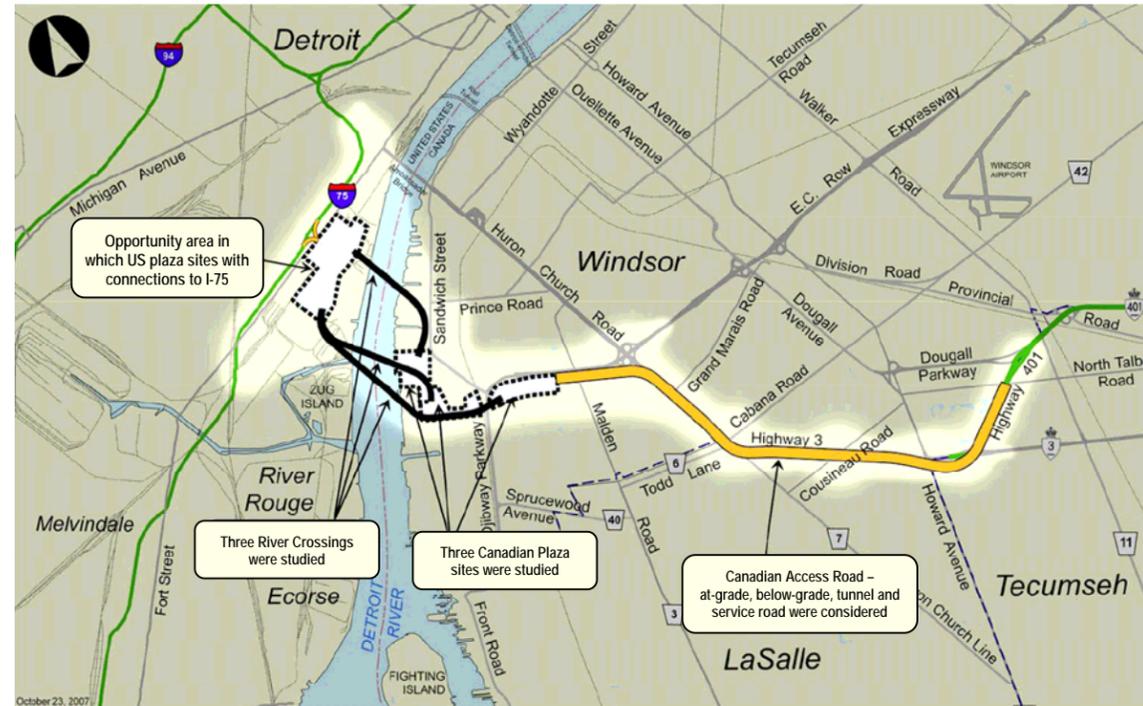


3 Cut-and-cover tunnel below rebuilt Highway 3/Huron Church Road Corridor.

8.2.2 Description of Practical Access Road Alternatives

The practical crossing, plaza and access road alternatives initially considered for the analysis are shown schematically in plan view in **Exhibit 8.6** and are illustrated in additional detail in **Exhibits 8.7** to **8.11**.

EXHIBIT 8.6 – PRACTICAL CROSSING, PLAZA & ACCESS ROAD ALTERNATIVES



The five initial access road alternatives were presented to public at the third round of PIOHs in March 2006. Input received at the third round of Public Information Open Houses, workshops and through correspondence with the public included several suggestions for the access road alternatives:

- Tunnel the access road from Todd Lane/Cabana Road West to E.C. Row Expressway;
- Tunnel from Howard Avenue to Turkey Creek;
- Tunnel under the existing roadway;
- Incorporate air ventilation buildings into the design of the roadway;
- Create a controlled access freeway on the existing roadways;
- Provide local access roads on either side of the highway;
- Consider an interchange at Cousineau Road or Howard Avenue; and
- Avoid impacts to existing community facilities including schools and sports fields.

The remainder of 2006 focused on technical analysis of the five practical access road alternatives. The preliminary results of the technical analysis was presented to the public at the fourth round of PIOHs held in December 2006. Comments received during this round of consultation indicated that local residents wanted an access road to a new border crossing that:

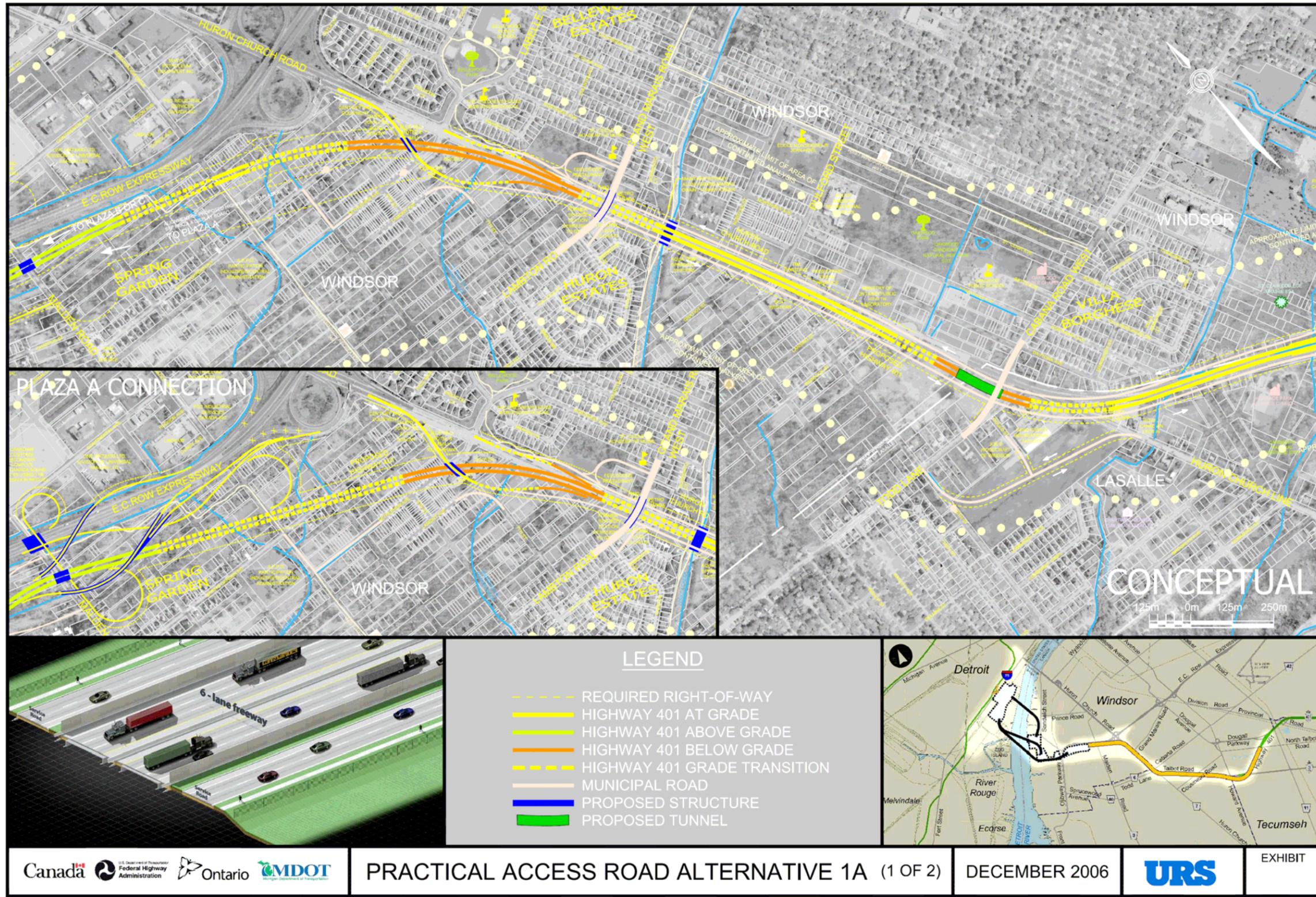
- Takes trucks off local streets;
- Strong preference for below-grade roadway, including tunnel;
- Reduces the amount of pollutants in the air;
- Improves the movement of border-bound traffic;
- Is not intrusive;
- Is state-of-the-art;
- Will not be determined on cost alone;
- Improves the quality of life; and,
- Provides a long-term solution.

Consultations continued after the open houses and workshops with growing interest around a concept which would be a combination of the below-grade and tunnel alternatives. The study team began developing a more "green" parkway-like alternative. The concept would include the best components of the practical alternatives based on the findings to date in a green corridor with tunneled sections, a grade separated recreational trail system, and extensive urban design of the green areas. The modified access road alternative featured:

- A below-grade freeway from Howard Avenue to E.C. Row Expressway with 10 tunnel sections ranging from 120 to 240 m in length, located in areas to provide community connectivity;
- A separate service road for local traffic to maintain access to neighbourhoods and local businesses;
- A widened right-of-way with buffer areas to reduce the potential nuisance effects of the roadway on adjacent neighbourhoods; and,
- Provision for recreational trails along the corridor, connecting to existing trails and providing new connections along and across the Huron Church Road/Highway 3 corridor.
- Improved interchange at Howard Avenue/Highway 3 that allows for diversion of longer distance traffic using Howard Avenue and a connection to a future Laurier Parkway.

This alternative, developed as a new alternative based on the below-grade and tunnel alternatives, was identified as The Parkway (refer to **Exhibit 8.12**).

EXHIBIT 8.7A- PRACTICAL ACCESS ROAD ALTERNATIVE 1A



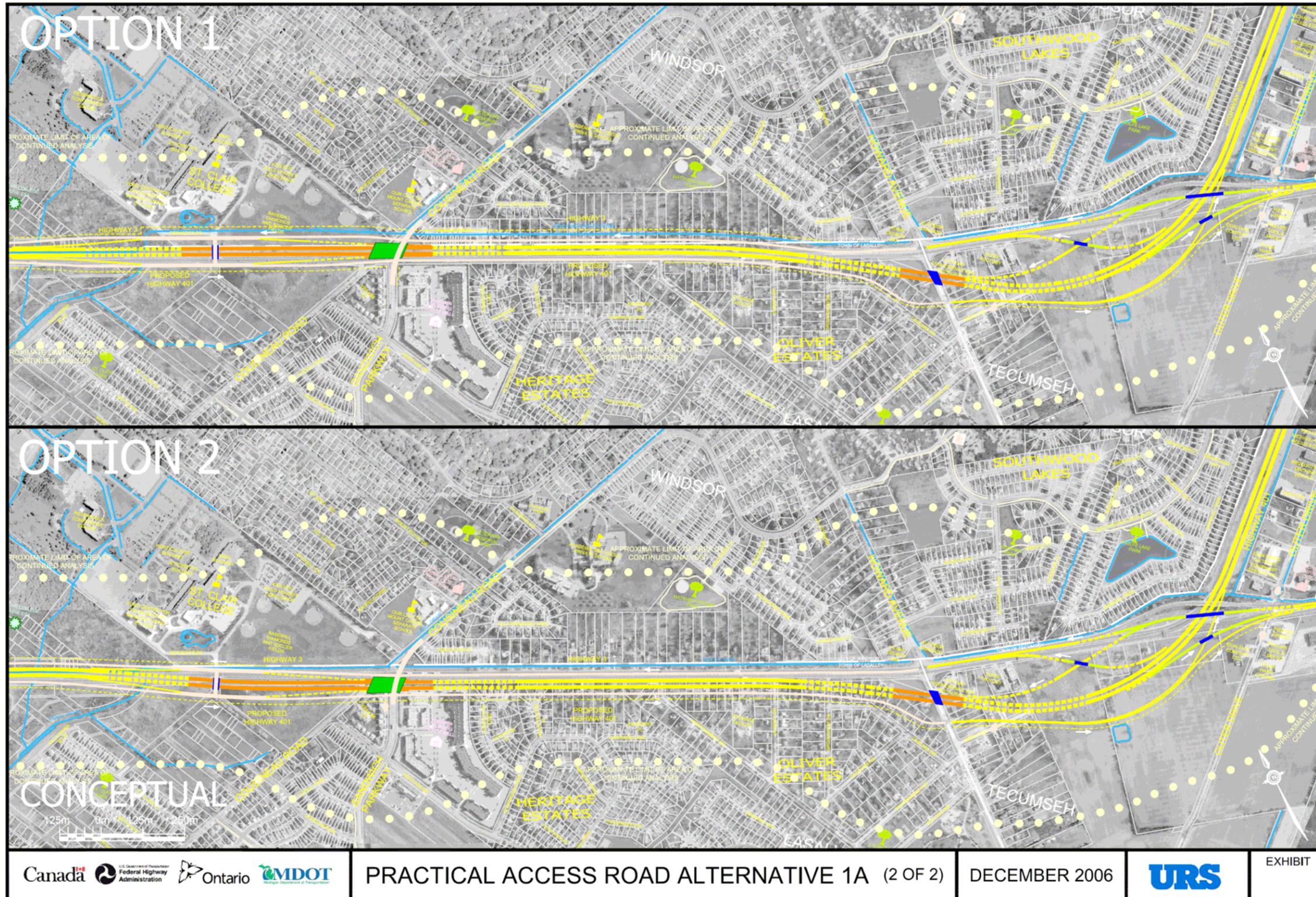


EXHIBIT 8.8A – PRACTICAL ACCESS ROAD ALTERNATIVE 1B

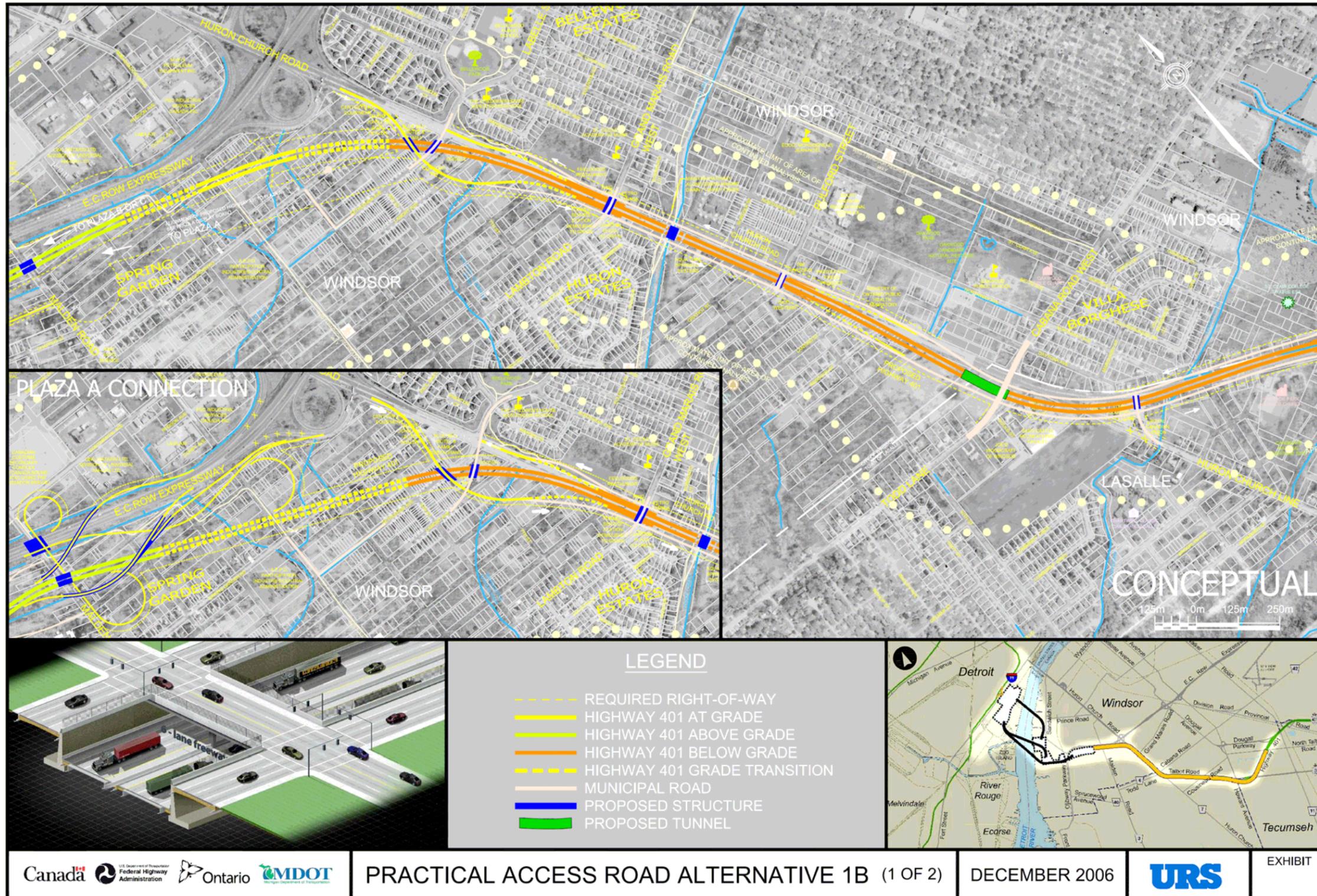
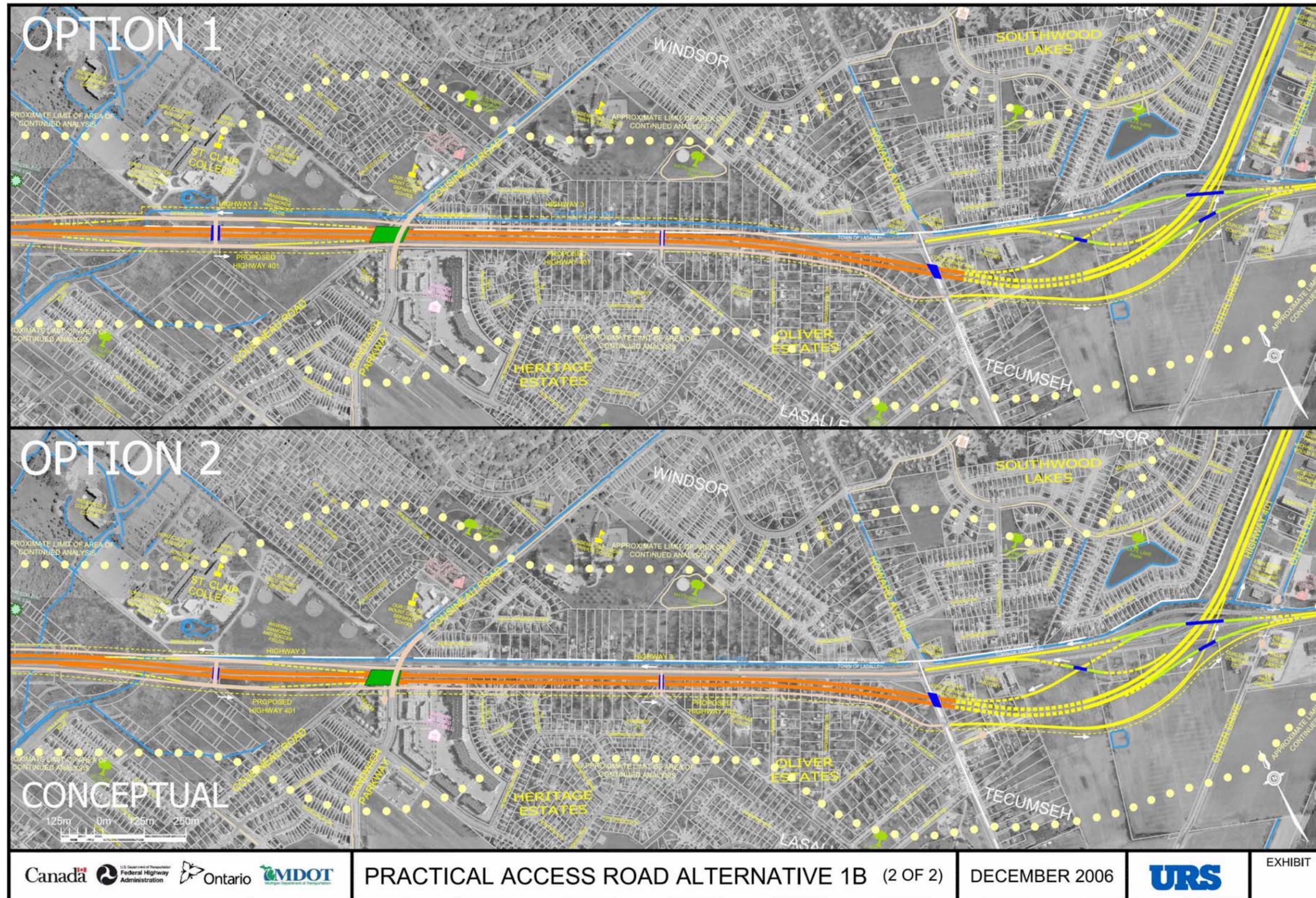


EXHIBIT 8.8B – PRACTICAL ACCESS ROAD ALTERNATIVE 1B



Canada U.S. Department of Transportation Federal Highway Administration Ontario MDOT

PRACTICAL ACCESS ROAD ALTERNATIVE 1B (2 OF 2)

DECEMBER 2006

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EXHIBIT

EXHIBIT 8.9A – PRACTICAL ACCESS ROAD ALTERNATIVE 2A

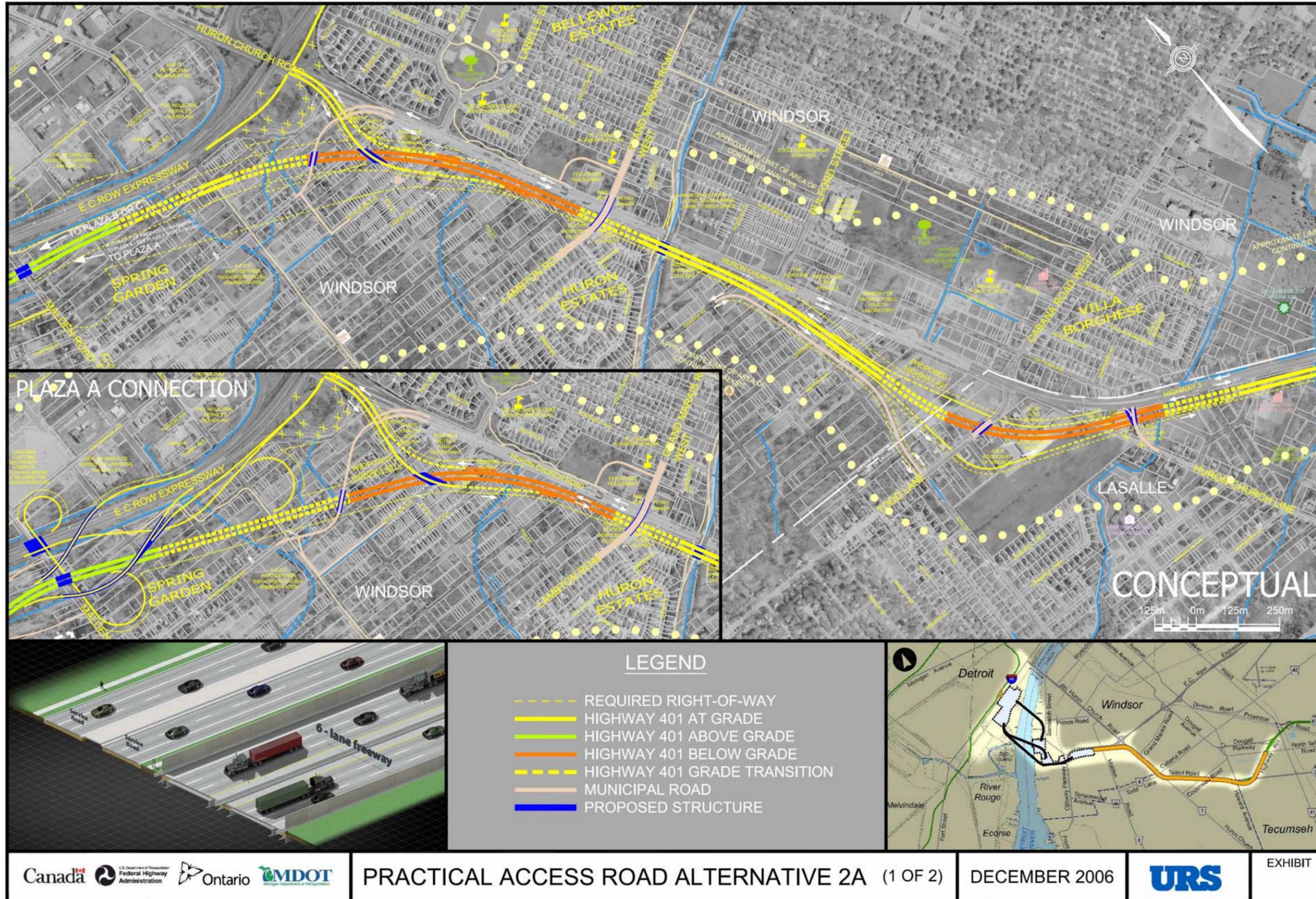


EXHIBIT 8.9B – PRACTICAL ACCESS ROAD ALTERNATIVE 2A

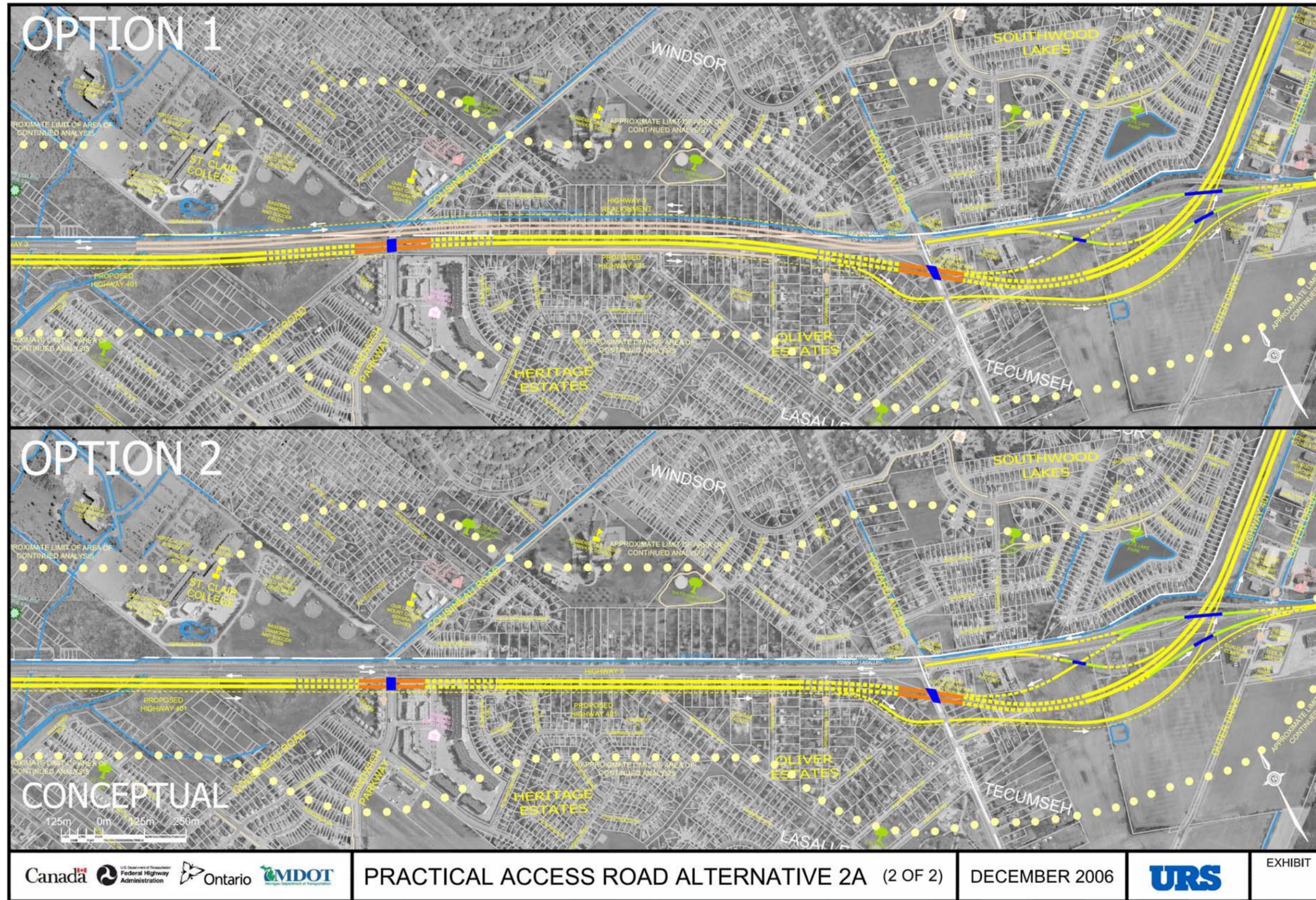
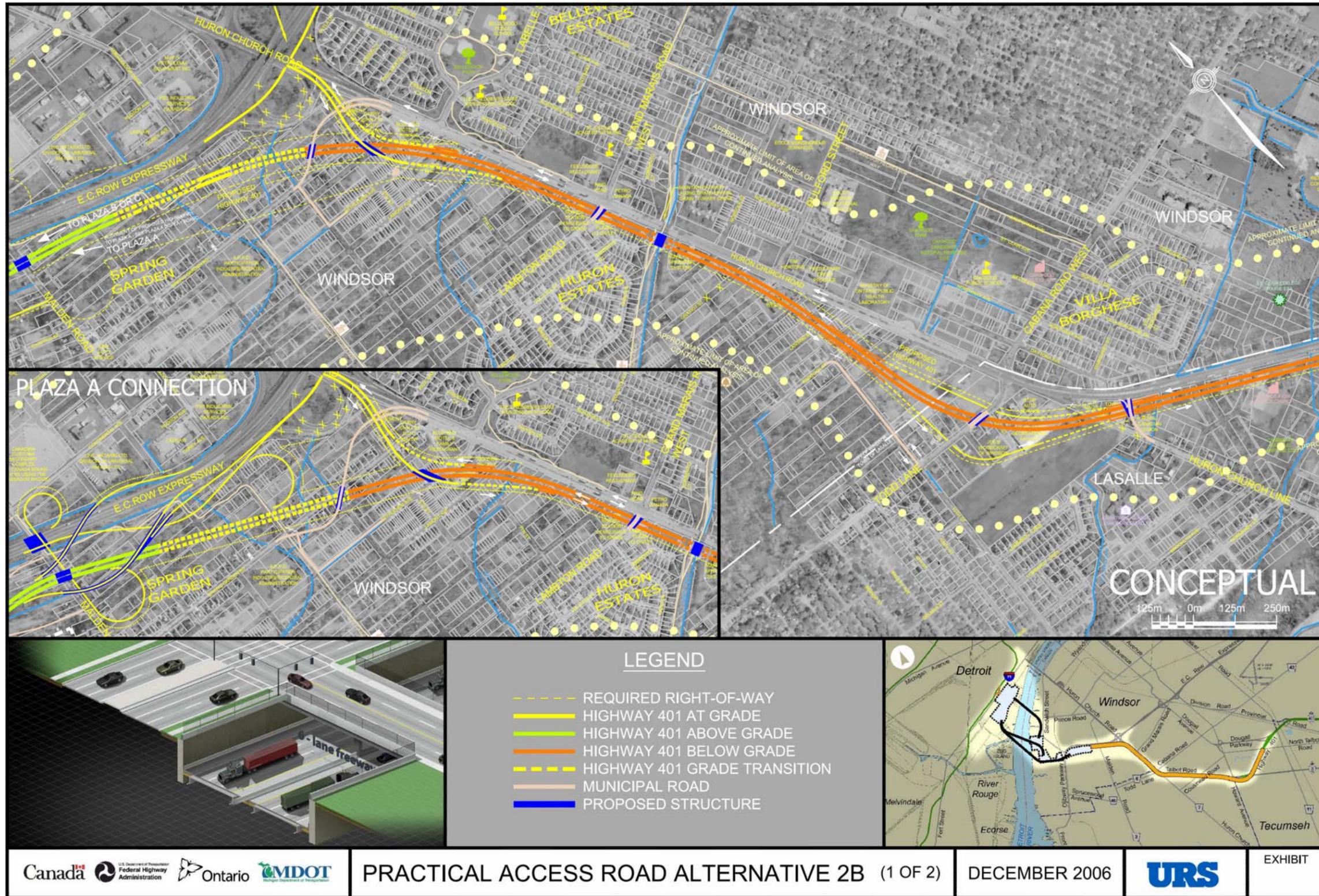


EXHIBIT 8.10A – PRACTICAL ACCESS ROAD ALTERNATIVE 2B



Canada U.S. Department of Transportation Federal Highway Administration Ontario MDT Michigan Department of Transportation

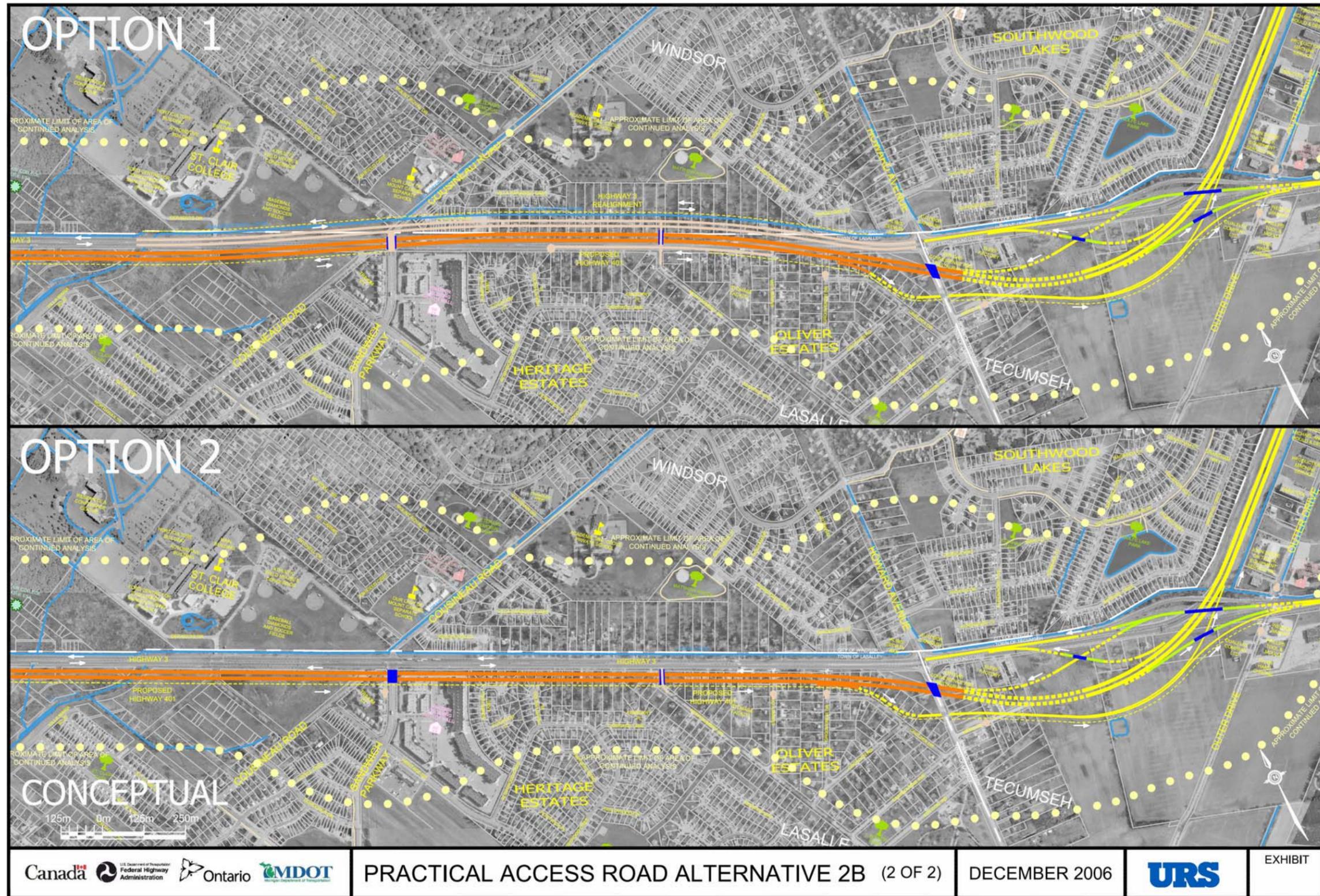
PRACTICAL ACCESS ROAD ALTERNATIVE 2B (1 OF 2)

DECEMBER 2006

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EXHIBIT

EXHIBIT 8.10B – PRACTICAL ACCESS ROAD ALTERNATIVE 2B



Canada U.S. Department of Transportation Federal Highway Administration Ontario MDT

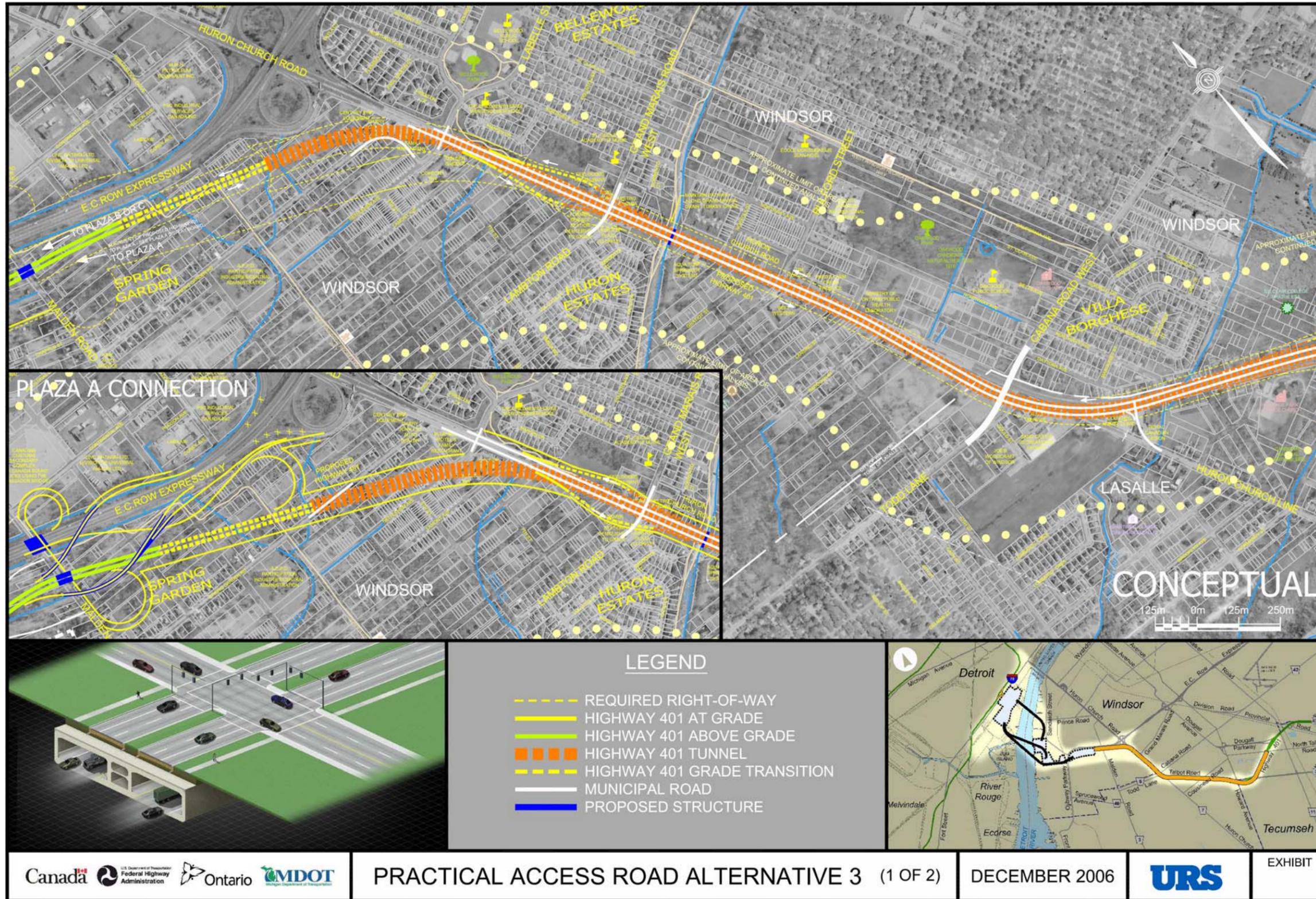
PRACTICAL ACCESS ROAD ALTERNATIVE 2B (2 OF 2)

DECEMBER 2006

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EXHIBIT

EXHIBIT 8.11A – PRACTICAL ACCESS ROAD ALTERNATIVE 3



Canada U.S. Department of Transportation Federal Highway Administration Ontario MDT Michigan Department of Transportation

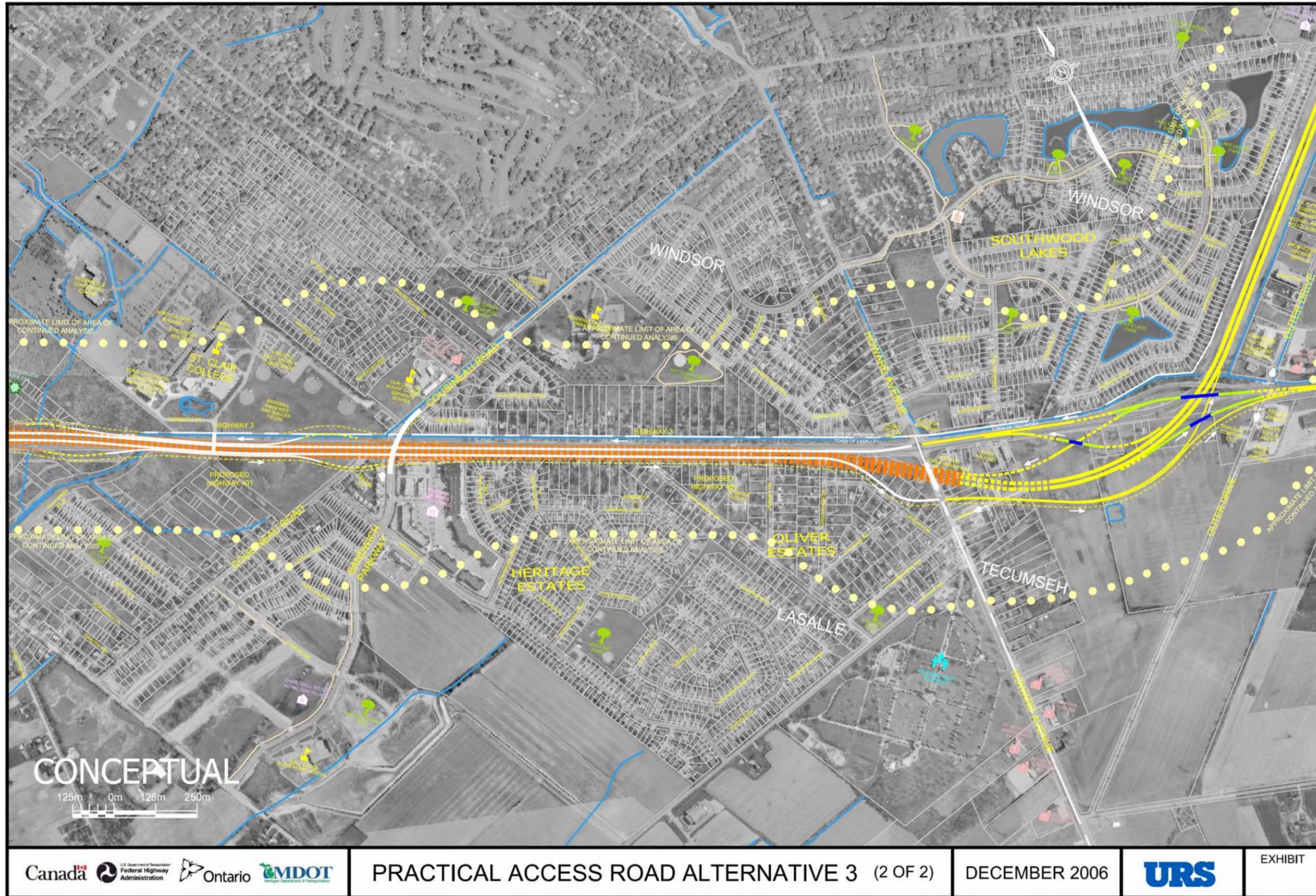
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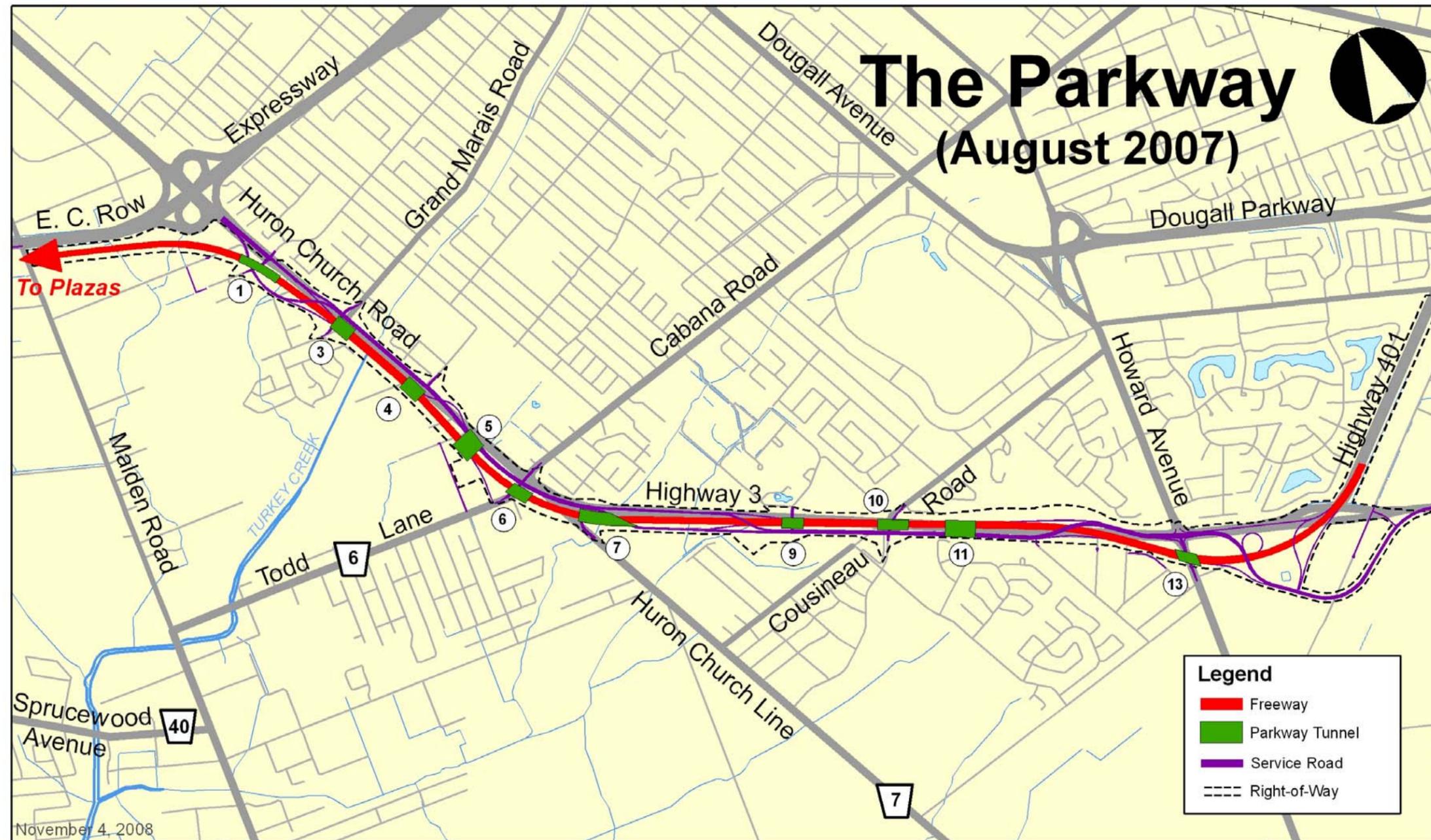
DECEMBER 2006

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EXHIBIT

EXHIBIT 8.11B – PRACTICAL ACCESS ROAD ALTERNATIVE 3





I.D.	Location of Tunnel	Tunnel Length (M)	Roof Area (Sq M)	I.D.	Location of Tunnel	Tunnel Length (M)	Roof Area (Sq M)
①	Spring Garden Road / Labelle Street	240	10,810	⑦	Huron Church Line	240	17,040
③	Grand Marais Road	120	9,550	⑨	St. Clair College	120	7,225
④	Pulford Street	120	9,705	⑩	Cousineau Road	170	9,590
⑤	Reddock Street	120	15,320	⑪	Hearthwood Place	165	14,805
⑥	Cabana Road	120	8,300	⑬	Howard Avenue	120	6,900

The ten tunnel sections of The Parkway were strategically placed to maintain existing access across and along the corridor, as well to provide new connections for roads, trails and wildlife linkages. The spacing between tunnel sections was also considered. Having two (or more) tunnel sections with insufficient space between them increases the risk that under certain emergency conditions, smoke from one tunnel section could be carried into the downwind tunnel section. The tunnel sections were developed with a minimum length of 120 m and were limited to a maximum length of 240 m. The minimum length of 120 m was determined to be a sufficient length to accommodate a community connection and allow for options for landscaping/green space to be placed on top of the tunnel so as to lessen any 'barrier effect' of the freeway for the neighbourhoods on either side of the access road. Highway tunnels longer than 240 m are subject to more complex fire and life safety requirements and regulations that would substantially alter the design, construction, operation and maintenance requirements. Table 8.9 provides the locations, lengths and rationale for the tunnel sections developed for The Parkway.

TABLE 8.9 – PARKWAY TUNNEL SECTION LOCATIONS, LENGTHS AND RATIONALE

Location	Length	Rationale for tunnel location/length
Bethlehem Avenue/ Labelle Street	240 m	Maintains existing road crossing at Labelle Street/Bethlehem Avenue. Provides improved connection between Bellewood neighbourhood/Bellewood Park/Bellewood School and Spring Garden/Bethlehem neighbourhoods/Spring Garden Road Prairie/Windsor community trails. Tunnel length of 240 m provides opportunities for public space and gateway features; this tunnel is situated at junction of The Parkway and Huron Church Road and is viewed by motorists entering Canada via the new crossing or the Ambassador Bridge.
Grand Marais Road/ Lambton Road	120 m	Maintains existing road crossing at Grand Marais Road/Lambton Road. Provides improved connection between Bellewood neighbourhood/Bellewood Park/Bellewood School and Huron Estates neighbourhood and Spring Garden Road Prairie. Tunnel also provides improved connection for existing West Windsor Recreationway trail; presently trail passes under Huron Church Road at Grand Marais Drain; in times of high water flows in the drain, this trail is closed. With The Parkway, this trail will need to be relocated due to changes to Grand Marais Drain structure. Trail will be relocated to allow crossing of The Parkway and service road either via Grand Marais tunnel or Pulford Avenue tunnel. Tunnel length constrained by road profile at south end (freeway is not as deep at Grand Marais drain crossing as other locations), location of exit ramp to service road and service road structure at north end.
Pulford Street	120 m	Provides improved connection between residential area on east side of Huron Church Road and South Windsor Recreation Complex to Huron Estates neighbourhood and Spring Garden Road Prairie. Tunnel also provides improved connection for existing West Windsor Recreationway trail; presently, trail passes under Huron Church Road at Grand Marais Drain; in times of high water flows in the drain, this trail is closed. With The Parkway, this trail will need to be relocated due to changes to Grand Marais Drain structure. Trail will be realigned to allow crossing of The Parkway and service road either via Grand Marais tunnel or Pulford Avenue tunnel. Tunnel length constrained by road profile at north end (freeway is not as deep at the Grand Marais drain crossing as other locations) and location of entrance ramp from service road at south end.
Reddock Street	120 m	Provides improved wildlife linkage and new community connection between Oakwood Bush/Oakwood School/Windsor community trails and Spring Garden Road Prairie.

Location	Length	Rationale for tunnel location/length
		Both the freeway and service road pass through this tunnel leaving a road-free connection at the surface. Tunnel length constrained by service road profile at north and south ends (service road profile rises from 7 m below grade to at-grade at intersections on both sides of tunnel).
Todd Lane/ Cabana Road West	120 m	Maintains existing road crossing at Todd Lane/Cabana Road West. Provides improved connection between Villa Borghese neighbourhood/Oakwood Bush/Oakwood School and Todd Lane neighbourhood and Spring Garden Road Prairie. Tunnel length constrained by service road profile at north end and proximity of tunnel to the south.
Huron Church Line	240 m	Maintains an existing road connection for Huron Church Line and the service road. Provides improved wildlife linkage and improved community connection between Lennon Drain/St. Clair College environmentally sensitive area and Cahill Drain candidate natural heritage site lands/LaSalle Woods/LaSalle community trails.
St. Clair College Entrance	120 m	Maintains an existing road connection for the main entrance to the college and the service road. Provides improved wildlife linkage and improved community connection between St. Clair College environmentally sensitive area/athletic fields and Cahill Drain candidate natural heritage site lands/Windsor Crossing commercial area/LaSalle community trails. No residential neighbourhood in this immediate area, but as the main entrance to the college, this area is expected to have a relatively high volume of pedestrian and cyclist traffic. A length of 120 m was considered adequate for meeting the connectivity requirements at this location.
Cousineau Road/ Sandwich West Parkway	170 m	Maintains existing road crossing at Cousineau Rd/Sandwich West Parkway. Provides improved community connection between St. Clair College and athletic fields/Our Lady of Mt. Carmel School/Kendleton Court and Villa Paradiso neighbourhoods and Heritage Estates neighbourhood/Windsor Crossing commercial area/LaSalle community trails. Length of tunnel sections in this area is constrained by service road profile at east end (service road profile rises from 7 m below grade to at-grade at intersection at Cousineau/Sandwich West Pkwy). Given the extent of buffer area at west end of tunnel section, a length of 170 m was considered adequate for meeting the connectivity requirements at this location.
Hearthwood Place	165 m	Provides improved wildlife linkage and new community connection between Villa Paradiso and Kendleton Court neighbourhoods/Matthew Rodzik Park/new green space north of corridor and Heritage Estates neighbourhood/Windsor Crossing commercial area/LaSalle community trails. Both the freeway and service road pass through this tunnel leaving a road-free connection at the surface. The length of tunnel section is constrained by service road profile at west end (service road profile rises from 7 m below grade to at-grade at intersection at Cousineau/Sandwich West Pkwy). East limit of tunnel constrained by proximity of at-grade intersection at Montgomery Dr. and entrance ramp to freeway.
Howard Avenue	120 m	Maintains existing road crossing at Howard Avenue. Provides improved community connection between Shadetree neighbourhood/Matthew Rodzik Park/new green space north of corridor and Oliver Estates neighbourhood/ LaSalle community trails. Tunnel length of 120 m provides opportunities for public space and Gateway features; this is the first tunnel along the Parkway as viewed by motorists entering Windsor/LaSalle via Highway 401 or Highway 3.

The Parkway alternative was presented for public review and comment at the fifth round of PIOHs in August 2007. In addition, meetings with ministries, agencies, municipalities, consultation groups and other stakeholders were also held to review the preliminary analysis of the practical access road alternatives and discuss the features of The Parkway.

GREENLINKWINDSOR CONCEPT

In October 2007, the City of Windsor presented an access road concept entitled GreenLinkWindsor. Like The Parkway, the GreenLinkWindsor concept proposed a below-grade freeway with tunnel sections, a separate service road for local traffic, a right-of-way with buffer areas between the corridor and adjacent residential areas, and a continuous recreational trail system along the corridor (see Exhibit 8.14).

EXHIBIT 8.13 – GREENLINKWINDSOR¹



Further details with regard to the study team's review of the GreenLinkWindsor proposal are documented in Chapter 3 of this report.

The study team carefully considered the GreenLinkWindsor concept, as well as the comments provided by other stakeholders, including other municipalities, government agencies and the public. The comments received were used to refine The Parkway.

Based on this input, and on further deliberations by the study team, a number of refinements were made to The Parkway alternative in the period following the August 2007 Public Information Open Houses. These refinements were adopted to reduce the effects of The Parkway alternative and to improve the transportation benefits and community benefits to the greatest extent practical. Following is a discussion of the refinements that were adopted between August 2007 and April 2008:

Additional tunnel section at Spring Garden

The Parkway alternative did not initially include a tunnel section in this area. A 200 metre long tunnel section was added to maintain the connection residents presently enjoy between Spring Garden residential area and vacant natural area adjacent to E.C. Row Expressway. The location and length of a tunnel section in this area is constrained by the roadway profile at the west end and the proximity of the Labelle Street/Bethlehem Avenue tunnel to the south.

Revised location and length of Howard Avenue tunnel

The Howard Avenue tunnel section was initially proposed in a location to maintain the existing road crossing at Howard Avenue as well as to provide improved community connection between Shadetree neighbourhood/Matthew Rodzik Park/new green space north of corridor and Oliver Estates neighbourhood/LaSalle community trails. As a result of comments provided through consultation events, including PIOH and subsequent community meetings with residents of Oliver Estates neighbourhood in particular to improve the effectiveness of connectivity between communities (nearer to residences), the tunnel section was shifted westerly from Howard Avenue to the area near Chelsea Drive. A tunnel section of 240 m in this area provides opportunities for landscaping/public space and gateway features on this roof deck, and this is the first tunnel along The Parkway as viewed by motorists entering Windsor/LaSalle via Highway 401 or Highway 3. The Howard Avenue road crossing will be accommodated by a roadway overpass.

Other tunnel lengths and locations refined

Adjustments were made to some tunnel locations to provide improved tunnel spacing and better alignments and locations for road and trail alignments. While most of these refinements were minor in nature and did not change the length of the tunnel sections, the modifications made at the Cousineau Road/Sandwich West Parkway and Hearthwood Place tunnels are notable. The length of the Cousineau Road/Sandwich West Parkway tunnel section was reduced by 50 to 120 m, while the section of tunnel covering the freeway at Hearthwood Place was lengthened by 55 to 220 m. The net effect of these modifications was that there was more tunneled section would be provided near adjacent residential areas, resulting in greater connectivity improvements.

Pedestrian and cyclists trails refined

The Parkway alternative presented at the August 2007 Public Information Open Houses featured a concept for a continuous pedestrian/cyclist trail system parallel to and separate from the freeway and service road. This trail system concept included grade separations (i.e. overpasses) at most road crossings so as to limit the conflicts between pedestrians, cyclists and motorists. Refinements were made to the trail system concept including removing overpasses at certain road crossings and changing or eliminating sections of trail to reflect comments received from property owners whose property would be impacted to accommodate the trail system and concerned about loss of privacy due to the proximity of trail overpasses to their property. In addition, some overpasses were removed and trail locations changed to provide better access between the trail system and the local street system. In identifying the refinements, an important principle of the trail concept was retained, in that trail users are able to traverse The Parkway corridor from Howard Avenue to the Spring Garden/Bellewood Estates area without having to cross a lane of traffic.

New loop ramp at Todd Lane

Consultation on The Parkway included meeting with municipal emergency services to discuss issues pertaining to emergency response to an incident in The Parkway corridor. In reviewing the proposed access points to the freeway section of The Parkway, it was identified that access to The Parkway for Windsor and LaSalle emergency services could be greatly improved with the provision of a freeway entrance ramp in the area of Todd Lane. Such a connection would provide direct access to the section of the freeway east of Todd Lane/Cabana Road West which is important for emergency service access as there is a fire station on Cabana Road West just east of Huron Church Road, and a LaSalle fire station on Malden Road just south of Todd Lane. Upon investigation of options for a new connection

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and the local constraints in this area, the study team developed a loop ramp connection from Todd Lane to the eastbound freeway. A signalized intersection at the ramp terminal will enable access to the eastbound freeway from Todd Lane for all eastbound and westbound vehicles on Todd Lane/Cabana Road West, thereby providing improved access for local emergency services stationed near this area.

Highway 3/Howard Avenue Interchange modified to include a connection to Howard Avenue and the possible future Laurier Parkway Extension

In discussions with the Municipal Advisory Group (MAG), the study team identified that the section of Highway 401 between Highway 3 and Howard Avenue must address several transportation issues:

- To improve the design speed at this location over what is provided by the existing Highway 401 alignment, The Parkway includes a realignment of Highway 401 at the existing Highway 3 interchange.
- The Howard Avenue/Highway 3 intersection is a major intersection in the regional road network. This intersection would typically be a candidate site for an interchange with the new freeway. However, development in three quadrants of this intersection represents a constraint to interchange design and construction.
- There is also the opportunity to improve connections between Highway 3 and Highway 401 (all moves between these two provincial highways are presently not provided).
- The Essex-Windsor Regional Transportation Master Plan (October 2005) identified Highway 3, the Laurier Parkway extension to Howard Avenue, as well as Howard Avenue itself, as components of a regional road network. Improving connections between these roadways would improve regional mobility.

Upon review of existing and future land use and traffic operations in the area, the study team developed a concept to address the above transportation issues by providing a new interchange at Highway 3 in the vacant lands east of Howard Avenue, with new road connections to Highway 3 and to Howard Avenue. Such a roadway connection would allow north-south traffic destined to/from employment lands in the east to avoid the Howard Avenue intersection at the proposed service road. This would benefit traffic operations by reducing congestion at the Howard Avenue/service road intersection. This connection would also improve continuity for north-south traffic in this area by providing a more direct connection between Howard Avenue, the future Laurier Parkway, Highway 3 and Highway 401. It will also reduce the volume of traffic using the City of Windsor portion of Howard Avenue, which would be compatible with the City of Windsor's vision. Overall this connection would improve regional mobility between western Essex County, LaSalle and east Windsor/Tecumseh.

The refined Parkway alternative was identified as The Windsor-Essex Parkway (refer to **Exhibit 8.15**). The Windsor-Essex Parkway alternative was analyzed in accordance with the seven major factors and evaluated against the other at-grade and below-grade alternatives, as well as the cut and cover tunnel alternative. (Refer to **Section 8.2.3**).

EXHIBIT 8.14 – THE WINDSOR-ESSEX PARKWAY



I.D.	Location of Tunnel	Tunnel Length (M)	Roof Area (Sq M)	I.D.	Location of Tunnel	Tunnel Length (M)	Roof Area (Sq M)
①	Spring Garden	200	9,000	⑦	Cabana Road West	120	8,300
②	Ramp N-E and Labelle Street	240	10,810	⑧	Huron Church Line	240	14,400
④	Grand Marais Road West	120	9,550	⑪	St. Clair College	120	7,225
⑤	Pulford Street	120	9,705	⑫	Cousineau Road	120	7,225
⑥	Reddock St - Double Tunnel	120	15,320	⑬	Hearthwood Place - Double Tunnel	220	19,250
				⑮	Oliver Estates Area	240	13,200

Structures ③ ⑨ ⑩ ⑭ ⑯ ⑰ ⑱ are proposed as roadway overpasses

8.2.3 Analysis and Evaluation

The evaluation of practical alternatives for the Canadian access road was conducted in conjunction with the evaluation of the Canadian plaza-crossing-U.S. plaza and U.S. connecting road, leading to a 'technically and environmentally preferred' end-to-end solution connecting Highway 401 in Ontario to Interstate 75 in Michigan.

As noted previously, the approved *EA TOR (2004)* identified two evaluation methods to be employed in the evaluation process: reasoned argument method and arithmetic method. These methods were employed in the analysis and evaluation of illustrative alternatives (refer to **Chapter 6**), as well as the analysis and evaluation of practical plaza and crossing alternatives (refer to **Section 8.1**). A similar approach was employed for the analysis and evaluation of the practical access road alternatives. While the same seven key factors were used, the performance measures were modified to make them applicable to the roadway alternatives considered. **Table 8.10** provides a summary of the evaluation factors and performance measures for evaluating the practical access road alternatives.

TABLE 8.10 – PRACTICAL ACCESS ROAD ALTERNATIVES EVALUATION FACTORS AND PERFORMANCE MEASURES – CANADIAN SIDE

Rating Factor	Performance Measure Categories	Performance Measure
Changes in Air Quality	Regional Burden	Analysis based on traffic model results.
	Dispersion (NO _x and PM _{2.5} as health based indicator substances)	Analysis for key roadway links
Protect Community/ Neighbourhood Characteristics	Traffic Impacts Volumes by Vehicle Type	Peak period volumes on specific links by mode (cars, trucks, and international trucks).
	Local Access	Number of streets crossed, closed, or connected with an interchange.
	Noise	Analysis based on traffic model results for key roadway links.
	Community Cohesion/Community Character	Encroachment/severance on neighbourhood based on professional judgment. Impact on delivery of community services (function of road closures) based on professional judgment.
	Acquisitions (Whole or Partial) Residential	Number of dwelling units by type; population estimate based on average persons per dwelling unit
	Business	Number of business establishments; employment estimate based on average employees per business for area.

Rating Factor	Performance Measure Categories	Performance Measure
	Institutions	Number of institutions by type (church, schools, etc.).
	Farm Property / Structures	Operations/structures affected.
	Public Safety/Security (Plaza Only)	Assessment based on professional judgment.
Maintain Consistency with Existing and Planned Land Use	Land Use (existing and planned)	Designation of "consistent," "not consistent," or "not applicable" with goals, objectives and/or policies based on review of official planning documents.
	Development Plans	Designation of "compatible," "not compatible," or "not applicable" with plans for upcoming development that may not be covered by official plans.
	Contaminated Sites/Disposal Sites	Number of documented sites affected.
Protect Cultural Resources	Historical	Number of listed sites affected.
	Parklands	Number of parks by type; number of hectares affected. Includes subset for Coastal Zone Management sites.
	Archaeological Sites	Number of known sites affected.
Protect the Natural Environment	Environmental Significant Features	Area (in hectares) affected by type.
	Surface Water Quality/Groundwater	Area of floodplains affected (hectares); number of water crossings (including secondary rivers and streams); Detroit River channel alteration; number and general location of in-water piers; wells/groundwater sources affected; number of water intakes affected.
	Environmentally Significant Species/Habitat	Area of habitat (hectares) affected by type; list of species; other significant features.
	Farmland/Prime Agricultural Soils	Area affected (hectares) by soil type
	Other Natural Resources	Area affected measured by area of right-of-way.
Improve Regional Mobility	Highway Network Effectiveness Service Levels	Level of Service (LOS) classification by major facility type.
	Vehicle kilometres of Travel	By major facility type.
	Vehicle Hours of Travel	By major facility type.
	Distance Travelled	Average km for car, local truck, and international truck.

Rating Factor	Performance Measure Categories	Performance Measure
	Continuous/ongoing river crossing capacity (i.e. redundancy)	Assessment of availability of crossing options.
	Operational Considerations of Crossing System (River Crossing and Plaza)	Distance to plaza from international border; accessibility; serviceability; security; flexibility for expansion.
Cost and Constructability ²	Millions of CAD\$ (expressed in year 2011 dollars)	Length of alternative, preliminary construction costs, constructability including site constraints; geotechnical constraints; construction staging/ duration; traffic maintenance; risk assessment.

Between March 2006 and July 2007, the study team conducted the analysis of the five initial access road alternatives:

- 1) **Alternative 1A** - At-grade freeway with separate one-way service roads located on either side of the freeway
- 2) **Alternative 1B** - Below-grade freeway with separate one-way service roads located on either side of the freeway
- 3) **Alternative 2A** - At-grade freeway with separate service road located on one side of the freeway
- 4) **Alternative 2B** - Below-grade freeway with separate service road located on one side of the freeway
- 5) **Alternative 3** - Freeway in cut and cover tunnel with at-grade service road on top of tunnel

Preliminary findings of the analysis of the five initial access road alternatives were released for public review at Open Houses held in December 2006 and August 2007. Subsequently, the analysis of The Windsor-Essex Parkway alternative was undertaken and the results incorporated with those of the initial five access road alternatives. The evaluation of the six access road alternatives was conducted to identify the Technically and Environmentally Preferred Alternative (TEPA) for the access road. The results of this analysis and evaluation were presented at the sixth round of Public Information Open Houses in June 2008.

REASONED ARGUMENT METHOD

The results of the reasoned argument evaluation of the six access road alternatives are documented in a number of technical documents prepared by the study team. The key findings for each of the seven evaluation factors are presented in **Exhibit 8.15**. Further details of the analysis of these alternatives are provided in a document entitled *Generation and Assessment of Practical Alternatives and Selection of the Technically and Environmentally Preferred Alternative – Access Road Alternatives (December 2008)*:

² In the evaluation of Illustrative Alternatives, this factor was entitled Minimize Cost; for the evaluation of Practical Alternatives, the title of this factor was revised to Cost and Constructability to more adequately reflect the basis of the assessment from a cost and constructability perspective.

EXHIBIT 8.15 – SUMMARY OF PRACTICAL ALTERNATIVES EVALUATION – ACCESS ROAD

FACTOR/ MEASURE	ALTERNATIVE 1A		ALTERNATIVE 1B		ALTERNATIVE 2A		ALTERNATIVE 2B		ALTERNATIVE 3	PARKWAY
	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)		
Changes to Air Quality										
Results of modeling	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies. Depressed alternatives result in slightly lower PM_{2.5} concentrations in comparison to the at-grade alternatives. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies. Depressed alternatives result in slightly lower PM_{2.5} concentrations in comparison to the at-grade alternatives. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies. Depressed alternatives result in slightly lower PM_{2.5} concentrations in comparison to the at-grade alternatives. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies but NO_x concentrations are greater compared to non-tunnel alternatives over a broader area (greater dispersion from ventilation stacks) Tunnel results in lower concentrations of PM_{2.5} in vicinity of the first 50m from the ROW compared to the other alternatives. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies. Depressed alternatives result in slightly lower PM_{2.5} concentrations in comparison to the at-grade alternatives. 	<ul style="list-style-type: none"> Predicted concentrations of NO_x are lower in the future compared to today's values due to changes in fuels and vehicular technologies.
Overall Assessment	<ul style="list-style-type: none"> All access road alternatives represent an improvement to local air quality over the no-build alternative. The assessment found essentially no difference among the access road alternatives (at grade, below grade, tunnel) in terms of the improvements provided to local air quality compared to the no-build alternative; the end-to-end tunnel offers a slightly greater reduction in particulate concentrations within 50m of the ROW under certain conditions compared to the other alternatives, but a slight increase in NO_x over a broader area. All alternatives were considered to have an equally low impact to air quality. 									
Protection of Community and Neighbourhood Characteristics										
Potential Acquisitions	Residences • 180-230 Businesses • 31	Residences • 160-210 Businesses • 45	Residences • 180-230 Businesses • 31	Residences • 160-210 Businesses • 45	Residences • 190-230 Businesses • 26	Residences • 170-220 Businesses • 40	Residences • 180-230 Businesses • 26	Residences • 170-220 Businesses • 40	Residences • 140-180 Businesses • 43-45	Residences • 309-333 Businesses • 48
Community Features Potentially Displaced	3 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church	4 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church, Trillium Court Housing (partial)	3 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church	4 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church, Trillium Court Housing (partial)	3 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church (partial)	4 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church, Trillium Court Housing (partial)	3 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church (partial)	4 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church, Trillium Court Housing (partial)	4 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church, Trillium Court Housing (partial)	5 – Montessori Preschool, Royal Canadian Legion, Heritage Park Alliance Church, Trillium Court Housing (entire property), St. Clair College Athletic Fields
Noise Receptors with >5 dB increase (after mitigation)	1 (additional investigations in Malden Road/ Spring Garden area are required)	0 (additional investigations in Malden Road/ Spring Garden area are required)	1 (additional investigations in Malden Road/ Spring Garden area are required)	0 (additional investigations in Malden Road/ Spring Garden area are required)	0 (additional investigations in Malden Road/ Spring Garden area are required)	0 (additional investigations in Malden Road/ Spring Garden area are required)	0 (additional investigations in Malden Road/ Spring Garden area are required)	0 (additional investigations in Malden Road/ Spring Garden area are required)	0 (additional investigations in Malden Road/ Spring Garden area are required)	0 (additional investigations in Malden Road/ Spring Garden area are required)
Effect on Access	<ul style="list-style-type: none"> 9 road closings 20 local access connections to new transportation facility No access to the new corridor from Cabana Road/Todd Lane; no access to Howard Avenue from Highway 401 Eastbound. Full access to St. Clair College. 	<ul style="list-style-type: none"> 13 road closings 14-15 local access connections to new transportation facility Partial access to/ from the new corridor from/to Cabana Road/Todd Lane. Full access to St. Clair College No direct access to Howard Avenue. 	<ul style="list-style-type: none"> 15 road closings 15 local access connections to new transportation facility Full access to/ from new corridor from/to Cabana Rd/Todd Lane; no direct access to St. Clair College/Howard Ave 	<ul style="list-style-type: none"> 15 road closings 14 local access connections to new transportation facility Full access to/ from new corridor from/to Cabana Rd/Todd Lane; no direct access to St. Clair College/Howard Ave 	<ul style="list-style-type: none"> 14 road closings 10 local access connections to new transportation facility Full access to/ from new corridor from/to Cabana Rd/Todd Lane; no direct access to St. Clair College/Howard Ave 	<ul style="list-style-type: none"> 14 road closings 11 local access connections to new transportation facility Full access to/ from new corridor from/to Cabana Rd/Todd Lane; no direct access to St. Clair College/Howard Ave 	<ul style="list-style-type: none"> 9 road closings 13 local access connections to new transportation facility No access to/from Cabana Road/Todd Lane; No access to Howard Avenue from Highway 401 Eastbound. 	<ul style="list-style-type: none"> 18 road closings 17 local access connections to new transportation facility No access to/from Cabana Road/Todd Lane; No access to Howard Avenue from Highway 401 Eastbound 		

EXHIBIT 8.15 – SUMMARY OF PRACTICAL ALTERNATIVES EVALUATION – ACCESS ROAD (CONT'D)

FACTOR/ MEASURE	ALTERNATIVE 1A		ALTERNATIVE 1B		ALTERNATIVE 2A		ALTERNATIVE 2B		ALTERNATIVE 3	PARKWAY
	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)		
Impact on Community Character/Cohesion	<ul style="list-style-type: none"> Overall, similar impacts to community compared to other alternatives Communities of Spring Garden, Bethlehem Street, Reddock Street and Talbot Road (between Cousineau Road and Howard Avenue) Montgomery-Chelsea Drive and Mero Avenue will experience change to community character and cohesion The displacement of households within the neighbourhoods will result in a change in character within each community Reddock Street will experience a change in community character and cohesion due to the access road alignment encroaching into the community The Bethlehem community will experience a change in character and cohesion due to development of Bethlehem Street to accommodate local traffic traveling from Spring Garden to Huron Church Road 	<ul style="list-style-type: none"> Overall, similar impact to community compared to other alternatives Communities of Spring Garden, Bethlehem Street, Reddock Street, Kendleton Court, and Talbot Road (between Cousineau Road and Howard Avenue) and Mero Avenue will experience change to community character and cohesion Below grade alternative has lower aesthetic impacts than the at-grade options Reddock Street will experience a change in community character and cohesion due to the access road alignment encroaching into the community Removes traffic from the viewshed of adjacent neighbourhoods 	<ul style="list-style-type: none"> Overall, similar impact to community compared to other alternatives Communities of Spring Garden, Bethlehem Street, Reddock Street and Talbot Road (between Cousineau Road and Howard Avenue) and Mero Avenue will experience change to community character and cohesion Over half of the households on Reddock Street will be displaced The residential in-fill area of Kendleton Court will be displaced with option 1; no households will be displaced in Kendleton Court with option 2 Talbot Road community will experience a change in character and cohesion due to the displacement of one entire side of Talbot Road, with either option 1 or option 2 	<ul style="list-style-type: none"> Overall, similar impact to community compared to other alternatives Communities of Spring Garden, Bethlehem Street, Reddock Street and Talbot Road (between Cousineau Road and Howard Avenue) and Mero Avenue will experience change to community character and cohesion All Kendleton Court households will be displaced with alignment option 1; with alignment option 2 only one Kendleton Court household is displaced Provides for some aesthetic benefits to the community at large and to adjacent neighbourhoods Removes traffic from the viewshed of adjacent neighbourhoods 	<ul style="list-style-type: none"> Overall, similar impact to community compared to other alternatives Impacts to Spring Garden, Talbot Road, Bethlehem Street, Mero Avenue, and Montgomery-Chelsea Drive neighbourhoods In the Talbot Road community, the displacement of households is limited to the LaSalle side of Talbot Road; resulting in a change in community character and cohesion as approximately one half of the community is displaced Tunnel alignment to Plaza A will result in a displacement of 32 out of 48 households on Bethlehem Street; which will result in a change in character and cohesion Lowest aesthetic impact, but visual impact of ventilation buildings, which are not compatible with the surrounding landscape; residents will have the ventilation buildings and stacks as part of their permanent viewshed 	<ul style="list-style-type: none"> Impacts to Spring Garden, Talbot Road, Bethlehem Street, Reddock Street, Kendleton Court, Trillium Court neighbourhoods Talbot Road (between Cousineau and Howard) community will experience a change in character and cohesion due to the displacement of all the households on both sides of the street Trillium Court community will be entirely displaced, resulting in a change to community cohesion and character In the Kendleton Court community, the displacement of households is limited to one side of the street. Parkway provides a greenspace buffer to adjacent neighbourhood communities, thus reducing the number of residents adjacent to the roadway. Parkway provides connectivity between communities and community features that currently does not exist. Greenspace buffer between residents and freeway/service roads will result in fewer residents experiencing long term nuisance effects 				
Overall Assessment	<ul style="list-style-type: none"> Overall, all alternatives are considered to have a high impact to community characteristics. All alternatives displace a high number of residences and businesses along the corridor and represent a substantive change to the local character and cohesion for the neighbourhoods along the corridor. The separation of local and international traffic and the additional roadway capacity provided will deter infiltration of international traffic onto local municipal streets, providing a benefit to south/west Windsor and LaSalle. The effects of loss of businesses along the corridor is offset by the ability of these businesses to locate elsewhere in the local area, improved access for these businesses over what is presently provided, and the benefits of thousands of direct and indirect project related jobs created by the construction of the new access road. The at-grade alternatives and below-grade alternatives 2A and 2B do not provide any improvements to community cohesion and character. The end-to-end tunnel does not provide the same benefits to community character and cohesion as it does not improve linkages across the Huron Church/Highway 3 corridor over the current condition and reduces visibility for local businesses. The Windsor-Essex Parkway has the highest displacement of homes and businesses, but provides a greater improvement to overall community character and cohesion of the corridor by improving linkages between neighbourhoods, buffering neighbourhoods from highway nuisance effects and providing new open space/recreational facilities along the corridor. These improvements result in a better long-term solution for the community. Based on the extent of long term improvements to community character and cohesion in south/west Windsor and LaSalle, the Windsor-Essex Parkway is slightly preferred over the other alternatives as having the least overall impacts to community and neighbourhood characteristics. 									
Consistency with Existing & Planned Land Use										
Consistency	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing); Proposed facility is consistent with local Official Plans 	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing); Proposed facility is consistent with local Official Plans 	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing) Proposed facility is consistent with local Official Plans 	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing) Proposed facility is consistent with local Official Plans 	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing) Proposed facility is consistent with local Official Plans 	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing) Proposed facility is consistent with local Official Plans 	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing) Proposed facility is consistent with local Official Plans 	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing) Proposed facility is consistent with local Official Plans 	<ul style="list-style-type: none"> Alternative utilizes Huron Church Road/ Highway 3 Corridor (major roadway, historical connection to border crossing) Proposed facility is consistent with local Official Plans including the Healthy Communities policies and objectives Parkway provides opportunities for additional parkland & recreational features 	

EXHIBIT 8.15 – SUMMARY OF PRACTICAL ALTERNATIVES EVALUATION – ACCESS ROAD (CONT'D)

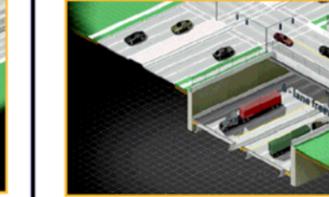
FACTOR/ MEASURE	ALTERNATIVE 1A		ALTERNATIVE 1B		ALTERNATIVE 2A		ALTERNATIVE 2B		ALTERNATIVE 3	PARKWAY	
											
	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)			
Total area of land use impacts	• 78 ha	• 74 ha	• 75 ha	• 78 ha	• 81 ha	• 78 ha	• 80 ha	• 85 ha	• 65 ha	• 99 ha	
Contaminated Sites/Potentially impacted area of high potential for contamination	• 17/9 ha	• 17/3.6 ha	• 18/3.5 ha	• 13/3.6 ha	• 17/4 ha	• 17/4 ha	• 16/3.8 ha	• 16/4 ha	• 16/3 ha	• 20/3 ha	
Overall Assessment	<ul style="list-style-type: none"> All the alternatives are developed in the same existing transportation corridor in Windsor and LaSalle and Tecumseh. The nature of existing and planned land uses affected by all alternatives are essentially the same. The Windsor-Essex Parkway demonstrates a greater consistency with local municipal planning in terms of meeting objectives that improve the quality of life for its residents. The tunnel sections over the below-grade freeway, additional buffer spaces along and across the corridor, opportunities for new recreational trails with connections to existing trails and wildlife linkages contribute to a corridor that better connects communities and natural features. The Windsor-Essex Parkway alternative is preferred over the other alternatives. 										
Protection of Cultural Resources											
Built Heritage Features Displaced	• 7 to 8 field identified built heritage features displaced		• 7 to 8 field identified built heritage features displaced		• 5 field identified built heritage features displaced		• 5 field identified built heritage features displaced		• 6 to 8 field identified built heritage features displaced		• 7 to 8 field identified built heritage features displaced
Disrupted	• 1 to 3 field identified built heritage features disrupted		• 1 to 3 field identified built heritage features disrupted		• 3 to 4 field identified built heritage features disrupted		• 6 field identified built heritage features disrupted		• 6 field identified built heritage features disrupted		• 3 to 5 field identified built heritage features disrupted
Parks	• 1 Impacted – Property taking • 5 impacted – potential disruption to access	• 6 Impacted – Potential disruption to access	• 1 Impacted – Property taking • 5 impacted – potential disruption to access	• 6 Impacted – Potential disruption to access	• 1 Impacted – Property taking • 5 impacted – potential disruption to access	• 6 Impacted – Potential disruption to access	• 1 Impacted – Property taking • 5 impacted – potential disruption to access	• 6 Impacted – Potential disruption to access	• 1 Impacted – Property taking • 5 impacted – potential disruption to access	• 1 Impacted – Property taking • 5 impacted – potential disruption to access	• 1 impacted-Property taking • 5 impacted – potential disruption to access • adds 240 acres of additional parkland and greenspace, and over 20 km of new recreational trails with the Windsor-Essex Parkway design
Archaeology Disturbance or destruction of known significant archaeological sites	• 1 to 2 small pre-contact habitation sites • 9 pre-contact findspots	• 1 to 2 small pre-contact habitation sites • 9 pre-contact findspots e.g. no known sites of high to moderate significance impacted	• 1 to 2 small pre-contact habitation sites • 9 pre-contact findspots	• 1 to 2 small pre-contact habitation sites • 9 pre-contact findspots	• 2 to 3 small pre-contact habitation sites • 10 to 11 pre-contact findspots	• 2 to 3 small pre-contact habitation sites • 10 pre-contact findspots	• 2 to 3 small pre-contact habitation sites • 10 to 11 pre-contact findspots	• 2 to 3 small pre-contact habitation sites • 9 to 10 pre-contact findspots	• 1 to 3 small pre-contact habitation sites • 8 pre-contact findspots	• 3 to 4 small pre-contact habitation sites • 15 to 17 pre-contact findspots	
Overall Assessment	<ul style="list-style-type: none"> In terms of reducing impacts to built heritage features and cultural landscapes, Alternatives 2A and 2B with the alignment connecting to Plaza A have the lowest impacts. Alternatives 1A and 1B have the highest impacts, regardless of the connecting plaza alignment considered. All the access road alternatives impact a similar number of existing municipal parks; only the Windsor-Essex Parkway provides over 100 ha (240 acres) of new open space suitable for active/passive recreational facilities and over 20 kilometres of additional recreational trails, with connections to the existing trail systems. Given that no access road alternatives have sites with human remains or large pre-contact Aboriginal (village) sites (based on the evidence to date), all access road alternatives are assessed to have low to medium archaeological impact to known archaeological sites. Overall, the Windsor-Essex Parkway was considered to be the preferred access road alternative on the basis of greater benefits to cultural resources by way of increasing the amount of park space and trails available to local residents, with similar low impacts to built heritage and archaeological features, compared to the other alternatives. 										

EXHIBIT 8.15 – SUMMARY OF PRACTICAL ALTERNATIVES EVALUATION – ACCESS ROAD (CONT'D)

FACTOR/ MEASURE	ALTERNATIVE 1A		ALTERNATIVE 1B		ALTERNATIVE 2A		ALTERNATIVE 2B		ALTERNATIVE 3	PARKWAY
	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)		
Protection of Natural Environment										
Fish and Fish Habitat	• No critical fish habitat impacted by any access road alternatives									
Plant/Vegetation Species	• 0.44 ha to 1.43 ha of provincially rare vegetation impacted	• 0.50 ha to 1.53 ha of provincially rare vegetation impacted	• 0.43 ha to 1.46 ha of provincially rare vegetation impacted	• 0.54 ha to 1.46 ha of provincially rare vegetation impacted	• 1.19 ha to 2.22 ha of provincially rare vegetation impacted	• 1.18 ha to 2.22 ha of provincially rare vegetation impacted	• 0.82 ha to 1.86 ha of provincially rare vegetation impacted	• 0.82 ha to 1.86 ha of provincially rare vegetation impacted	• 0.50 ha to 1.48 ha of provincially rare vegetation impacted	• 1.47 ha to 2.54 ha of provincially rare vegetation impacted
Wildlife Species and Habitat	• 102 to 142 specimens/colonies of species at risk	• 92 to 134 specimens/colonies of species at risk	• 112 to 152 specimens/colonies of species at risk	• 103 to 152 specimens/colonies of species at risk	• 122 to 162 specimens/colonies of species at risk	• 116 to 155 specimens/colonies of species at risk	• 105 to 145 specimens/colonies of species at risk	• 92 to 131 specimens/colonies of species at risk	• 92 to 131 specimens/colonies of species at risk	• 141 to 180 specimens/colonies of species at risk • wider right of way/buffer areas provides greater opportunities for restoration and enhancement of natural features along the corridor
Overall Assessment	• Overall, all the access road alternatives are considered as having similar impacts to natural features. While no one access road alternative was identified as being preferred over all others, the alternatives that avoid the Malden Road/Spring Garden area (i.e. those with the access road alignment connecting to plazas B/C) are slightly preferred.									
Improvements to Regional Mobility										
Highway Capacity	• Six lane freeway with controlled access and service roads provides sufficient capacity to meet future (2035) travel demand; Peak Hour LOS (2035) = C									
Continuous Capacity	<ul style="list-style-type: none"> All alternatives provide comparable access between the service roads and the cross streets with slight differences: Safety of controlled access freeway for access road is greatly increased compared to present arterial roadway with signalized intersections and other entrances/conflict points Provides increased local and regional mobility over the "do nothing" alternative Provides substantial travel time savings for local traffic when compared to the "do nothing" alternative 	<ul style="list-style-type: none"> Safety of controlled access freeway for access road is greatly increased compared to present arterial roadway with signalized intersections and other entrances/conflict points Provides increased local and regional mobility over the "do nothing" alternative Provides substantial travel time savings for local traffic when compared to the "do nothing" alternative 	<ul style="list-style-type: none"> Safety of controlled access freeway for access road is greatly increased compared to present arterial roadway with signalized intersections and other entrances/conflict points Provides increased local and regional mobility over the "do nothing" alternative Provides substantial travel time savings for local traffic when compared to the "do nothing" alternative 	<ul style="list-style-type: none"> Safety of controlled access freeway for access road is greatly increased compared to present arterial roadway with signalized intersections and other entrances/conflict points Provides increased local and regional mobility over the "do nothing" alternative Provides substantial travel time savings for local traffic when compared to the "do nothing" alternative 	<ul style="list-style-type: none"> Safety of controlled access freeway for access road is greatly increased compared to present arterial roadway with signalized intersections and other entrances/conflict points Provides increased local and regional mobility over the "do nothing" alternative Provides substantial travel time savings for local traffic when compared to the "do nothing" alternative 	<ul style="list-style-type: none"> Safety of controlled access freeway for access road is greatly increased compared to present arterial roadway with signalized intersections, other entrances/conflict points Provides increased local and regional mobility over the "do nothing" alternative Provides substantial travel time savings for local traffic when compared to the "do nothing" alternative The positive effects of tunnels on safety include elimination of adverse weather conditions and increased driver attention and/or slower speeds due to the confined driving space Elements of tunnel driving that negatively affect safety may include limited visibility due to tunnel walls and light changes at the portals; it is much more difficult to control events in a tunnel crash; motorists' escape is not simple, and it is harder for emergency response teams to reach the crash site The consequences of a crash in a tunnel are greatly increased over those on an open road, however, the frequency of catastrophic events is low, and the occurrence of general traffic crashes (on a tunneled freeway) is marginally less than on an open road 	<ul style="list-style-type: none"> Safety of controlled access freeway for access road is greatly increased compared to present arterial roadway with signalized intersections and other entrances/conflict points Provides increased local and regional mobility over the "do nothing" alternative Provides substantial travel time savings for local traffic when compared to the "do nothing" alternative Provides more favourable traffic operations on the service road than the other alternatives Provides higher degree of mobility between the service road and the new freeway when compared to the other alternatives. 			

EXHIBIT 8.15 – SUMMARY OF PRACTICAL ALTERNATIVES EVALUATION – ACCESS ROAD (CONT'D)

FACTOR/ MEASURE	ALTERNATIVE 1A		ALTERNATIVE 1B		ALTERNATIVE 2A		ALTERNATIVE 2B		ALTERNATIVE 3	PARKWAY
	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)	Option 1 (Widen to North on Hwy 3)	Option 2 (Widen to South on Hwy 3)		
Reasonable and Secure Options	<ul style="list-style-type: none"> All access road alternatives provide freeway connection to a river crossing as well as connections to Huron Church Road at E.C. Row enabling choice between new and existing crossings 									
Overall Assessment	<ul style="list-style-type: none"> All alternative provide a significant improvement to regional mobility by getting long distance truck traffic off local streets and providing full freeway access to/from the border. The local and regional function of the existing Highway 3/Huron Church Road corridor is improved by providing parallel service roads which can be designed to meet the needs of the community. The Windsor-Essex Parkway provides better access between the local street system and the freeway, providing greater benefits to regional mobility than the other alternatives. This advantage led to the determination that the Windsor-Essex Parkway is preferred over the other access road alternatives. 									
Cost and Constructability										
Estimated Construction Cost (SCAD 2011 dollars), North Talbot Road to Malden Road	\$750 M to \$920 M		\$1.19 B to \$1.36 B		\$620 M to \$790 M		\$1.03 B to \$1.20 B		\$3.6 B to \$3.78 B	\$1.5 B to \$1.6 B
Key Constructability Issues	<ul style="list-style-type: none"> Traffic management during construction Availability of resources and materials Utility relocations Watercourse crossings 0.3 km zone requiring soil stabilization techniques 		<ul style="list-style-type: none"> Traffic management during construction Availability of resources and materials Utility relocations Watercourse crossings Soil stabilization techniques required over 2.5 km 		<ul style="list-style-type: none"> Traffic management during construction Availability of resources and materials Utility relocations Watercourse crossings 0.3 km zone requiring soil stabilization techniques 		<ul style="list-style-type: none"> Traffic management during construction Availability of resources and materials Utility relocations Watercourse crossings Soil stabilization techniques required over 2.5 km 		<ul style="list-style-type: none"> Traffic management during construction Availability of resources and materials Utility relocations Watercourse crossings Soil stabilization required over 2.5 km Testing, commissioning and maintenance of tunnel support systems (ventilation, lighting communications, etc.) 	<ul style="list-style-type: none"> Traffic management during construction Availability of resources and materials Utility relocations Watercourse crossings Soil stabilization required to over 2.5 km Additional annual maintenance will be required for the Cahill and Lennon Drains
Overall Assessment	<ul style="list-style-type: none"> The at-grade alternatives have the lowest construction costs and the least constructability risks, while the end-to-end tunnel alternative carries the highest costs and greatest constructability risks. The below-grade alternatives, including the Windsor-Essex Parkway, carry estimated costs much less than the tunnel alternative, with lower cost and constructability risks. Alternative 2A, which is an at-grade alternative with a parallel two-lane service road is the preferred alternative based on cost and constructability. This alternative requires the least cost and least constructability risks. The new freeway could be built alongside much of the Huron Church/Highway 3 corridor without interfering with traffic. This alternative also avoids below-grade construction at Grand Marais Drain, which is an area of high risk construction. 									
Evaluation Summary	<ul style="list-style-type: none"> The Windsor-Essex Parkway was identified as preferred or slightly preferred over the other access road alternatives in four of the seven key factor areas considered. In two of the seven factor areas, no clear preference was identified; in the area of Cost and Constructability, the at-grade alternative 2A was identified as the preferred alternative. The Windsor-Essex Parkway was the second-most expensive alternative and is identified as having greater cost and constructability risks than the other alternatives expect for the tunnel alternative. Overall, the Windsor-Essex Parkway was considered to provide a better balance of impacts and benefits than the at-grade alternative 2A. The advantages of the Windsor-Essex Parkway in terms of providing greater protection to community and neighbourhood characteristics, a greater consistency with existing and planned land use, greater protection of cultural features and greater improvements to regional mobility than alternative 2A. Although alternative 2A has more cost and constructability advantages, it offers much less community, land use, cultural and mobility advantages than the Windsor-Essex Parkway. The study team therefore identified the Windsor-Essex Parkway as the preferred access road alternative. 									

The results of the access road alternatives evaluation are summarized in Table 8.11:

TABLE 8.11 – SUMMARY OF EVALUATION OF PRACTICAL ACCESS ROAD ALTERNATIVES

Factor	Preferred Alternative
Changes to Air Quality	No Clear Preference
Protect Community and Neighbourhood Characteristics	Windsor-Essex Parkway
Maintain Consistency with Existing and Planned Land Use	Windsor-Essex Parkway
Protect Cultural Resources	Windsor-Essex Parkway
Protect the Natural Environment	No Clear Preference
Improve Regional Mobility	Windsor-Essex Parkway
Cost and Constructability	Alternative 2A

The Windsor-Essex Parkway was identified as preferred over the other access road alternatives in four of the seven key factor areas considered. In two of the seven factor areas, no clear preference was identified. In the area of Cost and Constructability, the at-grade Alternative 2A was identified as the preferred alternative. For Changes to Air Quality the no clear preference was due to the limited range of impacts (typically within the first 50 m), the contribution from other sources including transboundary, and the overall loading for all scenarios is essentially equivalent. The Windsor-Essex Parkway alternative was the second-most expensive alternative and is identified as having greater cost and constructability risks than the other alternatives except for the tunnel alternative.

Overall, The Windsor-Essex Parkway was considered to provide a better balance of impacts and benefits than the at-grade Alternative 2A. The advantages of The Windsor-Essex Parkway provides greater protection to community and neighbourhood characteristics, more compatibility with existing and planned land use, greater protection of cultural features and greater improvements to regional mobility than Alternative 2A.

Although Alternative 2A has more cost and constructability advantages, it offers much less community, land use cultural and mobility advantages than The Windsor-Essex Parkway. The study team therefore identified The Windsor-Essex Parkway as the preferred practical access road alternative.

ARITHMETIC METHOD

The evaluation of practical access road alternatives was also conducted using an arithmetic method based on numerical weighting and scoring of impacts. The arithmetic evaluation of the practical access road alternatives was conducted in the same manner as the arithmetic evaluation of the practical plaza and crossing alternatives (refer to Section 8.1) and also utilized the weighting scenarios developed based on public input and input from the Community Consultation Group (CCG). The results of the arithmetic evaluation of practical access road alternatives is provided in Table 8.12.

TABLE 8.12 – ARITHMETIC EVALUATION OF PRACTICAL ACCESS ROAD ALTERNATIVES

Factor	Weight	1A Weighted Score		1B Weighted Score		2A Weighted Score		2B Weighted Score		3 Weighted Score		Parkway Weighted Score	
		Study Team Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score
Air	12.39	3	37.17	3	37.17	3	37.17	3	37.17	3	37.17	3	37.17
Community	15.93	1	15.93	1	15.93	1	15.93	1	15.93	1	15.93	1	15.93
Land Use	12.39	2	24.78	2	24.78	2	24.78	2	24.78	2	24.78	2	24.78
Cultural	12.39	3	37.17	3	37.17	3	37.17	3	37.17	3	37.17	3	37.17
Natural	15.93	3	47.79	3	47.79	3	47.79	3	47.79	3	47.79	3	47.79
Mobility	17.70	6	106.20	6	106.20	6	106.20	6	106.20	6	106.20	7	123.90
Cost/Constructability	13.27	3	39.81	2	26.54	3	39.81	2	26.54	1	13.27	2	26.54
Total	100.00	21	308.85	20	295.58	21	308.85	20	295.58	19	282.31	21	313.28
Rank	Unweighted	1		4		1		4		6		1	
	Weighted		2		4		2		4		6		1

Factor	Weight	1A Weighted Score		1B Weighted Score		2A Weighted Score		2B Weighted Score		3 Weighted Score		Parkway Weighted Score	
		Public Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score
Air	17.32	3	51.96	3	51.96	3	51.96	3	51.96	3	51.96	3	51.96
Community	15.49	1	15.49	1	15.49	1	15.49	1	15.49	1	15.49	1	15.49
Land Use	12.89	2	25.78	2	25.78	2	25.78	2	25.78	2	25.78	2	25.78
Cultural	13.14	3	39.42	3	39.42	3	39.42	3	39.42	3	39.42	3	39.42
Natural	16.34	3	49.02	3	49.02	3	49.02	3	49.02	3	49.02	3	49.02
Mobility	15.28	6	91.68	6	91.68	6	91.68	6	91.68	6	91.68	7	106.96
Cost/Constructability	9.54	3	28.62	2	19.08	3	28.62	2	19.08	1	9.54	2	19.08
Total	100.00	21	301.97	20	292.43	21	301.97	20	292.43	19	282.89	21	307.71
Rank	Unweighted	1		4		1		4		6		1	
	Weighted		2		4		2		4		6		1

Factor	Weight	1A Weighted Score		1B Weighted Score		2A Weighted Score		2B Weighted Score		3 Weighted Score		Parkway Weighted Score	
		Community Consultation Group Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score
Air	17.30	3	51.9	3	51.9	3	51.90	3	51.90	3	51.90	3	51.90
Community	13.88	1	13.88	1	13.88	1	13.88	1	13.88	1	13.88	1	13.88
Land Use	13.69	2	27.38	2	27.38	2	27.38	2	27.38	2	27.38	2	27.38
Cultural	13.12	3	39.36	3	39.36	3	39.36	3	39.36	3	39.36	3	39.36
Natural	17.11	3	51.33	3	51.33	3	51.33	3	51.33	3	51.33	3	51.33
Mobility	14.83	6	88.98	6	88.98	6	88.98	6	88.98	6	88.98	7	103.81
Cost/Constructability	10.07	3	30.21	2	20.14	3	30.21	2	20.14	1	10.07	2	20.14
Total	100.00	21	303.04	20	292.97	21	303.04	20	292.97	19	282.90	21	307.80
Rank	Unweighted	1		4		1		4		6		1	
	Weighted		2		4		3		4		6		1

Unweighted Scores

The unweighted scores represent the total of the impact scores determined by the study team based on the degree of impacts or benefits of each alternative. As can be seen in Table 8.12, the two at-grade alternatives (1A and 2A) and The Windsor-Essex Parkway were ranked highest overall. This reflects similarities in the balance of benefits and costs – the at-grade alternatives were found to be the lowest cost alternatives with the least constructability issues. The Windsor-Essex Parkway provides more benefits to regional mobility at higher costs than the at-grade solutions.

The rankings of the other alternatives reflect the higher impacts, lower benefits and/or increased costs compared to the higher ranked alternatives.

Weighted Scores

The weighted scores reflect the level of importance as well as the degree of impacts and benefits of each alternative. The results indicate that:

- The results of the weighted scoring were the same in terms of how each alternative was ranked among the three weighting scenarios considered
- The study team, public and CCG weighting scenarios identified The Windsor-Essex Parkway as the highest ranking alternative; consistent with the unweighted scores, this result reflects the

balance of high transportation benefits, comparable community and natural features impacts and comparable cost and constructability impacts

- The cut and cover tunnel alternative was the lowest ranked by all three weighting scenarios. This result reflects the relatively few benefits of a tunnel alternative in comparison to the other alternatives, at a much higher cost with greater constructability impacts.

The study team considered the results of the arithmetic method as a validation of the recommendations developed through the reasoned argument method presented in **Exhibit 8.15**. As such, The Windsor-Essex Parkway was selected as the technically preferred access road alternative for this study.

The Technically and Environmentally Preferred Alternative (TEPA) for this study therefore consists of The Windsor-Essex Parkway, connecting to Plaza B1, together with Crossing X-10B. Further details with regard to the TEPA are provided in **Chapter 9**.