



## **Canada-United States-Ontario-Michigan Border Transportation Partnership**

# **Level 3 Traffic Operations Analysis**

**Technically and Environmentally Preferred Alternative**

**December 2008**

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## PREFACE

The Detroit River International Crossing (DRIC) Environmental Assessment study was conducted by a partnership of the federal, state and provincial governments in Canada and the United States in accordance with the requirements of the Canadian Environmental Assessment Act (CEAA), the Ontario Environmental Assessment Act (OEAA), and the U.S. National Environmental Policy Act (NEPA). In 2005, the Canadian and U.S. Study Teams identified 15 potential river crossing locations and associated plaza and access road alternatives. The results of the assessment of these alternatives led to the identification of an Area of Continued Analysis (ACA). Within the ACA, practical alternatives were developed for the crossings, plazas and access road alternatives.

Through the analysis of the practical alternatives, and in conjunction with ongoing consultation efforts, a new alternative was developed that combined beneficial features of the original alternatives. The new alternative was identified as The Parkway in August 2007 and included 7 kilometres of below grade freeway, an optimized service road system, a green corridor with 10 tunnelled sections totalling 1.5 km in length, a grade separated recreational trail system, and extensive green areas.

Upon completion of the analysis of the practical alternatives, the alternatives were evaluated. The Partnership announced the results of the evaluation for the access road component in May 2008. Referred to as The Windsor-Essex Parkway, the Technically and Environmentally Preferred Alternative (TEPA) access road consisted of the major components of the Parkway with some refinements made to reflect additional community consultation and analysis. These refinements included an additional tunnel in the Spring Garden area, more green space and a refined trail network. The components of the TEPA for the international bridge crossing (Crossing X-10B) and Canadian plaza (Plaza B1) were announced in June 2008.

The remainder of 2008 focused on detailed analysis and identification of impacts and appropriate mitigation measures for the TEPA, along with further refinements. This report summarizes the work undertaken in this regard specific to Traffic Operations. These measures were also documented in a draft version of the Ontario Environmental Assessment Report, which was made available to the public, agencies, municipalities, First Nations, and other interested parties for review in November 2008.

Additional reports and details are available at the study website ([www.partnershipborderstudy.com](http://www.partnershipborderstudy.com)).

# 1. Introduction

The Border Transportation Partnership was formed between Transport Canada (TC), Ontario Ministry of Transportation (MTO), Federal Highway Administration (FHWA) and Michigan Department of Transportation (MDOT) to undertake an Environmental Assessment Study for a new international border crossing in southwest Ontario and southeast Michigan. The purpose of this study was to recommend the most feasible and environmentally sound location for the new crossing. From the transportation demand forecast and traffic operations standpoints, the study consists of the following three analysis levels:

*Level 1 Analysis: Transportation modelling and demand forecasts for the new crossing.* The final deliverable included passenger and commercial vehicle forecasts for the Detroit River International Crossing (DRIC). This work was completed in September 2005, and is summarized in the working paper titled *Detroit River International Crossing Study Travel Demand Forecasts*. As part of Level 1 Analysis, Illustrative Alternatives were developed and assessed based on various feasibility criteria. The initial Study Area was further narrowed to form the Area of Continued Analysis. Within the Area of Continued Analysis, Practical Alternatives for the new corridor/crossing were developed in light of the outcome and recommendations from the transportation modelling exercise (need and justification).

*The Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives (February 2008-revised December 2008).* As part of this analysis level, Practical Alternatives developed within the Area of Continued Analysis were further assessed using the Synchro 6 and HCS 2000 software packages for signalized and unsignalized intersections, freeway and arterial roadway segments, as well as weaving sections and ramp junctions. The purpose of this analysis level was to provide an assessment of all Practical Alternatives along with recommendations from the traffic operations standpoint to help select/develop the Technically and Environmentally Preferred Alternative (TEPA).

*Level 3 Analysis: Microsimulation Analysis of the TEPA (Windsor-Essex Parkway).* As part of this analysis level, the Windsor-Essex Parkway was developed and assessed using a traffic microsimulation software package. This micro-level analysis has been undertaken to identify required localized improvements, and graphically demonstrate anticipated traffic operations of the Windsor-Essex Parkway.

This report summarizes the results of the Level 3 traffic analysis, and provides a comprehensive assessment of the Windsor-Essex Parkway using the VISSIM microsimulation software package.

## 1.1.

## Study Methodology

The Level 3 Analysis incorporates an assessment of the Windsor-Essex Parkway under the future traffic conditions for the ultimate 2035 horizon year.

The VISSIM software package was used to determine traffic operations on the freeway mainline, ramp junctions and ramp terminal intersections, as well as other study area intersections along the Service Road and other arterial roads. Specifically, the road network analyzed included the Windsor-Essex Parkway between North Talbot Road and the new plaza, as well as the Highway 3/Service Road/Huron Church Road corridor and all major crossing roads.

The measures of effectiveness summarized in this report include levels of service, volume-to-capacity ratios, delays, 95<sup>th</sup> percentile queue length, as well as travel times and speeds.

## 2. The Windsor-Essex Parkway: Technically and Environmentally Preferred Alternative

Based on feedback from the December 2006 Public Information Open Houses, an additional Practical Alternative (The Parkway) was developed during the spring and summer of 2007. This alternative most closely followed the Practical Alternative 2B, but included a series of short tunnels, additional interchange connections, an expanded right-of-way, and other improvements to reduce community impacts.

In consultation with the Municipal Advisory Group (MAG), the Highway 401/Highway 3 interchange was conceptually redesigned to ensure that the new configuration does not preclude a connection to the future Laurier Parkway. A number of conceptual designs were developed and assessed from the traffic operations standpoint, and the interchange configuration illustrated in the Parkway was selected as the preferred configuration, which meets the interchange criteria with minimum impact to Highway 401 and Highway 3 traffic flows. The preferred design also incorporated a signalized intersection (Highway 3/Connection to Laurier Parkway) within the footprint of the interchange.

Other minor/localized modifications to interchanges and/or Service Road sections were incorporated as per the recommendations of the *Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives (February 2008-revised December 2008)*, which helped to form “The Parkway” scenario.

Through consultation with Windsor and LaSalle emergency services, additional modifications were recommended, and subsequently adopted including a loop on-ramp from Todd Lane to the eastbound freeway. With some further modifications to the tunnel locations/lengths, the Technically and Environmentally Preferred Alternative (TEPA) was formed, which is also known as The Windsor-Essex Parkway. In general, the freeway corridor of the Windsor-Essex Parkway incorporates a cross-section that is primarily below-grade for the six-lane controlled-access freeway facility. Crossings of the Windsor-Essex Parkway are provided at Labelle Street, Grand Marais Road, Todd Lane/Cabana Road, Huron Church Line, Cousineau Road, and Howard Avenue.

Upon further consultation with MAG and after a series of supplementary analysis, a scenario with a roundabout at the Highway 401/Highway 3 interchange was proposed and eventually recommended as an alternative to a traffic signal control at a traditional four-legged intersection. The roundabout design has been subsequently adopted. Other modifications to the TEPA include a future Howard Avenue diversion and the Windsor-Essex Parkway combining with EC Row Expressway west of existing Huron Church Road as a core-collector system (the Windsor-Essex Parkway forming the “core” lanes and the EC Row Expressway forming the “collector” lanes).

For consistency purposes, the freeway corridor is assumed to span east-west, while Huron

Church Road is assumed to span north-south. In the Windsor-Essex Parkway Huron Church Road is assumed to terminate south of EC Row Expressway where north and south Service Roads are formed. The Service Road is assumed to run north-south between Labelle Street and Huron Church Line, and east-west from Huron Church Line easterly to beyond Outer Drive.

Ramps to and from the freeway corridor are provided at the following locations:

**Northbound/Westbound (refer to Exhibit 1):**

1. To Howard Avenue/Highway 3 (off-ramp);
2. From Highway 3 east of Howard Avenue (loop on-ramp);
3. From Service Road west of Howard Avenue (on-ramp);
4. To Service Road west of St Clair College (off-ramp);
5. From Service Road north of Cabana Road (on-ramp);
6. To Service Road south of Labelle Street (off-ramp);
7. To Ojibway Parkway (off-ramp);
8. From Ojibway Parkway (on-ramp); and
9. From EC Row Expressway (westbound collector lanes), west of Malden Road (on-ramp).

**Southbound/Eastbound (refer to Exhibit 1):**

- A. To Ojibway Parkway (off-ramp);
- B. From Ojibway Parkway (on-ramp);
- C. To EC Row Expressway (eastbound collector lanes) west of Malden Road;
- D. From Service Road south of Labelle Street (on-ramp);
- E. To Cabana Road / Todd Lane (off-ramp);
- F. From Cabana Road / Todd Lane (loop on-ramp);
- G. To Service Road east of Huron Church Line (off-ramp);
- H. From Service Road west of St Clair College (on-ramp);
- I. From Service Road west of Howard Avenue (on-ramp);
- J. To Highway 3 east of Howard Avenue (off-ramp); and
- K. From Highway 3/Howard Avenue diversion (on-ramp).

The freeway corridor between the new Plaza and North Talbot Road was coded in VISSIM (traffic micro-simulation software) for a detailed analysis of the Windsor-Essex Parkway. The VISSIM model also incorporated the Service Road as well as all key ramp terminal intersections for the purpose of obtaining travel times, anticipated speeds, delays and traffic queues. An assessment of the Howard Avenue diversion has also been performed, and is described in detail in *Section 3.7* of this report. The 95<sup>th</sup> percentile queue lengths at

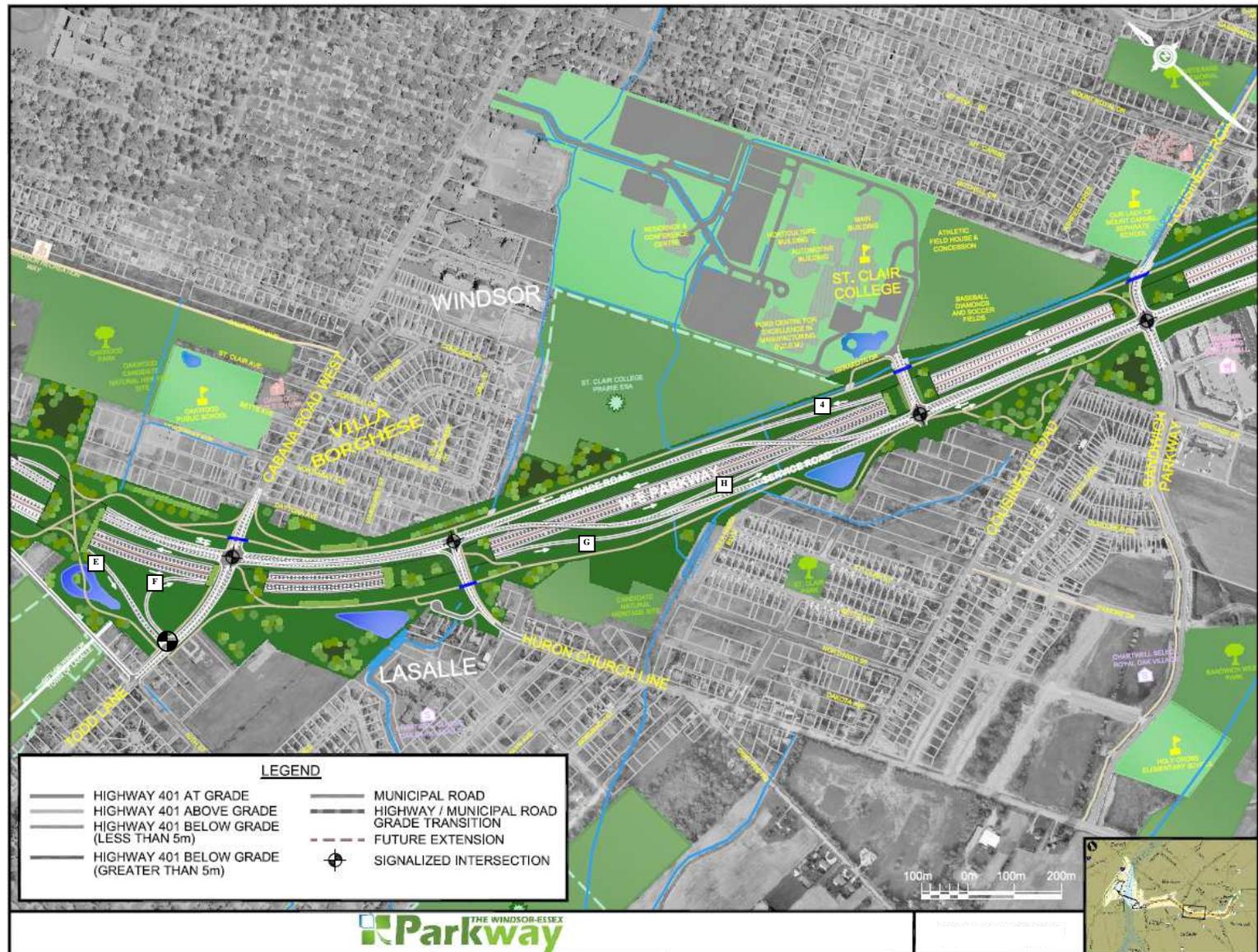
signalized intersections were used to determine required storage lengths to accommodate the anticipated demand. It should be noted that the micro-simulation analysis of the Windsor-Essex Parkway was performed for both 2035 AM and 2035 PM peak hours. The Windsor-Essex Parkway is illustrated in Exhibit 1.

**EXHIBIT 1. WINDSOR-ESSEX PARKWAY CONFIGURATION**

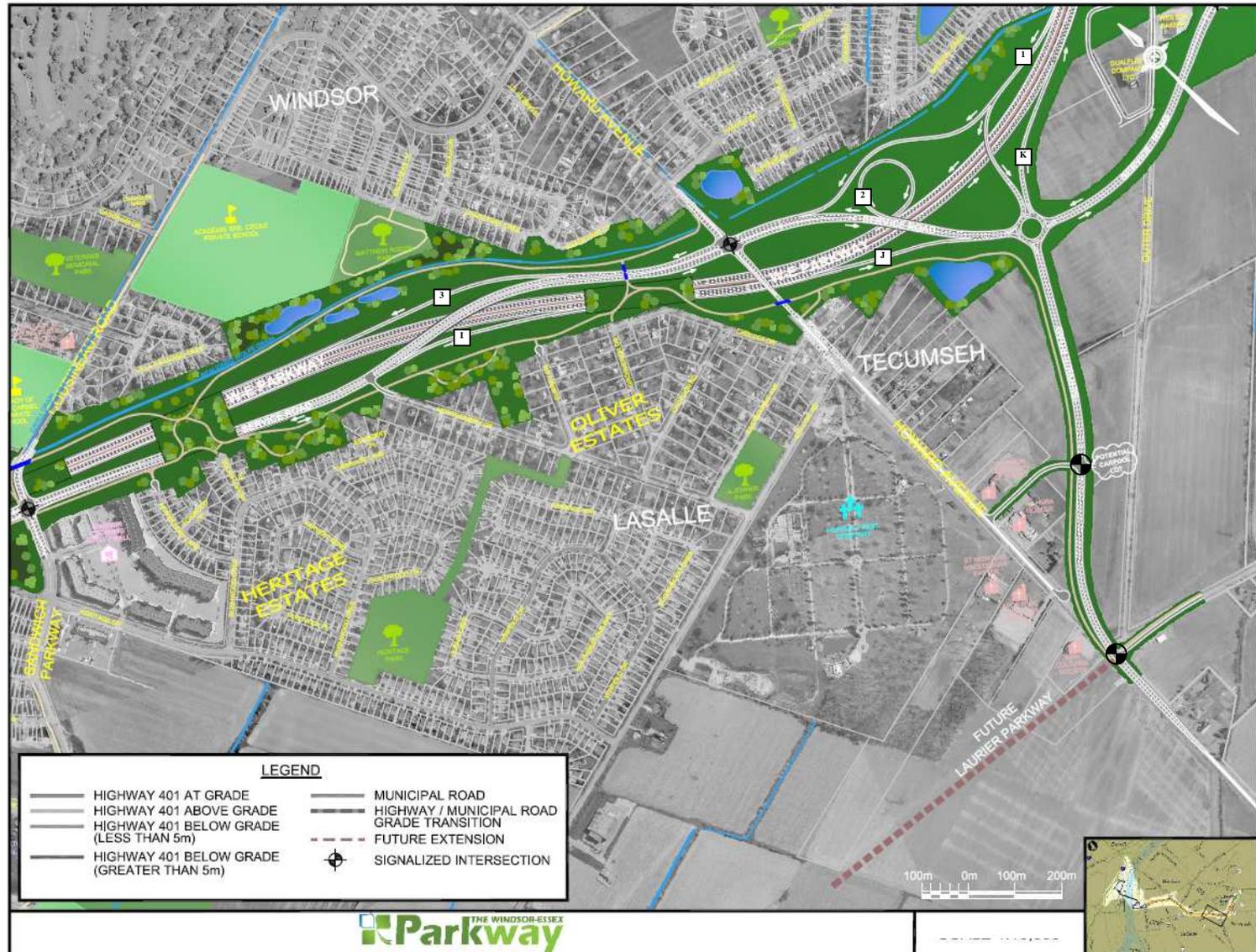




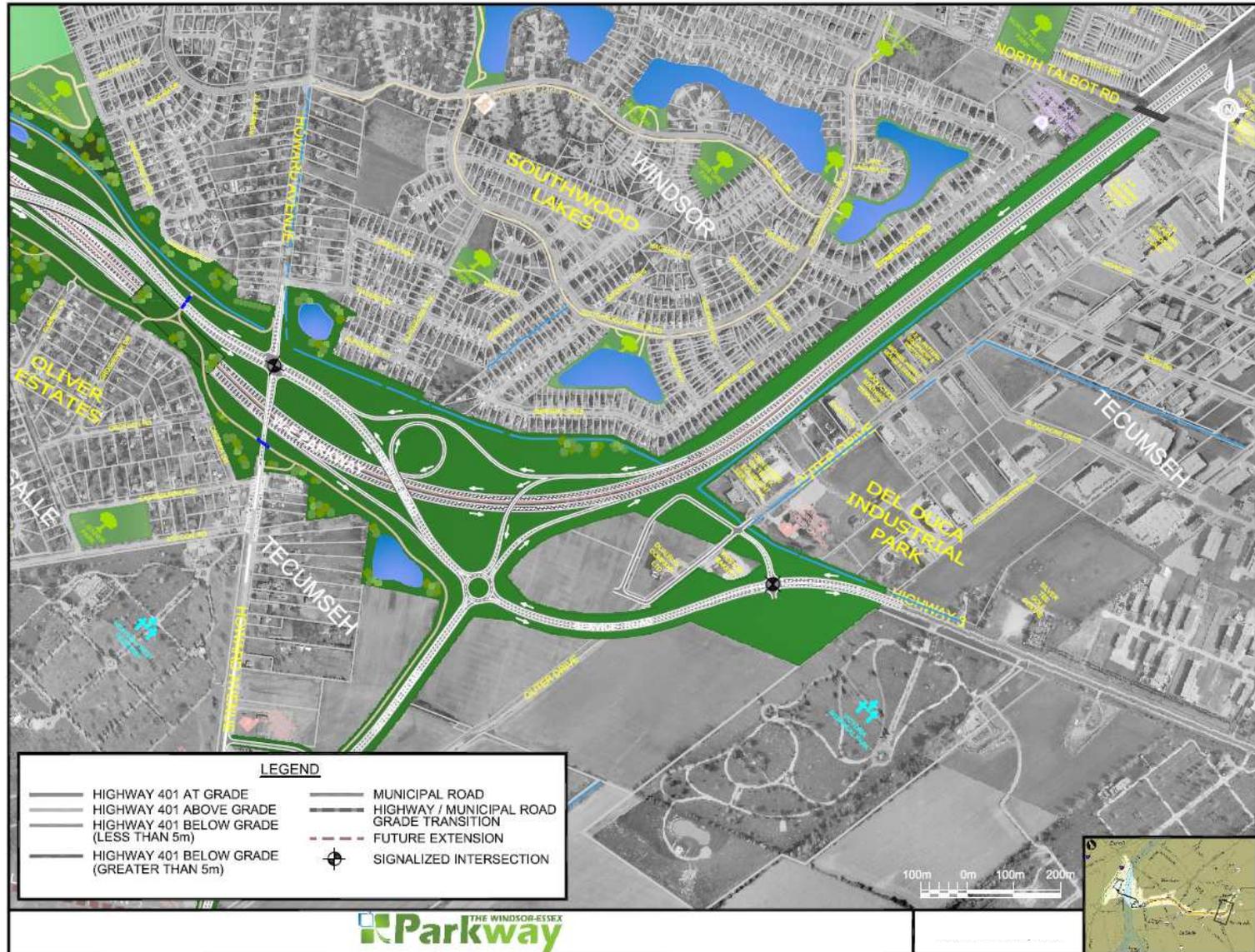
**EXHIBIT 1 CON'T. WINDSOR-ESSEX PARKWAY CONFIGURATION**



**EXHIBIT 1 CON'T. WINDSOR-ESSEX PARKWAY CONFIGURATION**



**EXHIBIT 1 CON'T. WINDSOR-ESSEX PARKWAY CONFIGURATION**



## 2.1.

### Mainline (Freeway) Analysis

The freeway section of the Windsor-Essex Parkway that carries the most traffic is between Labelle Street and Grand Marais Road in the eastbound direction, just downstream from the first on-ramp from the south Service Road. This section carries approximately 3,000 vehicles per hour during the PM peak hour (2035) with 23% commercial vehicles in the traffic flow, which corresponds to the Level of Service "C" operations. Level of service definitions are provided in Appendix A to this report. All other freeway mainline segments operate at LOS "C" or better. Minor reductions in speeds are anticipated at interchanges in the vicinity of off- and on-ramps.

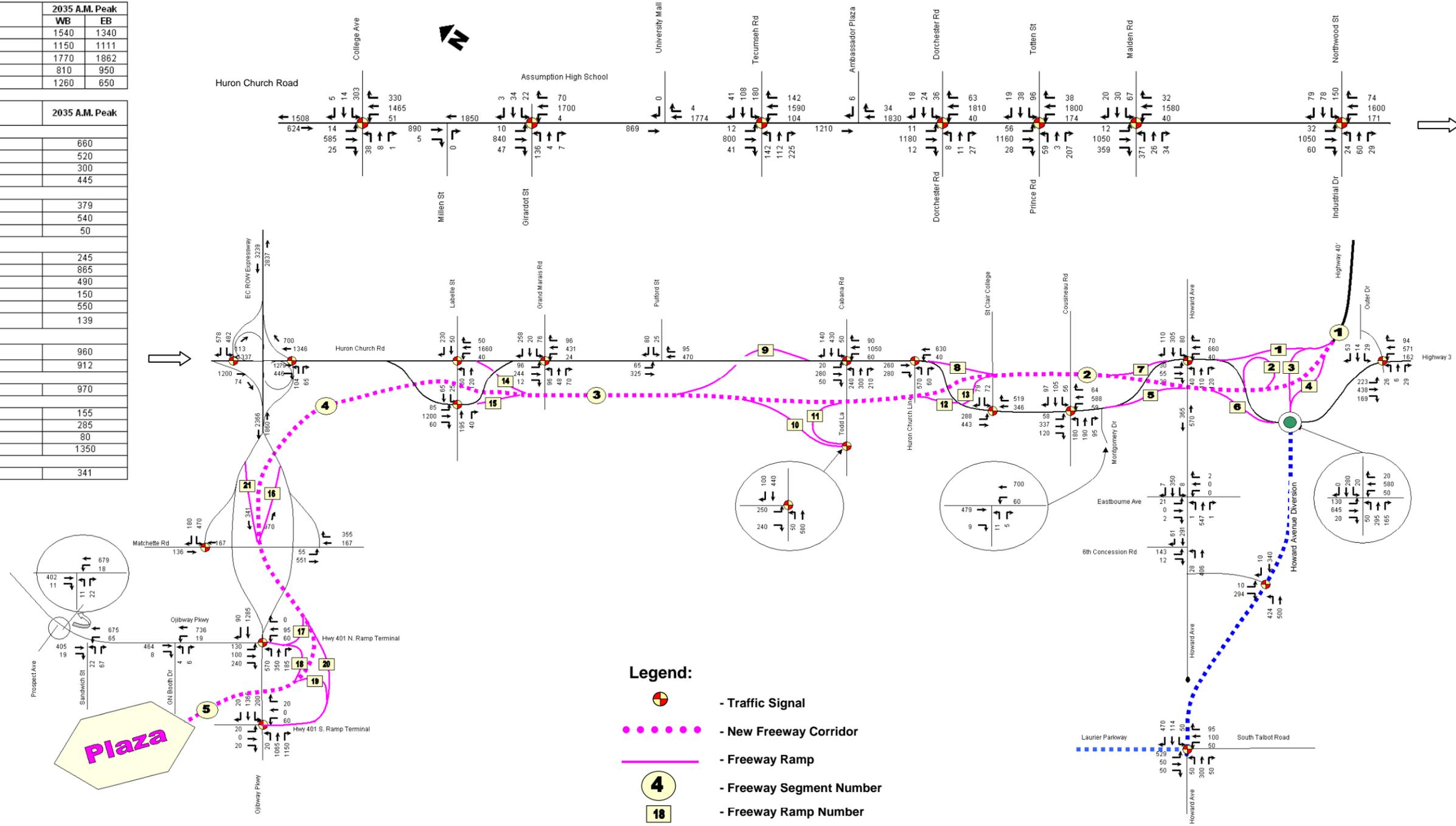
Overall, it is expected that traffic on the freeway will operate at free-flow speeds through the 2035 horizon year provided there are no delays at the border crossing.

Exhibits 2 and 3 illustrate 2035 AM and PM peak hour volumes for the Windsor-Essex Parkway.

**EXHIBIT 2. WINDSOR-ESSEX PARKWAY 2035 AM PEAK HOUR TRAFFIC VOLUMES**

HIGHWAY 401 Mainline	2035 A.M. Peak	
	WB	EB
1 E. of Hwy 3 merge/split	1540	1340
2 W. of Howard Ave	1150	1111
3 At Grand Marais Rd	1770	1862
4 E. of Malden Rd	810	950
5 To/From Canadian Plaza	1260	650

HIGHWAY 401 Ramps		2035 A.M. Peak
<b>Hwy 3 / Laurier</b>		
1 401 WB Off Ramp (to Hwy 3)		660
2 401 WB On Ramp		520
3 401 WB Off Ramp (to Laurier Parkway)		300
4 401 EB On Ramp		445
<b>At Howard Ave</b>		
5 401 EB On Ramp		379
6 401 EB Off Ramp		540
7 401 WB On ramp		50
<b>At Todd Lane/Cabana Rd</b>		
8 401 WB Off Ramp		245
9 401 WB On Ramp		865
10 401 EB Off Ramp (to Todd Lane)		490
11 401 EB On Ramp (from Todd Lane)		150
12 401 EB Off Ramp (to Highway 3)		550
13 401 EB On Ramp		139
<b>At Huron Church Rd</b>		
14 401 WB Off Ramp		960
15 401 EB On Ramp		912
<b>Hwy 401 to EC Row Expressway</b>		
16 401 EB Off Ramp		970
<b>Ojibway Pkwy IC</b>		
17 401 WB Off Ramp		155
18 401 WB On Ramp		285
19 401 EB Off Ramp		80
20 401 EB On Ramp		1350
<b>EC Row Expressway to Hwy 401</b>		
21 401 WB On Ramp		341

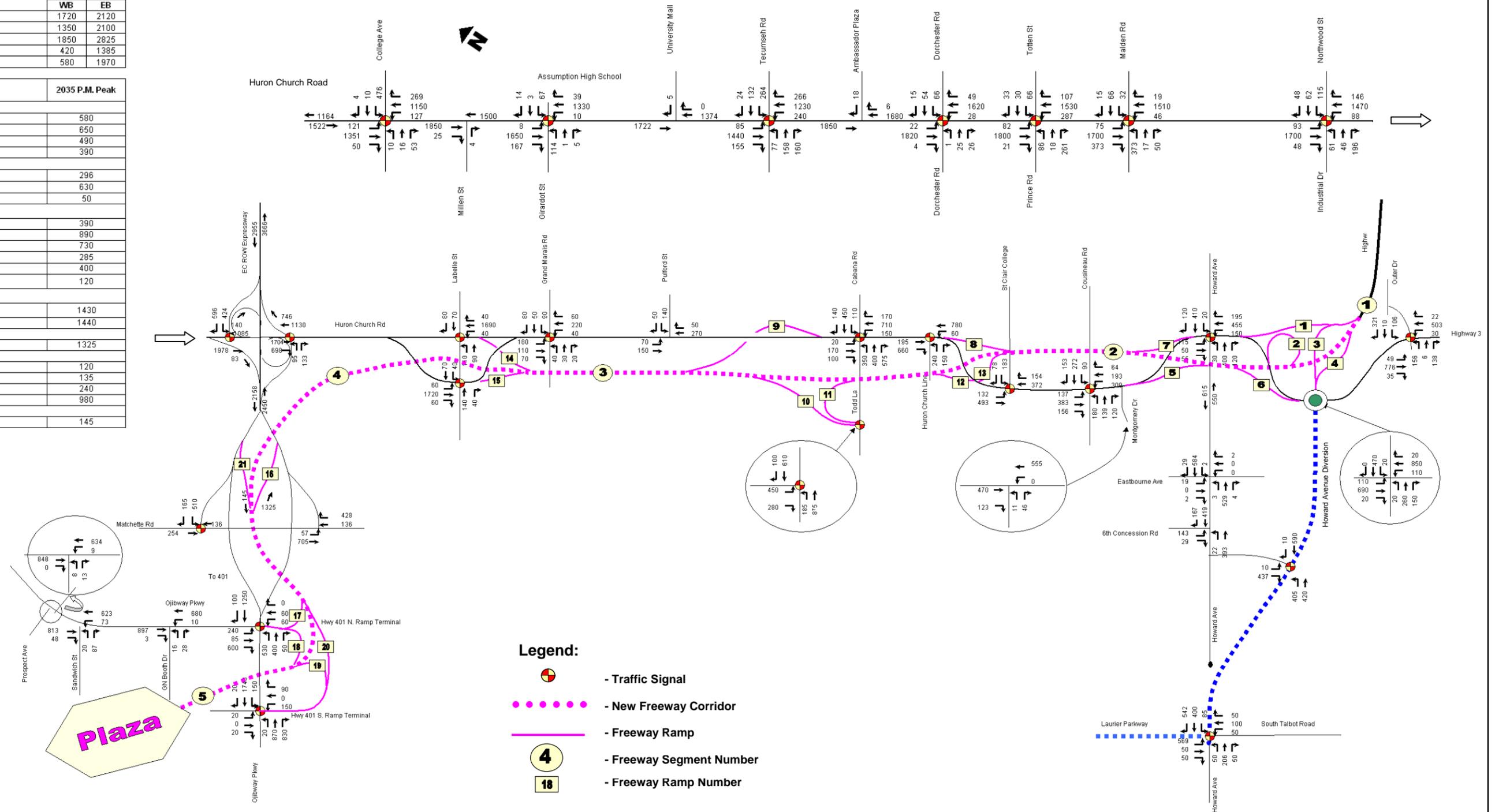


- Legend:**
- Traffic Signal
  - New Freeway Corridor
  - Freeway Ramp
  - Freeway Segment Number
  - Freeway Ramp Number

**EXHIBIT 3. WINDSOR-ESSEX PARKWAY 2035 PM PEAK HOUR TRAFFIC VOLUMES**

HIGHWAY 401 Mainline	2035 P.M. Peak	
	WB	EB
1 E. of Hwy 3 merge/split	1720	2120
2 W. of Howard Ave	1350	2100
3 At Grand Marais Rd	1850	2825
4 E. of Malden Rd	420	1385
5 To/From Canadian Plaza	580	1970

HIGHWAY 401 Ramps	2035 P.M. Peak	
	WB	EB
<b>Hwy 3 / Laurier</b>		
1 401 WB Off Ramp (to Hwy 3)	580	
2 401 WB On Ramp	650	
3 401 WB Off Ramp (to Laurier Parkway)	490	
4 401 EB On Ramp	390	
<b>At Howard Ave</b>		
5 401 EB On Ramp	296	
6 401 EB Off Ramp	630	
7 401 WB On Ramp	50	
<b>At Todd Lane/Cabana Rd</b>		
8 401 WB Off Ramp	390	
9 401 WB On Ramp	890	
10 401 EB Off Ramp (to Todd Lane)	730	
11 401 EB On Ramp (from Todd Lane)	285	
12 401 EB Off Ramp (to Highway 3)	400	
13 401 EB On Ramp	120	
<b>At Huron Church Rd</b>		
14 401 WB Off Ramp	1430	
15 401 EB On Ramp	1440	
<b>Hwy 401 to EC Row Expressway</b>		
16 401 EB Off Ramp	1325	
<b>Ojibway Pkwy IC</b>		
17 401 WB Off Ramp	120	
18 401 WB On Ramp	135	
19 401 EB Off Ramp	240	
20 401 EB On Ramp	980	
<b>EC Row Expressway to Hwy 401</b>		
21 401 WB On Ramp	145	

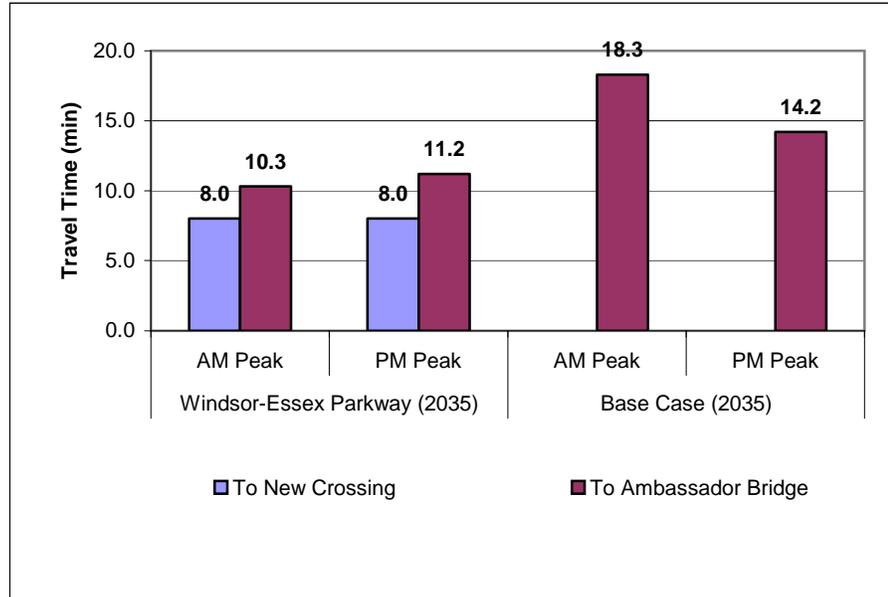


## 2.2. Travel Times and Speeds

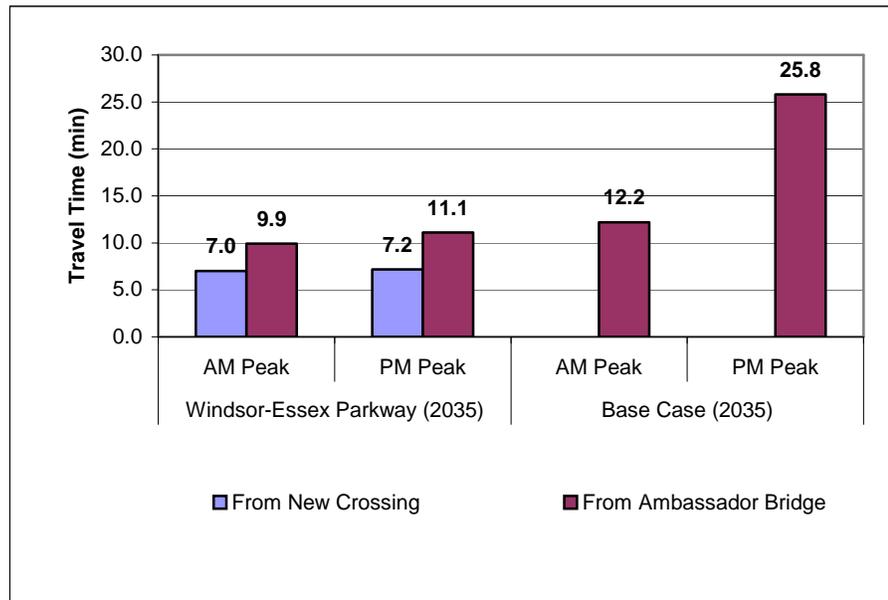
As previously mentioned in the report, the new facility (freeway corridor) is expected to operate at free-flow conditions between the Highway 401/Highway 3 interchange and the new plaza (assuming no delays at the border crossing). The VISSIM analysis (2035) demonstrated that travel times to the new crossing from east of the Highway 401/Highway 3 interchange would be in the 7 to 8-minute range during peak hours. Travel times to the Ambassador Bridge (with the new crossing in place) are anticipated to be in the 10 to 11-minute range during both AM and PM peak hours. The Base Case Synchro analysis (2035 horizon year without improvements) showed travel times to the Ambassador Bridge in the 18-minute range during the AM peak hour, while inbound traffic (Canada-bound) was found to take over 25 minutes to travel between the Ambassador Bridge and east of Howard Avenue in the PM peak hour (Source: *Level 2 Traffic Operations Analysis of Practical Alternatives, February 2008-revised December 2008*). It should be noted that with traffic operations in the Base Case scenario approaching/exceeding capacity by 2015, travel times in the ultimate horizon year are expected to further increase resulting in unstable traffic flows along the corridor. Exhibits 4 and 5 summarize a comparison of travel times between the Windsor-Essex Parkway and Base Case scenarios. Exhibits 6 and 7 illustrate speed profiles along the freeway corridor for the 2035 PM peak hour in the eastbound and westbound directions, respectively. The section of the Windsor-Essex Parkway between Huron Church Road and the plaza incorporates a core-collector system where EC Row Expressway lanes form eastbound and westbound collector lanes. EC Row Expressway will have two lanes in each direction between Huron Church Road and Ojibway Parkway based on 2035 traffic forecasts. It should also be noted that the existing posted speed on EC Row Expressway is 100 km/h while an 80 km/h posted speed is assumed for the freeway section between north of Labelle Street and the new plaza. It is recommended to reduce the speed limit on EC Row Expressway (collector lanes) to 80 km/h between Huron Church Road and Ojibway Parkway.

Average speeds (by direction) along the Service Road have been obtained from the VISSIM model. As previously noted, existing travel patterns are such that traffic peaks in the westbound/northbound direction during the AM peak hour, and in the southbound/eastbound direction in the PM peak hour. This travel pattern is expected to remain in the future, with PM peak traffic volumes in the southbound/eastbound direction being the highest. Exhibits 8 and 9 illustrate speed profiles for the Service Road. Average speeds generally decrease through signalized intersections along the Service Road.

**EXHIBIT 4. TRAVEL TIME COMPARISON: WESTBOUND/NORTHBOUND FROM EAST OF THE HIGHWAY 3 INTERCHANGE TO THE NEW CROSSING AND THE AMBASSADOR BRIDGE**

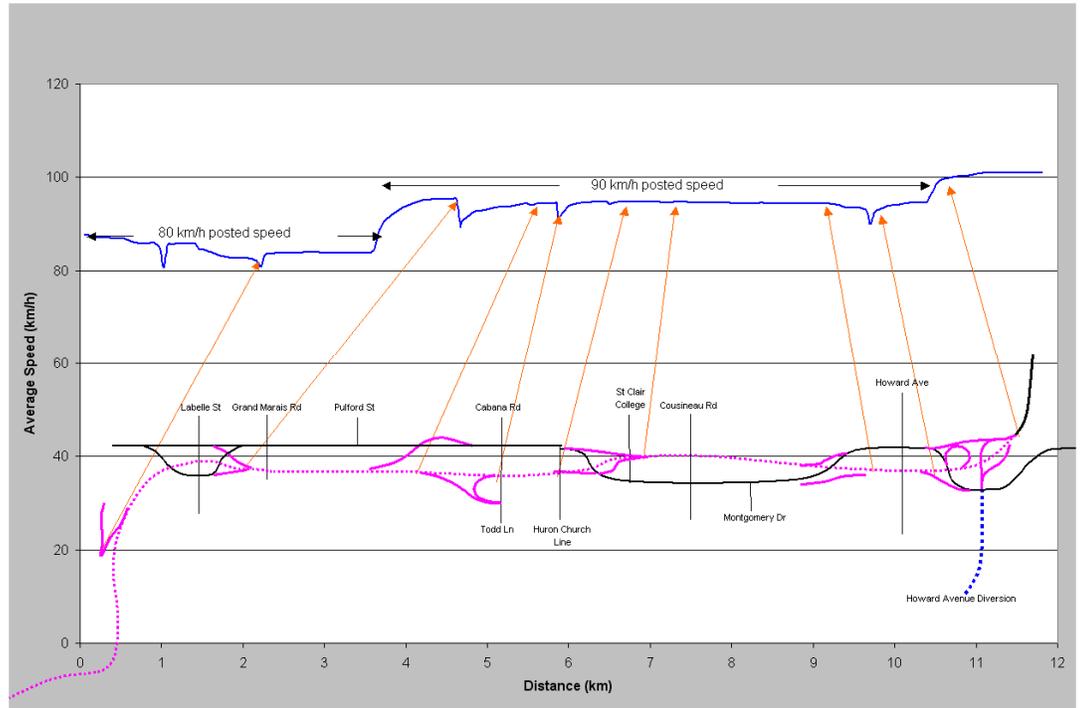


**EXHIBIT 5. TRAVEL TIME COMPARISON: EASTBOUND/SOUTHBOUND FROM THE NEW CROSSING AND THE AMBASSADOR BRIDGE TO EAST OF THE HIGHWAY 3 INTERCHANGE**

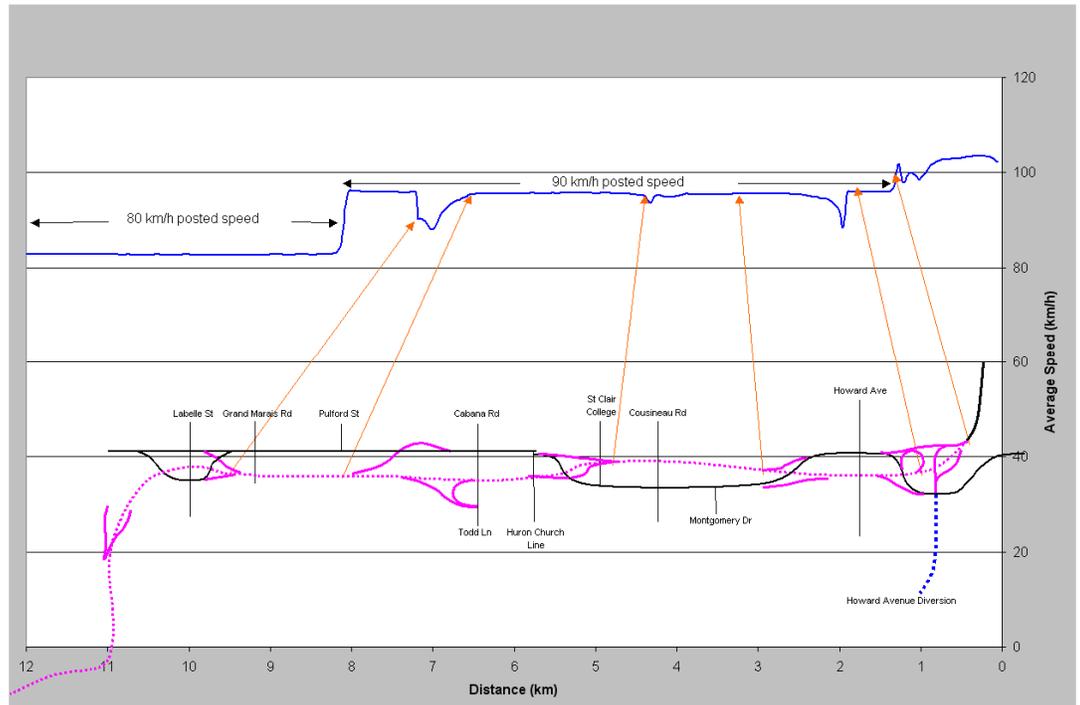


Note: Travel times for the Base Case scenario were obtained from the Synchro analysis

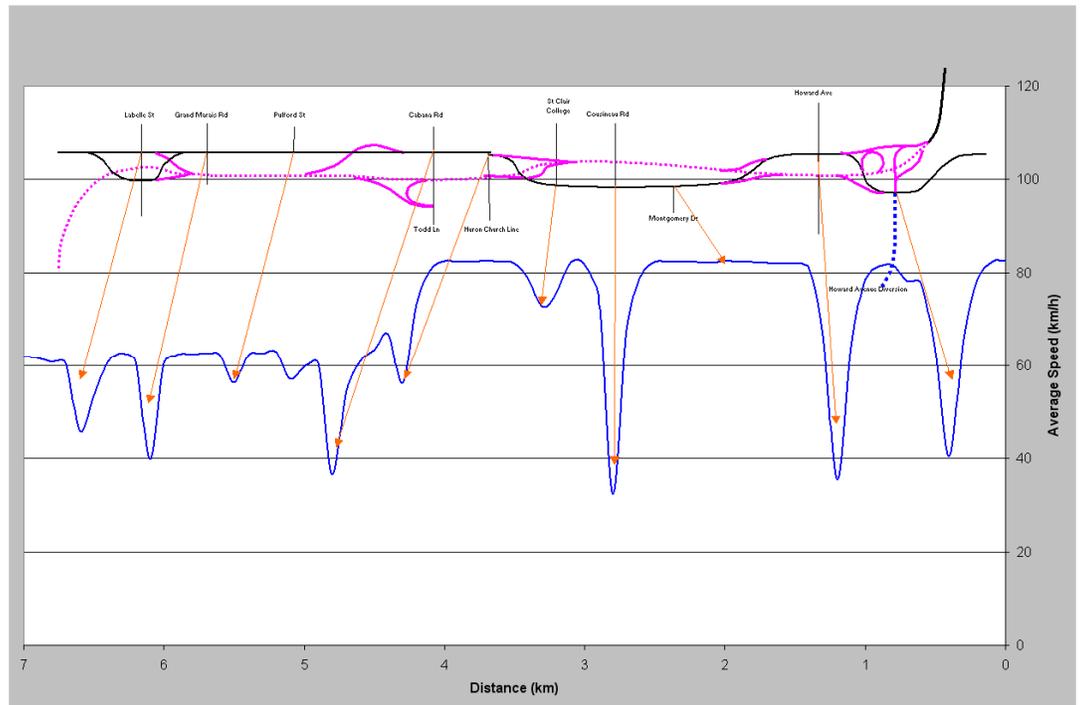
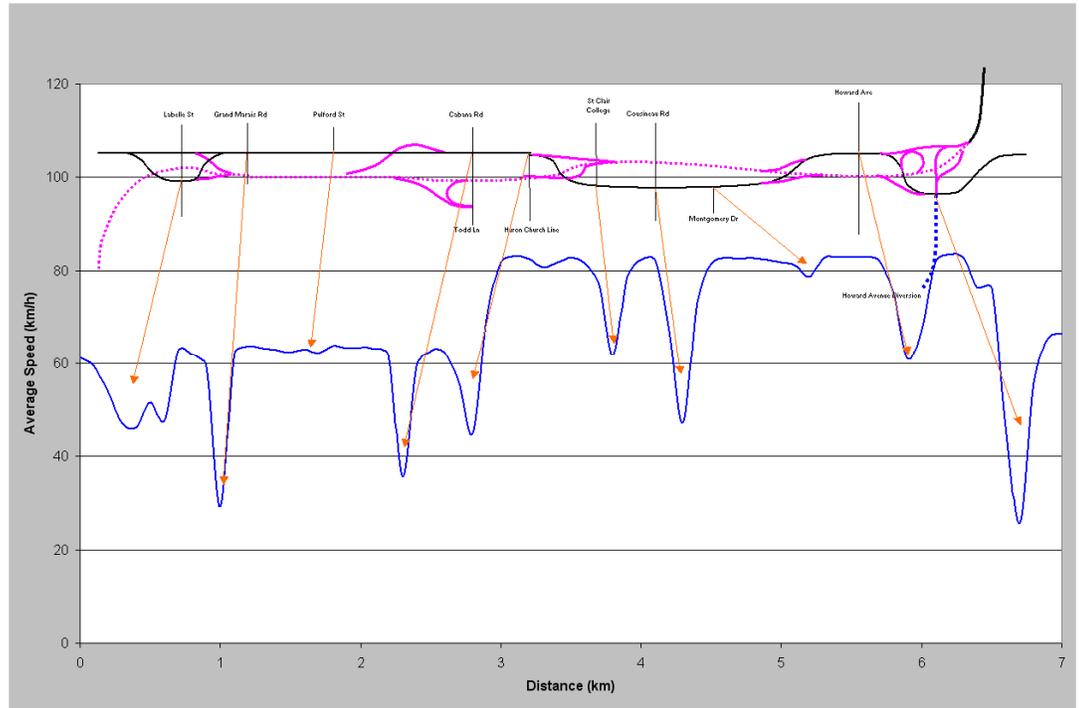
**EXHIBIT 6. 2035 PM PEAK HOUR FREEWAY EB SPEED PROFILE**



**EXHIBIT 7. 2035 PM PEAK HOUR FREEWAY WB SPEED PROFILE**



**EXHIBIT 8. 2035 PM PEAK HOUR SERVICE ROAD SB/EB SPEED PROFILE**



## 2.3.

### EXHIBIT 9. 2035 PM PEAK HOUR SERVICE ROAD NB/WB SPEED PROFILE

## Weaving Analysis

The following weaving locations along the freeway corridor were assessed:

- Westbound direction – Todd Lane to Labelle Street
- Eastbound direction – Labelle Street to Todd Lane
- Eastbound direction – Todd Lane to Huron Church Line
- Eastbound direction – Montgomery Drive to Highway 3
- Westbound direction – Howard Avenue to St. Clair College
- Eastbound direction – Ojibway Parkway to EC Row Expressway
- Westbound direction – EC Row Expressway to Ojibway Parkway

The weaving analysis was undertaken using the Highway Capacity Software (HCS) and VISSIM micro-simulation in order to evaluate measures of effectiveness including weaving speeds, weaving density, and Level-of-Service. The PM peak hour traffic volumes for the 2035 horizon year were used in the analysis as it was determined to be the worst of the two peak periods except for the section between EC Row Expressway and Ojibway Parkway (westbound) as AM peak hour traffic volumes is used.

Conservatively, it was assumed that the on-ramp to off-ramp non-weaving movement (B-D) is minimal (refer to Exhibit 10). This assumption has been applied to all weaving segments except for the section between Todd Lane and Labelle Street (westbound), as the off-ramp traffic at Labelle Street comprises of freeway traffic and traffic entering the system at Pulford Street (local traffic). Please note that the truck equivalent factor (pce) used in the analysis is 2.5, with a peak-hour factor of 1.00.

Since the maximum weaving segment length that can be set in HCS is 750 metres, it was used in the analysis for weaving sections that are longer than 750 metres in length, in order to have a conservative measure of weaving activities. The results of the weaving analysis are summarized in Table 1. The weaving analysis outputs are provided in Appendix B.

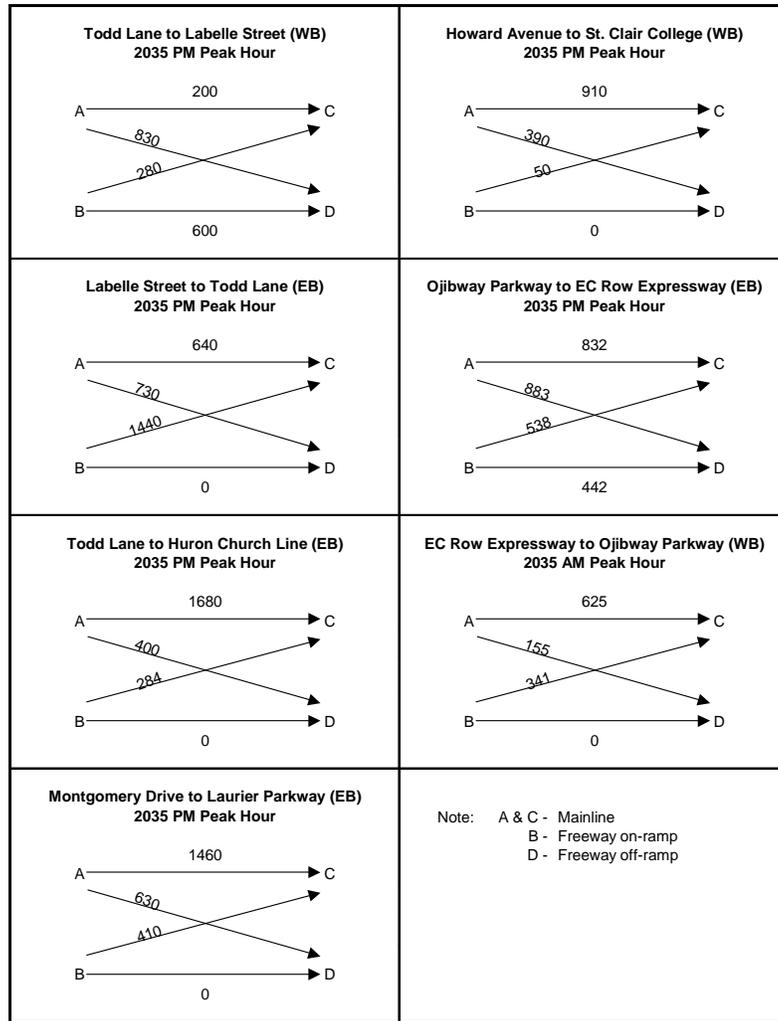
**TABLE 1. WINDSOR-ESSEX PARKWAY WEAVING ANALYSIS MEASURES OF EFFECTIVENESS (2035 PM PEAK HOUR)**

	<i>Weaving Segment Length, L</i>	<i>Weaving Segment Speed, S</i>	<i>Weaving Segment Density, D</i>	<i>LOS</i>
<i>WB (Todd Lane to Labelle Street)</i>	475 m	79.56 km/h	6.59 pc/km/ln	A
<i>EB (Labelle Street to Todd Lane)</i>	990 m	67.84 km/h	12.07 pc/km/ln	B
<i>EB (Todd Lane to Huron Church Line)</i>	750 m	104.40 km/h	7.28 pc/km/ln	A
<i>EB (Montgomery Dr to Highway 3)</i>	490 m	87.55 km/h	8.90 pc/km/ln	B
<i>WB (Howard Ave to St. Clair College)</i>	1130 m	107.05 km/h	5.30 pc/km/ln	A
<i>EB (Ojibway Pkwy to EC Row Expressway)</i>	800 m	70.35km/h	14.02 pc/km/ln	B
<i>WB (EC Row Expressway to Ojibway Pkwy)</i>	635 m	86.97km/h	4.83 pc/km/ln	A

The weaving analysis undertaken in HCS illustrated that the freeway will operate at good levels of service (LOS A / B) during the PM peak hour by the 2035 horizon year. The average speeds through the weaving segments are generally acceptable. The section between Labelle Street and Todd Lane (eastbound direction) and the section between Ojibway Parkway and EC Row Expressway were found to have weaving speeds around 70 km/h. Since the actual weaving length at this location is 990 and 800 metres, respectively, as opposed to 750 metres that was actually used in the analysis, speeds along this segment are expected to be higher, which has also been confirmed by the VISSIM microsimulation analysis (Exhibits 6 and 7 illustrate speed profiles for the freeway corridor in the eastbound and westbound directions, respectively). It is also noted that the posted speed on the freeway between Ojibway Parkway and Labelle Street is 80 km/hr as opposed to 100 km/hr in other weaving sections.

Based on the analysis results, the freeway corridor (Windsor-Essex Parkway) is expected to operate at good levels of service under the ultimate 2035 traffic conditions. No additional improvements along the mainline are required.

**EXHIBIT 10. WEAVING VOLUME DIAGRAMS (2035 PM PEAK HOUR)**



**2.4. Intersection Analysis**

All key intersections were analyzed using the VISSIM software package. It should be noted that traffic volumes on Huron Church Road north of EC Row Expressway in the Windsor-Essex Parkway are expected to be similar to other Practical Alternatives previously assessed as part of the *Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives (February 2008-revised December 2008)*. Changes in travel patterns/operations are expected along the freeway, and on the Service Road south of EC Row Expressway. As such, the intersection capacity analysis was undertaken for all key intersections south of EC Row Expressway. The results of the analysis are summarized in Tables 2 and 3.

**TABLE 2. WINDSOR-ESSEX PARKWAY AM PEAK HOUR & DIRECTION  
 (WESTBOUND/NORTHBOUND) LEVEL OF SERVICE, SERVICE ROAD (2035)**

Intersection	LOS, Peak Through Movement (WB/NB)	Delay per vehicle (s), Peak Through Movement (WB/NB)	Overall Intersection LOS
Labelle	B	11.1	B
Grand Marais	A	6.9	B
Pulford*	A	0	A
Cabana	C	29.1	B
Huron Church Line	B	11.9	B
St Clair	A	1.8	A
Cousineau	B	11.8	B
Montgomery*	A	0	A
Howard	B	11.0	B
Highway 3**	A	5.4	A
Matchette / E-N/S Ramp	WBL – B	12.1	B
Matchette / N/S-E Ramp*	SBL – A	3.9	A
Ojibway / W-N/S Ramp	WBL – D	37.8	B
Ojibway / E-N/S Ramp	EBL – D	45.2	B

 - measures of effectiveness are stated for critical movements

\* - unsignalized intersection

\*\* - roundabout

**TABLE 3. WINDSOR-ESSEX PARKWAY PM PEAK HOUR & DIRECTION  
(SOUTHBOUND/EASTBOUND) LEVEL OF SERVICE, SERVICE ROAD (2035)**

Intersection	LOS, Peak Through Movement (SB/EB)	Delay per vehicle (s), Peak Through Movement (SB/EB)	Overall Intersection LOS
Labelle	B	16.1	B
Grand Marais	A	7.5	B
Pulford*	A	0	A
Cabana	B	17.6	B
Huron Church Line	A	8.5	A
St Clair	A	5.8	A
Cousineau	B	15.2	B
Montgomery*	A	0	A
Howard	B	9.5	B
Highway 3**	A	8.9	A
Matchette / E-N/S Ramp	WBL – B	13.3	B
Matchette / N/S-E Ramp*	SBL – A	5.8	A
Ojibway / W-N/S Ramp	WBL – C	31.8	B
Ojibway / E-N/S Ramp	NBL – D	44.2	C

- measures of effectiveness are stated for critical movements

\* - unsignalized intersection

\*\* - roundabout

All intersections are expected to operate at LOS C or better during both AM and PM peak hours through the 2035 horizon year.

### *Ojibway Parkway Interchange*

Both ramp terminal intersections were found to operate at LOS C or better during both peak hours in 2035. The interchange configuration incorporates a double left turn lane on the northbound approach at the north ramp terminal intersection. The previous analysis (*Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives, February 2008-revised December 2008*) showed that this approach with a single left turn lane would experience long delays and traffic queues. The southbound volume on E.C. Row Expressway ranges between 1,200 and 1,300 vehicles per hour during peak hours by the 2035 horizon year. The northbound left turn was found to carry over 500 vehicles per hour during both AM and PM peak hours. By providing the double left turn lane on the

northbound approach and reducing the amount of green time to accommodate the move, southbound through traffic would also experience lesser degree of delay as a result. It is also recommended to eliminate the channelized right turn from the eastbound approach (Ojibway Parkway) at the north ramp terminal intersection to eliminate the potential weave between the two signalized intersections/ramp terminals. Exhibit 11 illustrates a 3-D snap shot of the interchange from the VISSIM model. Vehicles on this snapshot are colour-coded by speed: from green (free-flow) to magenta (stopped).

**EXHIBIT 11. VISSIM SNAPSHOT: OJIBWAY PARKWAY INTERCHANGE - FACING NORTHWEST (2035 PM PEAK HOUR)**



***Service Road/Freeway Ramps (Labelle Street to Grand Marais Road)***

The distance between the freeway off-ramp and the intersection at Labelle Street (along the northbound lanes of the Service Road) is approximately 150 metres, which is similar to the Practical Alternative 1B. The previously identified concern was the potential weave between the north Service Road traffic destined to Bethlehem Avenue (left turn at the intersection), and through traffic from the freeway. As previously noted, potential for weaving on this section of the northbound Service Road (between freeway off-ramp traffic and the Service Road traffic approaching the intersection) is low due to relatively low traffic demand to Labelle Street and Bethlehem Road (left and right turns at the intersection).

The analysis showed 95<sup>th</sup> percentile queues on the northbound approach at the Labelle Street/Service Road intersection in the 60-metre range during the peak hours. Weaving was not identified to be a concern from the modeling analysis. Exhibit 12 illustrates a snapshot of the northbound Service Road/Labelle Street intersection from the VISSIM model.

In addition, Huron Church Road splits south of EC Row Expressway into two service roads (northbound and southbound). This horizontal alignment forms two intersections on Labelle Street/Bethlehem Avenue (can be seen in Exhibit 12). There are two alternative locations for the southbound left-turn lane (traffic destined to Labelle Street) at either the north Service Road/Labelle Street or south Service Road/Bethlehem Avenue intersections. The two alternatives have been reviewed, and the analysis results revealed that the southbound left-turn in the former scenario would require an additional signal phase to accommodate the inbound left turning traffic from north Service Road to Labelle Street. This could further increase traffic queues on north Service Road toward the freeway off-ramp. Therefore, it would be preferable to provide the southbound left-turn lane at the intersection with Bethlehem Avenue (on south Service Road) to reduce the potential for queues on north Service Road. A detailed discussion is also provided in Section 3.3 of this report.

### EXHIBIT 12. VISSIM SNAPSHOT: SERVICE ROAD / LABELLE STREET INTERSECTION - FACING SOUTHEAST (2035 PM PEAK HOUR)

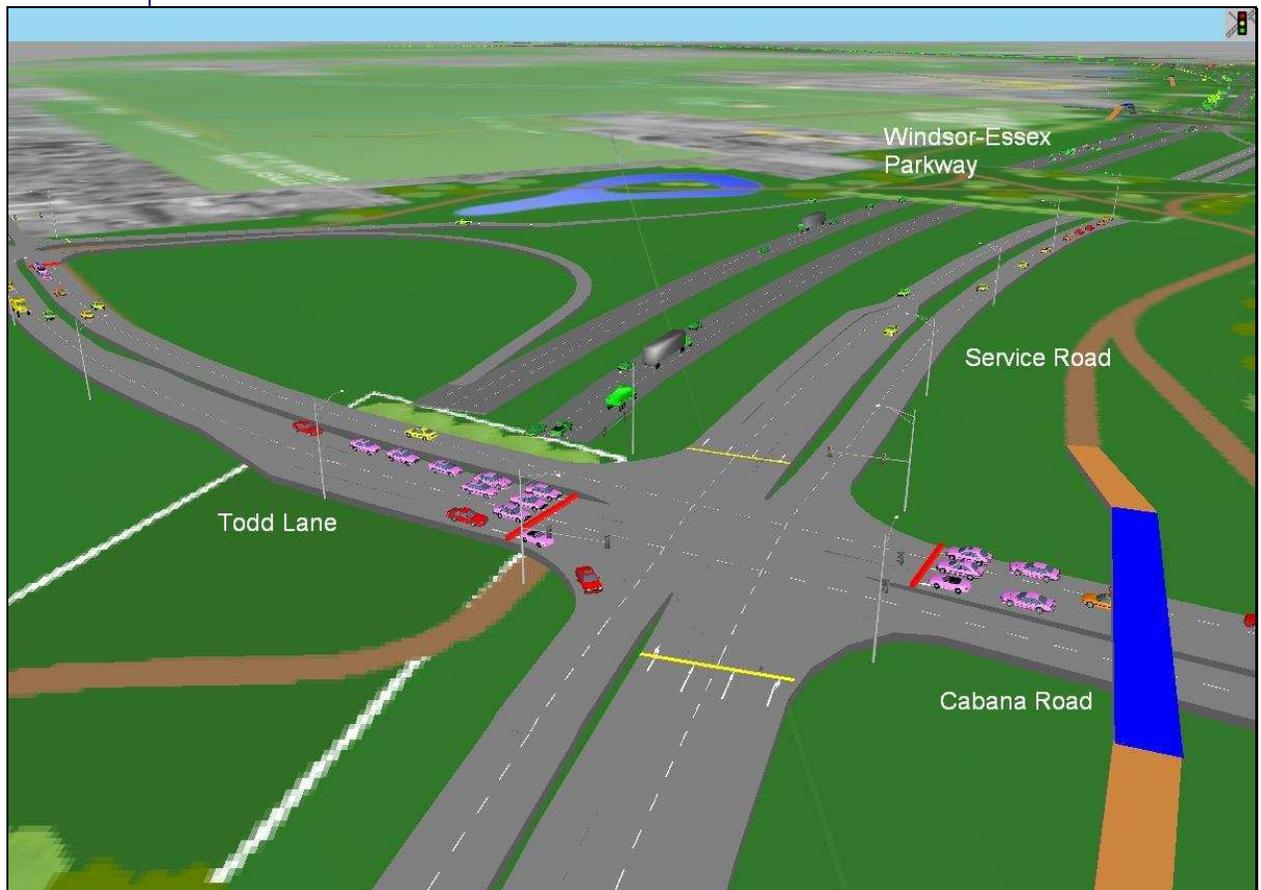


#### *Todd Lane/Cabana Road*

Numerous operational concerns were identified at this location during the preparation of the *Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives (February 2008-revised December 2008)*. The proposed configuration in the Windsor-Essex Parkway includes a series of on- and off-ramps to and from the freeway in the vicinity of the Todd Lane interchange. A directional eastbound off-ramp to Todd Lane will accommodate traffic destined to Todd Lane as well as Huron Church Line and Cabana Road, while the off-ramp further downstream will accommodate traffic destined to St. Clair College, Windsor Crossing Outlet Mall and Cousineau Road. This provides a relief to the ramp terminal intersection on Todd Lane as well as the intersection of Cabana Road and the Service Road. In addition, a loop on-ramp to the freeway corridor in the eastbound direction is provided at the Todd Lane/Cabana Road interchange. For traffic destined to the freeway corridor in the westbound direction, an on-ramp is provided off the Service Road just west of Cabana Road. The VISSIM analysis revealed good operations at both the ramp terminal

intersection with Todd Lane, and the intersection of the Service Road and Cabana Road. Exhibit 13 illustrates a snapshot of off-ramp terminal intersection at Todd Lane/Cabana Road. Traffic queuing at this location is discussed in the following chapter.

**EXHIBIT 13. VISSIM SNAPSHOT: FREEWAY TO TODD LANE/CABANA ROAD OFF-RAMP - FACING NORTHWEST (2035 PM PEAK HOUR)**



***Cousineau Road/Service Road***

Based on the VISSIM analysis, this intersection was found to operate at LOS B during both AM and PM peak hours (2035) without any operational concerns.

***St. Clair College Main Entrance/Service Road***

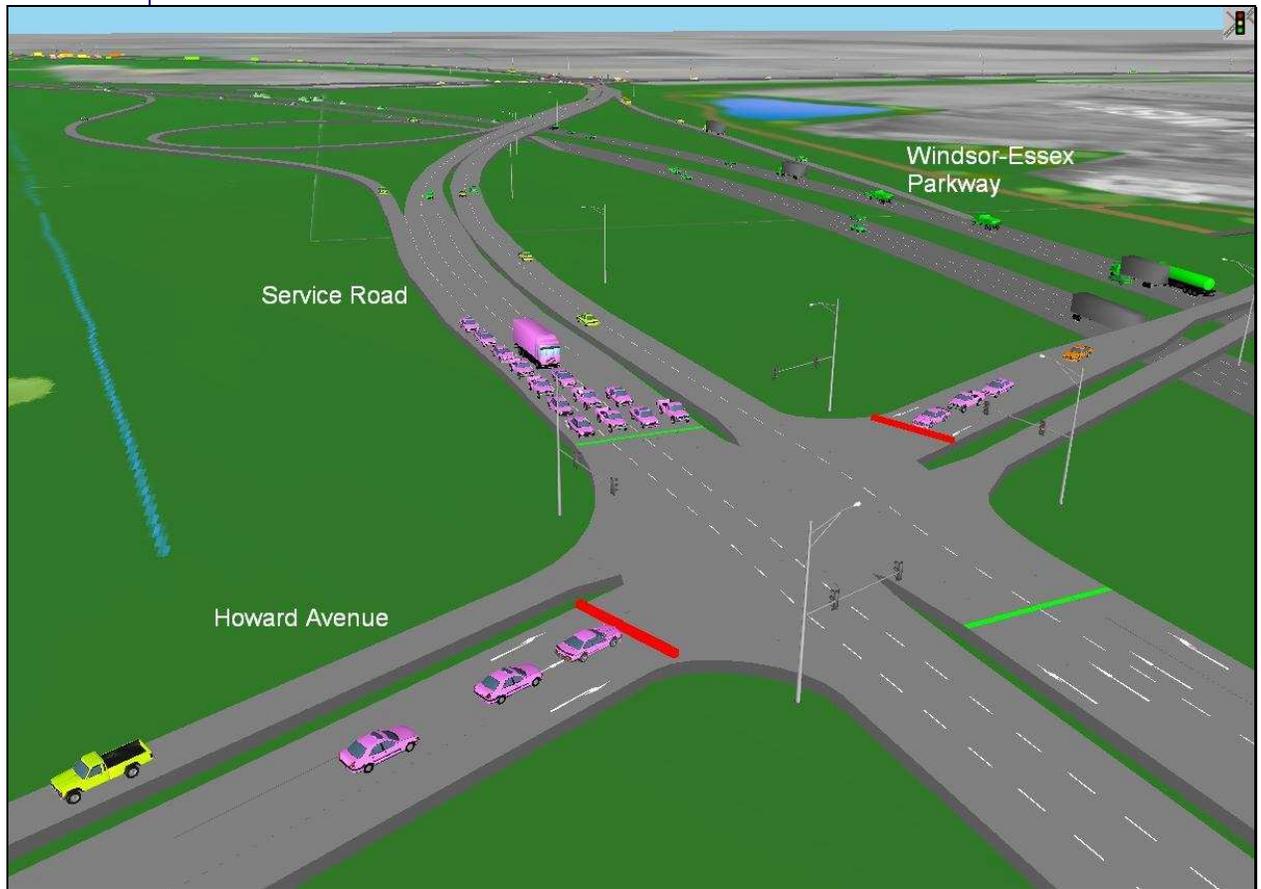
Operational concerns were identified at this location in the Practical Alternatives analysis (*Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives, February 2008-revised December 2008*) for most of the Practical Alternatives. The previously identified weaving issues have been addressed by eliminating the successive off- and on-ramp from and to the freeway at this location. Access to St. Clair College is provided via a "T" intersection at the Service Road. The intersection was found to operate at good levels of

service during both AM and PM peak hours (2035).

### *Howard Avenue/ Service Road*

Although there is no interchange with the freeway at Howard Avenue, freeway access from/to Howard Avenue is provided in the vicinity of the Howard Avenue/Service Road intersection. The Howard Avenue/Service Road intersection was found to operate at good levels of service during peak hours (LOS B). Potential for a weave was identified on the westbound approach at the Howard Avenue/Service Road intersection between the Highway 401 off-ramp traffic destined to travel south on Howard Avenue (left turn at the intersection) and through traffic on the Service Road. This weave diminishes with the Howard Avenue diversion in place as traffic destined to LaSalle from Highway 401 would be diverted to the Howard Avenue diversion. In order to further reduce the likelihood of a weaving problem occurrence, the westbound right turn channelization (Highway 401 off-ramp) should be removed to increase the weaving distance between the off-ramp and the intersection to approximately 150 metres. Howard Avenue is proposed to remain two-lanes wide under the ultimate horizon. Traffic queues at this location are discussed in the following chapter.

### EXHIBIT 14. VISSIM SNAPSHOT: SERVICE ROAD / HOWARD AVENUE INTERSECTION - FACING SOUTH/EAST (2035 PM PEAK HOUR)



#### *Highway 3/Howard Avenue Diversion Roundabout*

As previously noted, the Windsor-Essex Parkway has been designed to accommodate a connection to the future Laurier Parkway via the Howard Avenue diversion. The Highway 401/Highway 3/Howard Avenue diversion junction was analyzed under the ultimate traffic and geometric conditions. As an alternative to a traffic signal control, a roundabout design was developed and assessed. The analysis was performed using both VISSIM (micro-simulation) and ARCADY (Assessment of Roundabout Capacity and Delay) – a static analysis software for roundabout assessments. The following provides a brief summary of the analysis results.

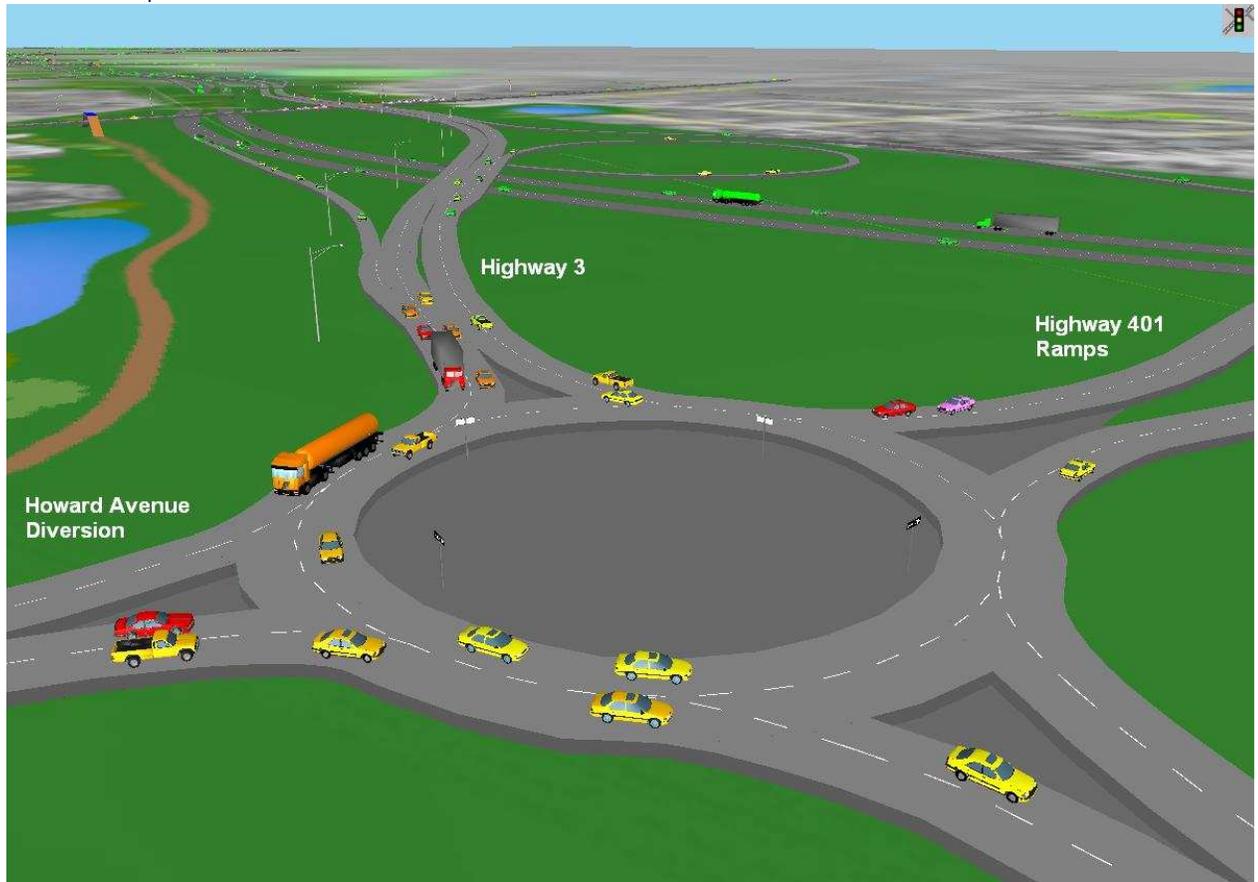
The proposed roundabout has an inscribed diameter of 65 metres, and a two-lane cross-section. Under this configuration, the Service Road forms east and west approaches/legs to/from the roundabout. The north leg (southbound approach) being the Highway 401 ramps, as the Howard Avenue diversion forms the south leg of the roundabout (Exhibit 15).

The roundabout was found to operate well with an overall Level-of-Service A during the PM peak hour. The 95<sup>th</sup> percentile queue identified in VISSIM for the southbound approach in the PM peak hour (Highway 401 westbound ramps) was 21 metres with a two-lane off-ramp (second lane is developed upstream from the roundabout), with the average vehicular delay for the southbound approach of 9.5 second. Under the traffic signal control, the traffic analysis revealed that the intersection will operate with an overall Level-of-Service B, and an average vehicular delay of 19.0 seconds during the PM peak hour in 2035.

In addition, and for comparison purposes, an assessment of the proposed roundabout at Highway 401 / Highway 3 was undertaken using ARCADY. Similar operation performance measures such as queue lengths and delays during the 2035 PM peak hour were measured in comparison with the results from VISSIM.

The results of the ARCADY assessment indicate that the roundabout will be operating at an excellent level-of-service with minimal delays and queues during the PM peak hour. Both the VISSIM and ARCADY analyses confirmed that with the dual-lane off-ramp from Highway 401 westbound, the traffic roundabout will be operating below capacity by 2035.

### EXHIBIT 15. VISSIM SNAPSHOT: HIGHWAY 3 / HOWARD AVENUE DIVERSION ROUNDBABOUT - FACING NORTH (2035 PM PEAK HOUR)



#### *Traffic Signal Warrants*

Traffic signals are not warranted at the Pulford Street/Service Road intersection, as well as at the Montgomery Drive intersection with Service Road by the ultimate horizon year of 2035. Traffic signals are warranted at Service Road intersections with Labelle Street, Bethlehem Avenue, Grand Marais Road, and Outer Drive connection, future Laurier Parkway/Howard Avenue, and Howard Avenue diversion/existing Howard Avenue connection. Traffic signals are also warranted at the E-N/S EC Row Expressway ramp terminal at Matchette Road. All other study area intersections where traffic signal control currently exists will remain signalized. Signal warrant outputs are provided in Appendix C.

## 2.5. Queue Lengths

Traffic queue lengths (95<sup>th</sup> percentile) were obtained from the VISSIM analysis, and are summarized in Table 4. The queue lengths in metres were then converted to number of passenger car equivalents based on an assumption that the length of one PCE and the space between adjacent vehicles is 7.5 metres.

**TABLE 4. HURON CHURCH ROAD/SERVICE ROAD/HIGHWAY 3 CORRIDOR QUEUE LENGTHS, AM AND PM PEAK HOURS (2035)**

Intersection	AM (Westbound/Northbound)		PM (Southbound/Eastbound)	
	Queue Length Metres (PCE)	Distance from Upstream Intersection	Queue Length Metres (PCE)	Distance from Upstream Intersection
Labelle	63 (9)	480 m	225 (30)	350 m
Grand Marais	7 (1)	580 m	24 (3)	555 m
Pulford	0 <sup>1</sup>	680 m	0 <sup>1</sup>	580 m
Cabana	84 (11)	440 m	20 (3)	680 m
Huron Church Line	34 (5)	1,010 m	13 (2)	440 m
St Clair	6 (1)	500 m	20 (3)	1,010 m
Cousineau	21 (3)	765 m	25 (3)	500 m
Howard	34 (5)	740 m	6 (1)	765 m
Highway 3 <sup>2</sup>	17 (3)	-	39 (6)	740 m
Outer Drive	37 (5)	-	41 (6)	605 m
Howard Ave Diversion / Howard Ave Connection	18 (3)	405 m	40 (6)	470 m
Laurier Parkway & Howard Ave Diversion	30 (4)	-	90 (12)	405 m
Matchette/E-N/S Ramp	24 (3)	85 m	33 (5)	-
Matchette/N/S-E Ramp	0 <sup>1</sup>	-	SBL – 6 (1) <sup>1</sup>	85 m
EC Row/Ojibway	70 (10)	400 m	137 (19)	-
Ojibway/Broadway	93 (13)	-	122 (16)	400 m

<sup>1</sup> Unsignalized Intersection (T-intersection – traffic signal is not warranted)

<sup>2</sup> Roundabout

### *Ojibway Parkway Interchange*

Based on the VISSIM analysis results and forecasted traffic volumes, 95<sup>th</sup> percentile traffic queues on the northbound approach at the E-N/S ramp terminal (EC Row Expressway / Ojibway Parkway / Broadway Street) will be in the order of 70 metres (northbound left turn). The 95<sup>th</sup> percentile queue on the southbound approach at the W-N/S ramp terminal (Ojibway Parkway / occurs during the PM peak hour, and were calculated at 122 metres (southbound through). The distance between the two ramp terminal intersections is 400 metres. Traffic queues at one ramp terminal intersection are not anticipated to extend to the ramp terminal upstream.

### *Service Road/ Freeway Ramps (Labelle Street to Grand Marais Road)*

The freeway E-N off-ramp to Huron Church Road in the Windsor-Essex Parkway is expected to carry up to 1,430 vehicles per hour during the PM peak hour. This translates to a 63-metre queue (95<sup>th</sup> percentile) on the northbound approach (off-ramp) at the north Service Road/Labelle Street intersection. The distance between the intersection and the Highway 401 off-ramp is approximately 150 metres. The 95<sup>th</sup> percentile queue at the intersection is not anticipated to extend to the off-ramp.

Eastbound traffic queues on Labelle Street at the north Service Road/Labelle Street intersection are not anticipated to extend to the Bethlehem Avenue intersection with south Service Road during peak periods (2035). The 95<sup>th</sup> percentile queue on this approach was calculated at 21 metres (AM peak hour). The 95<sup>th</sup> percentile traffic queue on the westbound approach at the south Service Road/Bethlehem Avenue intersection was determined to be in the 14-metre range. The distance between the two intersections is approximately 110 metres.

Several alternatives for the northbound connection from the freeway to Huron Church Road at Labelle Street have been analyzed, including the option to provide a two-lane exit ramp (refer to Section 3.4). The Study Team has undertaken additional traffic analysis to review the operations in this area and it was determined that this area will operate at an acceptable level of service beyond 2035 with a single lane off-ramp. Nevertheless, the possibility of widening the exit ramp to two lanes will be considered as part of the preliminary design. This would provide future flexibility if traffic growth exceeds expectations.

### *Todd Lane/Cabana Road*

Traffic queues on the eastbound approach at the Service Road/Cabana Road intersection are not anticipated to extend to the ramp terminal intersection at Todd Lane. Similarly, westbound traffic queues at the Todd Lane ramp terminal are not anticipated to extend to the Cabana Road/Service Road intersection. Traffic queues on the northbound approach (Service Road) at this intersection will be in the 84-metre range during the PM peak hour. It should be noted that the distance between the Cabana Road/Service Road intersection and the upstream intersection at Huron Church Line is approximately 480 metres. Therefore, anticipated northbound traffic queues on the Service Road at Cabana Road will not extend to the Huron Church Line intersection.

### *Howard Avenue/Service Road*

The westbound traffic queue at the Howard Avenue/Service Road intersection was calculated to be approximately 34 metres during the PM peak hour (2035). The distance between this intersection and the Highway 401 off-ramp is approximately 150 metres. Traffic queues are not anticipated to extend to the Highway 401 off-ramp. Traffic queues on other approaches were found not to exceed 85 metres.

### *Service Road / Howard Avenue Diversion Roundabout*

As previously noted, the traffic roundabout was found to operate at good levels of service with 95<sup>th</sup> percentile queues on eastbound and westbound approaches (Service Road) in the 25-40-metre range during the peak periods. A detailed discussion on the roundabout operations is provided in the following section.

## 3. Other Considerations/Supplementary Analyses

During the preparation of the Level 3 Traffic Operations Report, the Study Team was requested to evaluate additional/specific scenarios within the Windsor-Essex Parkway in a series of supplementary analyses to address comments/suggestions by the general public and the MAG. Technical Memorandums summarizing the results of the analysis were circulated to the Ministry of Transportation, and subsequently adopted. The following provides brief discussions on the analysis results, as well as adopted recommendations.

### 3.1. South Ramp Terminal at Ojibway Parkway I/C– Northbound Right-Turn Lane

*The Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives (February 2008-revised December 2008)* revealed that a significant percentage of the right turning traffic comprises of local traffic destined to EC Row Expressway, which uses the freeway to bypass the Ojibway Parkway interchange. This traffic was found to exit to EC Row Expressway further downstream. The elimination or reduction of the northbound right turn lane storage at the N/S-E ramp terminal intersection with Ojibway Parkway analysis was thought to discourage the short-cuts, and subsequently reduce the right turning traffic volume by diverting traffic back to Ojibway Parkway/EC Row Expressway.

The analysis revealed that without the exclusive northbound right-turn lane, traffic operations on the northbound approach are anticipated to marginally deteriorate; however, the 95<sup>th</sup> percentile northbound queue was found to increase significantly during peak hours. It would also have an impact on traffic queues in the southbound left-turn lane at the subject intersection.

Based on the analysis, an exclusive right turn lane on the northbound approach at the south ramp terminal intersection was recommended as it accommodates over 800 vehicles per hour during the AM peak hour even if local traffic destined to EC Row Expressway is reassigned back to Ojibway Parkway/EC Row Expressway. The VISSIM analysis showed 95<sup>th</sup> percentile queue lengths in the order of 85 metres. As such, it was recommended to provide an exclusive right turn lane on the northbound approach at the subject intersection with a storage length of 85 metres in addition to appropriate parallel lane and taper.

### 3.2. Todd Lane & Huron Church Line / Service Road – Local Traffic Diversion

As per the *Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives*

(February 2008-revised December 2008), approximately 160 vehicles on the freeway (eastbound) off-ramp to Todd Lane in the AM peak hour and 300 vehicles in the PM peak hour were estimated to be destined to Huron Church Line. This also includes local traffic entering the freeway via the on-ramp at Labelle Street to bypass signalized intersections on Service Road. As a sensitivity analysis, the "local" component of this traffic pattern was redistributed back onto Service Road resulting in fewer vehicles using the off-ramp.

The sensitivity analysis scenario demonstrated improved operations at the off-ramp terminal intersection with Todd Lane. Traffic queues on the northbound approach at the Todd Lane/Cabana Road/Service Road intersection are not anticipated to extend to the freeway ramp terminal intersection in either scenario.

The travel time comparison suggested that travel time savings for local traffic using the freeway versus the service road is marginal. Both corridors provide flexibility for local traffic, and based on the VISSIM modeling analysis it is anticipated that local traffic that is destined to either Cabana Road or Huron Church Line is likely to use both the freeway and the service road to get to their destination. In order to make the service road corridor more attractive, traffic signals along the service road corridor should be kept optimized and coordinated to minimize delays to through traffic, potentially resulting in fewer local vehicles using the freeway for shorter distance trips.

### 3.3. Service Road & Labelle Street – Southbound Left-Turn Lane Analysis

The analysis was undertaken with an emphasis on anticipated traffic queues due to closely spaced intersections, and considered the following two configurations:

Option 1: Southbound left-turn lane to Labelle Street is aligned with north Service Road;

Option 2: Southbound left-turn lane to Labelle Street is aligned with south Service Road, as recommended in the *Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives (February 2008-revised December 2008)*.

The first option would reduce the anticipated queues on Labelle Street between the two signalized intersections on Labelle Street at north and south Service Roads. However, it would introduce an additional traffic signal phase at the north Service Road intersection to accommodate left-turning southbound traffic destined to Labelle Street, potentially resulting in longer queues on north Service Road due to a reduction in available green time for northbound traffic.

The latter option diverts Labelle Street-destined traffic to the south Service Road resulting in longer potential queues on Labelle Street between the two signalized intersections; however, minimizes traffic queues on the northbound approach to the intersection with Labelle Street. It should be noted that north Service Road carries significantly higher traffic volumes than Labelle Street.

Based on the analysis results, provision of the southbound left turn lane on the north

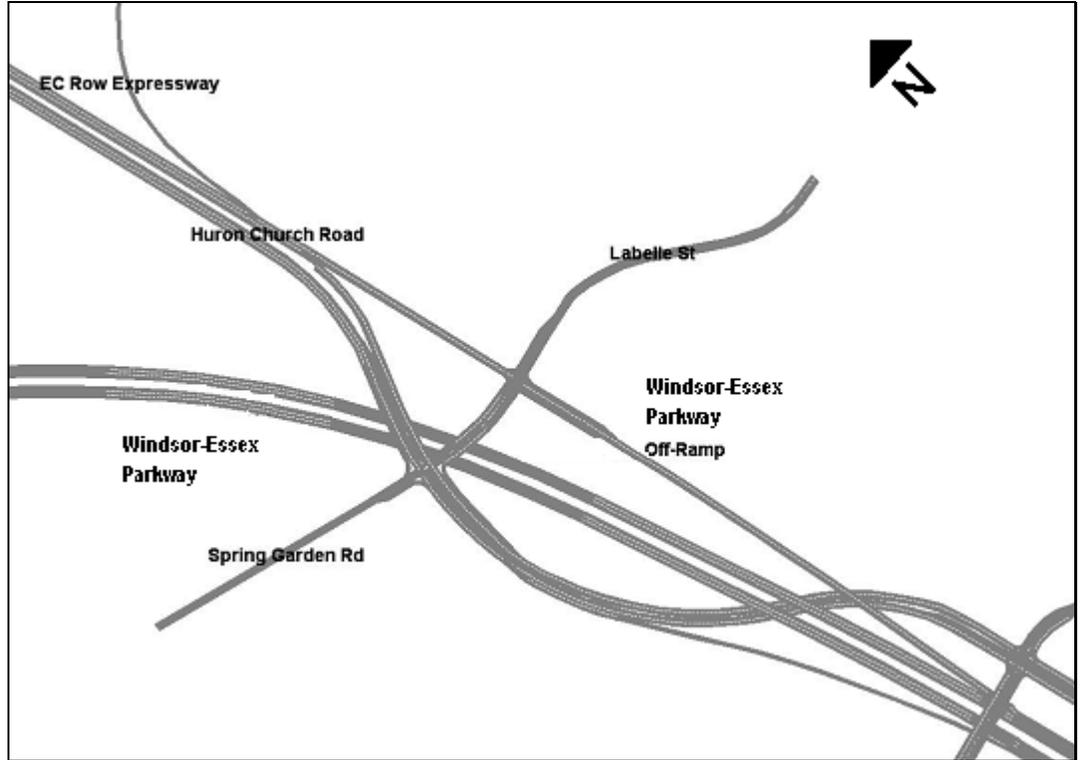
Service Road is likely to result in more adverse traffic impacts compared to the option where the lane is placed onto the south Service Road. Based on the above, and from traffic operations standpoint, it is more desirable to locate the southbound left turn lane on south Service Road, as recommended in the *Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives (February 2008-revised December 2008)*.

### 3.4. Realignment of North Service Road at Labelle Street

The analysis was performed to evaluate the feasibility of not splitting the service roads between south of EC Row Expressway and Grand Marais Road. The service road horizontal alignment would follow the south service road alignment in the Windsor-Essex Parkway. The freeway off-ramp to Labelle/Service Road would remain on the north side of the freeway (refer to Exhibit 16). This scenario would eliminate any potential weaving on the north Service Road between the freeway off-ramp/north Service Road merge and the intersection at Labelle Street.

With the realignment of north Service Road, both intersections on Labelle Street at the freeway off-ramp and the service road were found to operate at good Levels-of-Service during both AM and PM peak hours. However, the service road realignment will introduce a weaving section in the northbound direction on Huron Church Road between the freeway off-ramp and the EC Row Expressway S-E on-ramp. The weaving distance is approximately 50 metres, and the weaving volume was estimated at 270 and 130 vehicles in the AM and PM peak hour, respectively. In the TEPA, the weaving distance between the freeway off-ramp and the intersection at Labelle Street is approximately 150 metres. Overall, the realignment of north Service Road results in acceptable operations at both intersections on Labelle Street/Bethlehem Avenue; however, it creates weaving issues on Huron Church Road in the northbound direction approaching the EC Row Expressway interchange, and therefore, was not recommended.

**EXHIBIT 16. SERVICE ROAD/LABELLE STREET SENSITIVITY ANALYSIS**



**3.5. Elimination of the Highway 401 Westbound Off-Ramp**

## to Howard Avenue

An analysis was undertaken to evaluate the operating conditions of the scenario “without” the Highway 401 westbound off-ramp to Howard Avenue. It should be noted that at the time of the analysis, an option with a traffic signal control at the Howard Avenue diversion and Highway 3 intersection was assumed (and is discussed below). Since then, a roundabout alternative has been proposed, analyzed and recommended for this location.

In this sensitivity scenario, Highway 401 westbound traffic destined to Howard Avenue would use the Highway 3/Howard Avenue diversion exit instead, and would then turn right onto Highway 3 westbound toward Howard Avenue. This option was considered in light of a perceived weaving concern on the Highway 401 off-ramp to Howard Avenue as it merges with Highway 3 approximately 150 metres upstream from the intersection with Howard Avenue. It should be noted that the *Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives (February 2008-revised December 2008)* did not reveal weaving problems provided that Howard Avenue diversion forms the fourth leg on the south side of the intersection to accommodate traffic destined to LaSalle.

Overall, the sensitivity scenario analysis revealed acceptable levels of service and 95<sup>th</sup> percentile queues. An additional 580 vehicles in the peak hour would be expected on the north approach to the intersection (southbound). Highway 401 traffic destined to Howard Avenue north would experience additional delays having to go through the intersection as opposed to having a direct access to Howard Avenue. The analysis did not reveal any weaving problems along the section of Highway 3 in the westbound direction between the ramp terminal and the Highway 401 westbound loop on-ramp. It was recommended to retain the off-ramp to Howard Avenue, as it would reduce delays to traffic destined to Howard Avenue from Highway 401 Westbound.

An additional analysis with a roundabout configuration at Howard Avenue diversion/Highway 3, and no direct Highway 401 off-ramp to Howard Avenue revealed an increase in the southbound queue and a reduction in the Level of Service to traffic on this approach (LOS D) during the p.m. peak hour. This reinforces the previously made recommendation to retain the direct ramp to Howard Avenue.

### 3.6. Elimination of the Freeway Eastbound Off-Ramp to EC Row Expressway

This analysis was performed to test the redundancy of the off-ramp in question as access to EC Row Expressway is provided via the interchange at Ojibway Parkway.

The simulation results indicated that elimination of the eastbound off-ramp to EC Row Expressway would result in poor levels of service of the Ojibway Parkway interchange, especially during the AM peak hour (2035). The northbound approach on Ojibway Parkway and the westbound approach from the freeway off-ramp were found to experience significant delays at the ramp terminal intersection. The resultant traffic queues on the westbound approach are anticipated to extend onto the mainline/plaza. Based on

the results of the analysis, elimination of the eastbound off-ramp to EC Row Expressway would result in adverse impacts to the Ojibway Parkway interchange, and, therefore, was not recommended.

### 3.7. Howard Avenue Diversion

Through consultation with the MAG, the Howard Avenue diversion was developed (and subsequently adopted) in order to reduce the amount of through traffic on Howard Avenue (Exhibit 17). Under this scenario Howard Avenue south of the Windsor-Essex Parkway is terminated with a cul-de-sac north of South Talbot Road; however, access to the Howard Avenue diversion is provided approximately midpoint between South Talbot Road and the Roundabout. The section connecting existing Howard Avenue and the Howard Avenue diversion is referred as the Howard Avenue connection in this section of the report for consistency purposes. Consideration should be given to reducing the speed limit on existing Howard Avenue with the Howard Avenue diversion in place and existing Howard Avenue terminated midpoint between the future Laurier Parkway and the Howard Avenue connection.

Previously, it was assumed that Laurier Parkway would be aligned with the Howard Avenue diversion north of South Talbot Road, while Howard Avenue would remain a continuous two-lane road. Under the adopted scenario, Laurier Parkway terminates at Howard Avenue, and is aligned with South Talbot Road forming a four-legged intersection with Howard Avenue/Howard Avenue diversion and Howard Avenue becomes a discontinuous road.

The latter configuration was incorporated in the Windsor-Essex Parkway VISSIM model to test the operations under the ultimate 2035 horizon year conditions. Howard Avenue and South Talbot Road are anticipated to remain two-lanes wide, while Laurier Parkway and Howard Avenue diversion will have a four-lane cross-section. Traffic signals are anticipated at both: Howard Avenue/South Talbot Road/Laurier Parkway and Howard Avenue diversion/Howard Avenue connection intersections. Traffic operations at both intersections are summarized in Table 5.

**EXHIBIT 17. HOWARD AVENUE/LAURIER PARKWAY RECOMMENDED CONFIGURATION**



**TABLE 5. HOWARD AVENUE/LAURIER PARKWAY/SOUTH TALBOT ROAD OPERATIONS  
 (2035 VISSIM MODEL)**

**2035 AM Peak Hour**

**Laurier Parkway & Howard Avenue Diversion**

	Laurier Parkway			South Talbot Road			Howard Avenue Diversion						Overall
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
TMC	529	50	50	50	100	95	50	300	50	50	114	470	
Delay (s)	18.6	12.5	3.0	37.0	29.7	4.1	20.5	21.8	7.8	26.9	23.4	6.4	
95%th Queue (m)	82	8	2	18	23		11		30	11	27	35	
LOS	B	B	A	D	C	A	B	B	A	C	B	A	

**Howard Avenue Diversion & Howard Avenue Connection**

	Howard Avenue Diversion				Howard Avenue Connection		Overall
	NBL	NBT	SBT	SBR	EBL	EBR	
TMC	424	500	340	10	10	294	
Delay (s)	9.2	4.5	10.8	7.1	30.7	7.1	
95%th Queue (m)	39	18	21		2	17	
LOS	A	A	B	A	C	A	

**2035 PM Peak Hour**

**Laurier Parkway & Howard Avenue Diversion**

	Laurier Parkway			South Talbot Road			Howard Avenue Diversion						Overall
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
TMC	569	50	50	50	100	50	50	206	50	85	400	542	
Delay (s)	18.3	11.5	5.2	34.4	32.0	3.5	36.2	21.7	7.1	26.9	27.1	8.9	
95%th Queue (m)	81	6	0	14	29		13		23	18	90	69	
LOS	B	B	A	C	C	A	D	B	A	C	C	A	

**Howard Avenue Diversion & Howard Avenue Connection**

	Howard Avenue Diversion				Howard Avenue Connection		Overall
	NBL	NBT	SBT	SBR	EBL	EBR	
TMC	405	420	590	10	10	437	
Delay (s)	13.5	6.7	16.3	11.0	41.3	9.5	
95%th Queue (m)	45	20	40		5	31	
LOS	B	A	B	B	D	A	

The analysis revealed LOS B or better overall traffic operations for both AM and PM peak hours. The previous analysis of the Practical Alternatives (without the extension in place) revealed that traffic volumes on Howard Avenue south of Highway 401 would be in the 800 to 1,000 vehicles per hour range (peak direction) in 2035. With the Howard Avenue diversion in place, and Howard Avenue remaining a continuous two-lane road, this volume is anticipated to reduce by approximately 50 percent. In the proposed option with the Howard Avenue diversion and Howard Avenue terminated just north of the South Talbot Road intersection, a further reduction in through traffic on Howard Avenue is expected. For the purposes of this assessment, no additional reduction in through traffic was assumed in order to analyze the worst case scenario of approximately 400 vehicles per hour in the peak direction still remaining on Howard Avenue north of the Howard Avenue connection in the 2035 horizon.

## 3.8. Highway 3/Outer Drive

The existing intersection of Highway 3 and Outer Drive will be removed to accommodate the Windsor-Essex Parkway. Access to Outer Drive will be provided via a signalized intersection on Highway 3 (Exhibit 18). The future four-legged intersection at this location is expected to accommodate future commercial developments in the surrounding areas (both sides of Highway 3). Traffic volumes associated with the future development were derived using the ITE Trip Generation Manual (Land Use Code 770: Business Park) and the total development area on both sides of the highway. The future development was estimated to generate 199 and 208 two-way trips during the AM and PM peak hours, respectively, once fully built out. The traffic distribution was based on the existing and future travel patterns on Highway 3 during peak periods. The resultant traffic volumes at the subject intersection are provided in Exhibits 2 and 3 for the AM and PM peak hours, respectively.

### EXHIBIT 18. HIGHWAY 3/OUTER DRIVE CONFIGURATION



The analysis revealed overall LOS B overall operations under the ultimate traffic conditions during both peak hours. The 95<sup>th</sup> percentile queues on Highway 3 are not expected to extend beyond 41 metres. Table 6 summarizes the results of the analysis.

**TABLE 6. HIGHWAY 3/OUTER DRIVE CONNECTION OPERATIONS (2035 VISSIM MODEL)**

**2035 AM Peak Hour**

	Highway 3						Outer Drive Connection						Overall
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
TMC	223	438	169	162	571	94	26	6	29	29	14	53	10.6
Delay (s)	13.5	8.4	6.5	9.7	10.0	7.4	32.9	42.9	6.1	34.1	37.7	11.7	
95%th Que	25		29	14		37	7		4	11		16	
LOS	B	A	A	A	A	A	C	D	A	C	D	B	

**2035 PM Peak Hour**

	Highway 3						Outer Drive Connection						Overall
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
TMC	49	776	35	30	503	22	156	6	138	106	10	321	12.0
Delay (s)	11.2	8.9	6.3	13.5	8.5	5.0	32.4	23.9	8.9	27.7	27.5	11.7	
95%th Que	7		41	4		26	39		16	26		34	
LOS	B	A	A	B	A	A	C	B	A	C	C	B	

## 4. Conclusions

- From the traffic operations standpoint, the Windsor-Essex Parkway addresses operational concerns identified during the Practical Alternatives analysis process (*Level 2 Analysis: Traffic Operations Assessment of Practical Alternatives, February 2008-revised December 2008*);
- The Windsor-Essex Parkway accommodates the future connection of Laurier Parkway to the Highway 401/Highway 3 junction via the proposed Howard Avenue diversion at the south/east end of the project limits;
- Travel times to and from the international border crossings are expected to be in the 7-minute to 10-minute range (between the new crossing/Ambassador Bridge and just east of the Highway 401/Highway 3 junction) by the 2035 horizon year;
- All intersections within the study area are expected to operate at good levels of service in 2035 (LOS "C" or better);
- The 95<sup>th</sup> percentile traffic queues at the study area intersections are not anticipated to extend to the upstream intersections;
- The southbound left turn lane to Labelle Street should be provided along the south Service Road at the intersection with Bethlehem Avenue;
- Freeway eastbound off-ramp to EC Row Expressway, and Highway 401 westbound off-ramp to Howard Avenue should be provided to facilitate improved operations/connectivity within the network;
- An exclusive right turn lane on the northbound approach at the Ojibway Parkway W-N/S ramp terminal intersection should be provided to accommodate heavy right turns during the peak hours;
- Channelization of right turns should be removed from the eastbound approach at the Ojibway Parkway/EC Row Expressway/Highway 401 E-N/S ramp terminal, and from all approaches at the Howard Avenue/Highway 3 intersection to alleviate/eliminate potential traffic weaving and facilitate the recommended lane configurations at these locations;
- A roundabout design of the Highway 3/Highway 401 westbound off-ramp/Howard Avenue diversion junction provides a feasible alternative to a traffic signal control at this location;
- Posted speed on EC Row Expressway west of Huron Church Road should be reduced to 80 km/h (once realigned to form the core-collector system), to match the proposed posted speed for the express (freeway) lanes; and
- The Howard Avenue diversion is expected to divert approximately 50% of through traffic from Howard Avenue even if the latter remains a continuous road north of South Talbot Road. The through traffic diversion is anticipated to further increase should Howard Avenue terminate with a cul-de-sac north of South Talbot Road.

