Canada-United States-Ontario-Michigan
Border Transportation Partnership

Detroit River International Crossing Environmental Assessment Study

DRAFT

DRAFT Level 2 Traffic Operations Analysis of Practical Alternatives

November 2006

Table of Contents

List of Exhibits

List of Tables

1. Introduction

The Border Transportation Partnership was formed between the Transport Canada (TC),Ministry of Transportation (MTO), Federal Highway Administration (FHWA) and Michigan Department of Transportation (MDOT) to undertake an Environmental Assessments 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. This work has been undertaken by IBI Group (traffic forecasts on the Canadian side). 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. As a result of this analysis 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).

Level 2 Analysis: Traffic operations assessment of Practical Alternatives. 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 final deliverable of this analysis level is to provide an assessment of all Practical Alternatives along with recommendations from the traffic operations standpoint to help select/develop the Technically Preferred Alternative (TPA).

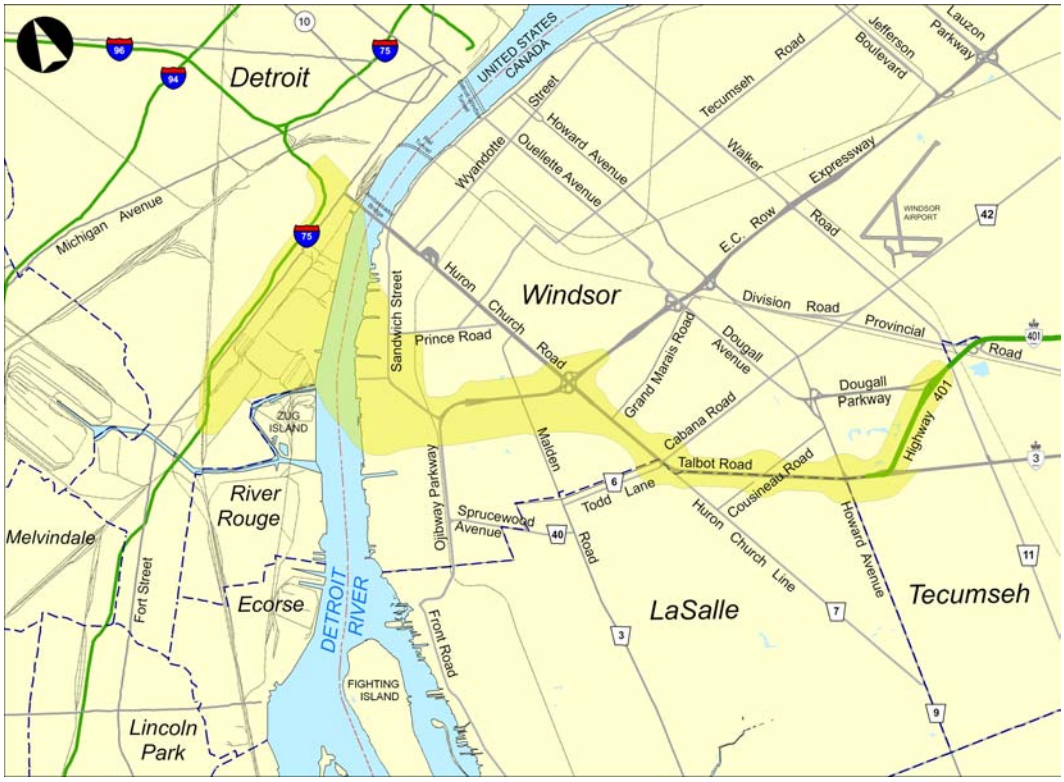
Level 3 Analysis: Microsimulation analysis of the TPA. As part of this analysis level, the Technically Preferred Alternative will be further assessed using a microsimulation package. This micro-level analysis will be undertaken to identify required localized improvements and graphically demonstrate anticipated traffic operations within the Technically Preferred Alternative.

This report summarizes the results of the Level 2 Analysis, and provides a comprehensive comparison between the Practical Alternatives and the future Base Case from the traffic operations standpoint, as well as a basis for continued refinement of the alternatives. It is expected that additional travel time analyses would be undertaken to support separate financing review of the project.

1.1. Area of Continued Analysis

The Area of Continued Analysis (ACA) developed as part of the macro-assessment of Illustrative Alternatives (Level 1 Analysis) was utilized in the Level 2 Analysis of the Practical Alternatives (Exhibit 1).

EXHIBIT 1. AREA OF CONTINUED ANALYSIS



The ACA captures Highway 401 between Dougall Parkway and Highway 3, and the Highway 3/Huron Church Road corridor between Highway 401 and the Ambassador Bridge. The ACA also incorporates a section of E.C. Row Expressway west of Huron Church Road, as well as all crossing roads within the specified corridors.

1.2. Study Methodology

The Level 2 Analysis incorporates an assessment of existing traffic operations at key locations as well as a detailed assessment of future traffic conditions for 2015, 2025 and 2035 horizon years. The future traffic analysis was performed for the Base Case as well as for the identified Practical Alternatives carried forward from the Level 1 Analysis within the Area of Continued Analysis. Passenger and commercial traffic volume forecasts were obtained from the DRIC Travel Demand Model.

Existing traffic volumes were developed from data obtained through a series of traffic surveys undertaken by URS and IBI in February of 2006. Practical Alternatives were developed by URS and assessed/compared against measures of effectiveness such as levels of service, intersection delays, travel times (quantitative assessment), as well as network flexibility/local connections and anticipated changes to travel patterns (qualitative analysis).

The Synchro 6 and HCS 2000 software packages were used to calculate traffic operations for various traffic, road network and horizon year scenarios. The analysis was undertaken for the ACA intersections, arterial roadway sections as well as freeway segments.

The purpose of the analysis was to provide a comprehensive comparison of the Practical Alternatives, and recommendations from the traffic operations standpoint to be used in the selection/development of the Technically Preferred Alternative process.

2. Existing Conditions

2.1. Existing Road Network

The primary roadways within the ACA today are Highway 3, Huron Church Road and the E.C. Row Expressway. The following sections describe these roadways in detail.

2.1.1. Huron Church Road / Highway 3 Corridor

The Huron Church Road/Highway 3 corridor (also described as "the corridor") is an urban arterial road linking Highway 401 to the Ambassador Bridge. The Highway 3 section is four lanes wide, and Huron Church Road has a six-lane cross-section. The posted speed on Highway 3 is 80 km/h (east of Huron Church Line easterly to Highway 401). Huron Church Road has a posted speed of 60 km/h. Community Safety Zone signs advising of increased fines for speeding are posted on Huron Church Road. No street parking is permitted along Huron Church Road. There are seventeen signalized intersections along the corridor between Highway 401 and the Ambassador Bridge.

Ambassador Bridge carries the highest volume of cross-border passenger car and commercial vehicle truck traffic of all Canada-U.S. border crossings. Consequently, Huron Church Road carries a higher proportion of international traffic than any other road in Windsor. North of the intersection of Highway 3 and Todd Lane/Cabana Road, overhead signs direct commercial vehicles to use the centre lane, local traffic to use the right lane, and international cars to use the left lane. Further north, at Northwood Street (north of the E.C. Row Expressway) cars are directed to use the left lane, while commercial vehicles use the centre and right lanes.

Significant development and facilities along Huron Church Road also contribute to traffic levels on this route. Significant traffic generators along Huron Church Road include, from north to south, University of Windsor at Wyandotte Street, Assumption High School at Girardot Street, the University Mall at Tecumseh Road, and, further south on the Highway 401/Huron Church corridor, St. Clair College on Highway 3 . A secondary customs inspection facility for commercial vehicles entering Canada via the Ambassador Bridge, located west of Huron Church Road between Malden Road and Industrial Drive, generates truck-turning movements at the intersections of Huron Church Road and Malden Road, and at Huron Church Road and Industrial Drive.

Huron Church Road in its entirety lies within the City of Windsor, while to the east, Highway 3 is within the Town of LaSalle. Traffic signals along Huron Church Road between College Avenue and Pulford Road (south of the E.C. Row Expressway) are operated by the City of Windsor, while signals south of Pulford Road are operated by the MTO. From Pulford Road northerly, the signals on Huron Church Road are co-ordinated and operated on two timing plans for different periods of the day. One timing plan is

implemented between 6 AM and 11 PM, while the other plan covers the nightly period between 11 PM and 6 AM. During the day, the signals have a cycle length of 130 seconds. Signalized intersections elsewhere in Windsor typically use four different signal timing plans to reflect different traffic demands during the morning peak period, mid-day period, evening peak period and overnight. The use of one timing plan on Huron Church Road between 6 AM and 11 PM is consistent with relatively steady traffic demand during that period.

Signal phases for left turns from Huron Church Road and for traffic on side streets (with the exception of Tecumseh Road) are only operated if vehicle detectors are triggered. All left turns to cross streets are made from auxiliary left turn lanes on Huron Church Road. In the absence of any left turn or side street traffic demand, all green time is given to the through movement on Huron Church Road. This traffic signal strategy is intended to maximize the through capacity of Huron Church Road.

The Essex Terminal Railway level crossing on Huron Church Road immediately north of College Avenue stops all traffic flow when the crossing gates are lowered to allow a train to cross over Huron Church Road. Trains typically cross Huron Church Road several times per day, stopping traffic entering and exiting the bridge plaza for approximately 3 to 4 minutes each time.

2.1.2. E.C. Row Expressway

E.C. Row Expressway is a divided, four-lane, controlled access expressway running east-west through the City of Windsor, with a posted speed of 100 km/h. The E.C. Row Expressway begins in the east, outside of the ACA, as a continuation of County Road 22. The final at-grade intersection is with Banwell Road. Continuing west, outside the Study Area, E.C. Row Expressway has interchanges with Lauzon Parkway, Jefferson Boulevard, Central Avenue, Walker Road, Howard Avenue, Dougall Avenue and Dominion Boulevard.

Within the ACA, E.C. Row Expressway has a Parclo A4 interchange with Huron Church Road and a partial interchange with Matchette Road, before ending at an at-grade intersection with Ojibway Parkway. The roadway continues at-grade towards the south as Ojibway Parkway.

2.1.3. Cross Streets

The following list describes some of the primary cross streets in the Area of Continued Analysis:

- **Tecumseh Road** is a major two-way arterial road, generally operating with a five-lane cross section and running east-west in the northern part of the ACA. Tecumseh Road begins as an extension of Matchette Road west of Huron Church Road and extends across the City of Windsor into the Town of Tecumseh. Tecumseh Road is the only continuous east-west street in Windsor between E.C. Row Expressway and Wyandotte Street;

- **Malden Road** is a two-way arterial road with a two-lane cross-section, generally running north-south through the ACA. Malden Road terminates at Huron Church Road. Although it crosses under the E.C. Row Expressway, there is no existing interchange;
- **Todd Lane / Cabana Road** is a major two-way, primarily two-lane arterial road generally running east-west. For the purpose of this report Todd Lane/Cabana Road is assumed to be north-south oriented at the intersection with Highway 3, which runs east-west. Todd Lane begins at Malden Road, to the southwest of the corridor and continues across the corridor as Cabana Road, before ultimately turning into Division Road;
- **Howard Avenue** is a major two-way, generally two-lane arterial road running north-south through the ACA. Howard Avenue begins well to the south of the ACA, passing through LaSalle. The intersection of Highway 3 and Howard Avenue is the first signalized intersection after the Highway 401 termination in the westbound direction.
- **Highway 3** east of Highway 401 (east of Outer Drive) is a two-lane King's Highway with a rural cross-section, and an 80 km/h posted speed. Highway 3 outside of the ACA spans southeast and into the Town of Essex.

2.2. Existing Crossings

There are two road crossings of the Detroit River in the Windsor-Detroit area, consisting of the Ambassador Bridge and the Detroit-Windsor Tunnel. The Ambassador Bridge was opened in 1929 and connects the local road network in west Windsor with the U.S. interstate system in southwest Detroit. From entrance to exit, the suspension bridge is 2.8 kilometres (9,200 feet) long, and rises as high as 46 m (152 feet) above the Detroit River at its centre. Two lanes in each direction are provided along its length; currently, one is used for cars and one for commercial vehicles. Currently, all tolls are collected on the U.S. side of the bridge, although toll collection facilities also exist on the Canadian side on the approach to the bridge.

The Detroit-Windsor Tunnel was opened in 1930 and connects downtown Windsor and downtown Detroit. The tunnel is approximately 1.6 kilometres (1 mile) long and descends 23 metres (75 feet) below the surface of the Detroit River. The tunnel is illuminated and ventilated. One lane is provided in each direction. The tunnel has a height clearance of 4.0 metres (13'2") and a 330-degree bend in the tunnel, which restricts the types of commercial vehicles that can use the tunnel.

Summaries of the existing (2004) traffic characteristics of these crossings are shown in Exhibits 2 and 3. For more detailed analysis and trends, see the ***Travel Demand Forecasts Report*** (September 2005).

2.3. Traffic Data Collection

A series of traffic surveys was undertaken at key intersections and roadway segments in

February 2006 to develop a Base Case traffic scenario (existing AM and PM peak hour volumes) to be utilized in the operational analysis. The surveys included turning movement counts at key intersections, automated traffic recorder (ATR) counts, saturation flow rate surveys at key signalized intersections, and travel time and delay surveys. Table 1 summarizes the locations and timeframes of the surveys.

2.3.1. Traffic Volume Surveys

The surveys were undertaken to establish base year traffic volumes (AM and PM peak hours) to be used in the assessment of existing and future traffic conditions. It should be noted that the surveys were undertaken before spring breaks at the University of Windsor and St. Clair College. Traffic associated with both institutions was taken into account during the surveys. Additional/missing traffic information was obtained from the MTO and the City of Windsor.

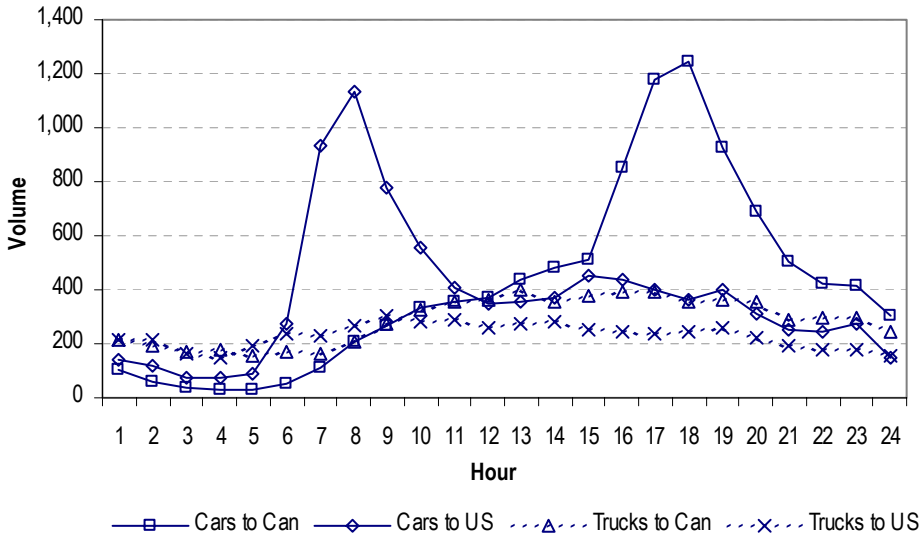
There is an existing MTO vehicle class station located on Highway 3 approximately 2.5 kilometres west of Howard Avenue. The following summarizes existing traffic volumes based on information obtained through traffic surveys and from the MTO and City of Windsor. Exhibits 4 and 5 summarize traffic data obtained from the MTO vehicle class station (August 2005). For consistency purposes, Highway 401, Highway 3 and E.C. Row Expressway are assumed to span east-west, while Huron Church Road is assumed to span north-south. Exhibits 6 and 7 summarize existing AM and PM peak hour volumes at all key intersections within the corridor. Existing lane configurations at key intersections are illustrated in Exhibit 8.

EXHIBIT 2. AMBASSADOR BRIDGE EXISTING TRAFFIC CHARACTERISTICS, 2004

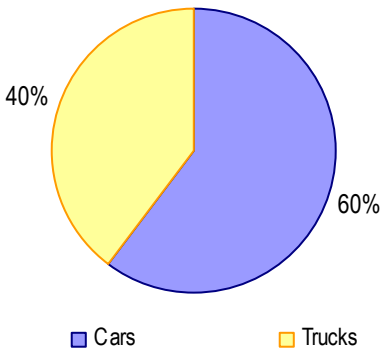
A. PERIOD VOLUMES

Period	Vehicle Type and Direction					
	Passenger Cars			Commercial Vehicles		
	U.S. to Canada	Canada to U.S.	Total	U.S. to Canada	Canada to U.S.	Total
AM Peak Hour	200	1,140	1,340	210	270	480
Mid-Day Peak Hour	430	350	780	400	270	670
PM Peak Hour	1,180	400	1,580	390	240	630
Daily	9,900	8,900	18,800	6,900	5,500	12,400

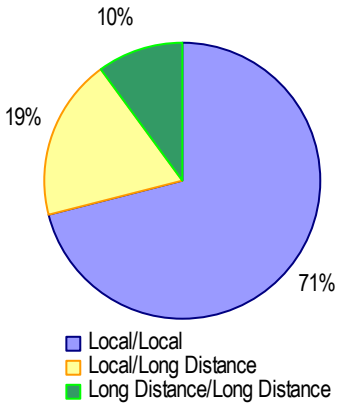
B. DAILY VOLUME DISTRIBUTION



C. DAILY VEHICLE TYPE SPLIT



D. DAILY ORIGIN-DESTINATION MARKET



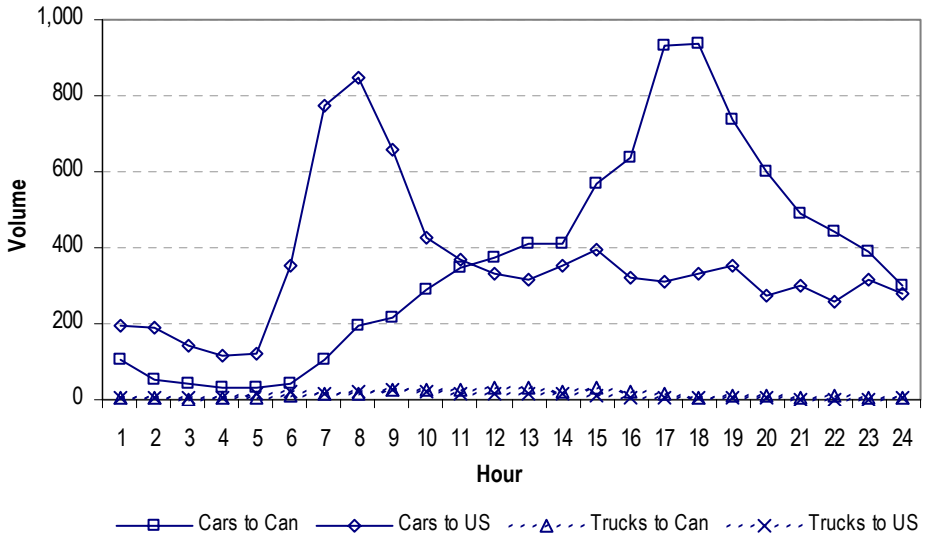
Source: MTO National Roadside Survey/Commercial Vehicle Survey; traffic counts

EXHIBIT 3. DETROIT-WINDSOR TUNNEL EXISTING TRAFFIC CHARACTERISTICS, 2004

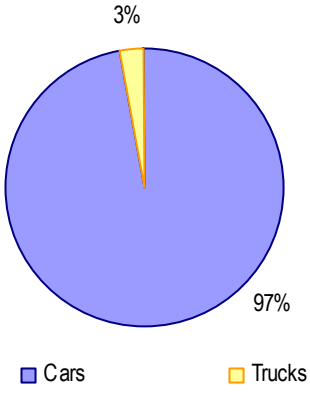
A. PERIOD VOLUMES

Period	Vehicle Type and Direction					
	Passenger Cars			Commercial Vehicles		
	U.S. to Canada	Canada to U.S.	Total	U.S. to Canada	Canada to U.S.	Total
AM Peak Hour	200	850	1,050	10	20	30
Mid-Day Peak Hour	410	320	730	30	20	50
PM Peak Hour	930	310	1,240	10	10	20
Daily	8,700	8,300	17,000	300	200	500

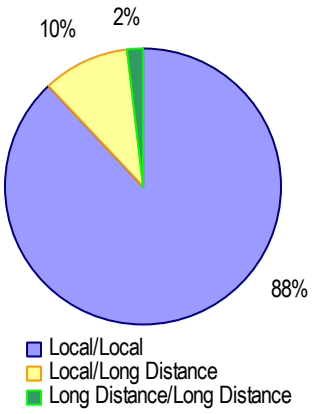
B. DAILY VOLUME DISTRIBUTION



C. DAILY VEHICLE TYPE SPLIT



D. DAILY ORIGIN-DESTINATION MARKET



Source: MTO National Roadside Survey/Commercial Vehicle Survey; traffic counts

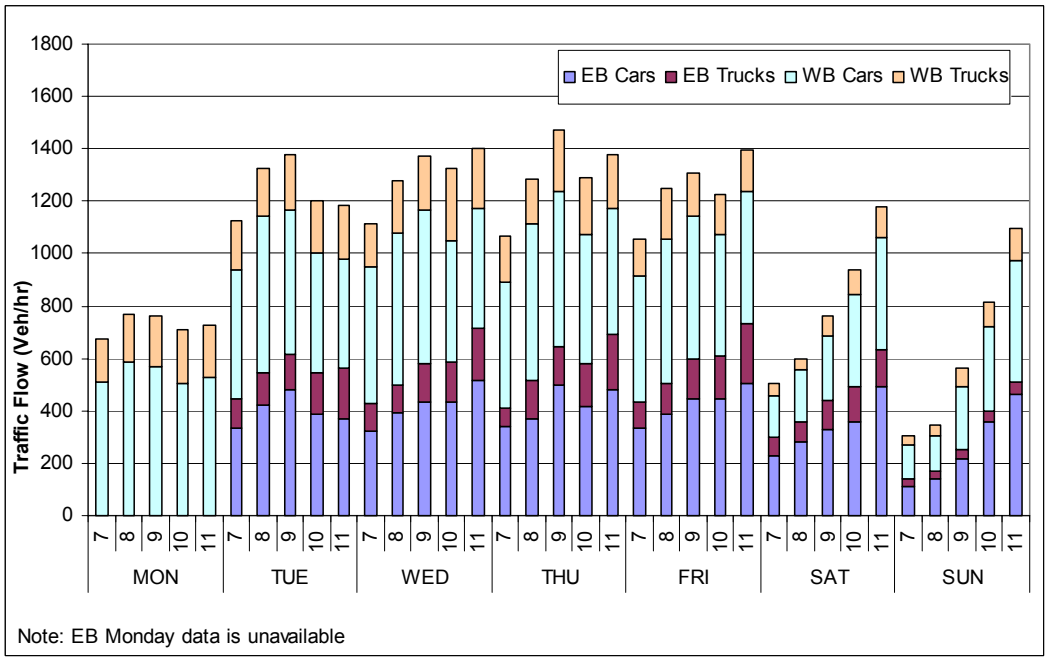
TABLE 1. TRAFFIC VOLUME SURVEY LOCATIONS

Task	Locations
Travel Time/Delay	Two Corridors: Corridor 1: Highway 401 (@ Provincial Road)-Highway 3-Huron Church Rd-College Ave (no border crossing)
	Corridor 2: Highway 401 (@ Provincial Road)-Dougall Pkwy-Ouellette Ave-Wyandotte Ave (no border crossing)
Turning Movement Counts (TMC)	Highway 3/St Clair College
	Highway 3/Cabana Rd/Todd Ln
	Highway 3/Huron Church Line
	Highway 3/Cousineau Rd
	Highway 3/Montgomery Dr
	Highway 3/Surrey Dr
	Highway 3/Grosvenor Dr
	Highway 3/Howard Ave
	Howard Avenue/Eastbourne Ave/Mero Ave
	Howard Ave/6th Concession Road
	Howard Avenue/Dougall Pkwy ramp terminals
	Howard Avenue/Tulson Way
	Howard Avenue/North Talbot Road
	Howard Avenue/Lake Trail Dr/Country Club Dr
	Howard Avenue/Havens Dr
	Huron Church Rd/Malden Rd
	Huron Church Rd/Hotel access east of Malden + U-turns
	Huron Church Rd/Kenora St + U-turns
	Huron Church Rd/EC Row Expressway westerly ramp terminal
	Huron Church Rd/EC Row Expressway easterly ramp terminal
	Huron Church Rd/Reddock Ave + U-turns
	Huron Church Rd/Pulford St
	Huron Church/Spring Garden Rd
	Huron Church/Grand Marais Rd/Lambton St
	EC Row Expressway/Machette Rd both ramp terminals
	Sandwich St/Ojibway Pkwy
	Prospect Ave/Ojibway Pkwy
	GN Booth Dr/Ojibway Pkwy
	Huron Church Rd/College Ave
	Huron Church Rd/Millen St
	Huron Church Rd/Industrial Dr
	Huron Church Rd/Girardot St
	Huron Church Rd/Tecumseh Rd
	Huron Church Rd/Dorchester Rd
	Huron Church Rd/Ambassador shopping plaza
	Huron Church Rd/Totten St/Prince Rd
	Huron Church Rd/University mall accesses
	Highway 3/Outer Dr
Saturation Flow Observations	Howard Ave/Highway 3
	Cabana Rd/Todd Ln//Highway 3
	Tecumseh Rd/Huron Church Rd
	Malden Rd/Huron Church Rd
	College Ave/Huron Church Rd
General Observations (queue lengths, durations, delays, etc.)	same corridors as travel time surveys
ATR Counts (by class)	Patricia Rd (east of Walnut St)
	Huron Church Rd (before merge with int'l traffic)
	Union Street (north of plaza)

Note:
Travel Time/Delay: February 23, 2006 6 am - 8 pm
Turning Movement Counts: February 22-23, 7 am - 10 am, noon - 2 pm, 3:30 pm - 6:30 pm
Saturation Flow Observations: peak periods
Automated Traffic Recorder: February 18-25, 2006

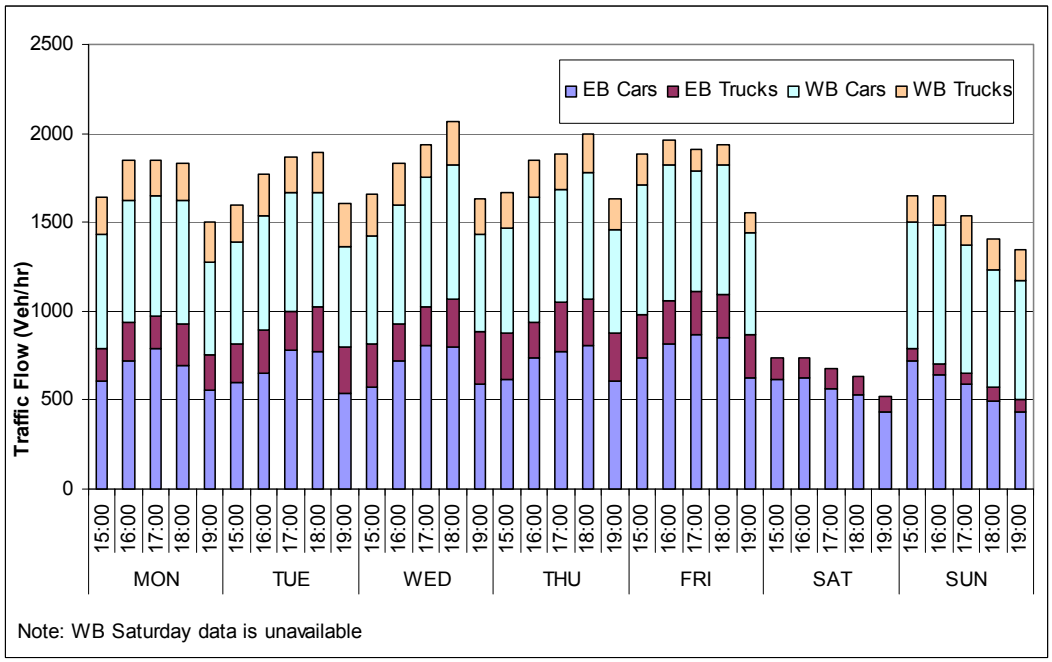
Overall, traffic volumes are heaviest during the PM peak hour (U.S. to Canada traffic), while U.S. bound traffic peaks during the morning peak period. The proportion of trucks on the corridor during the peak hours is up to 30% (lower in peak direction). Truck percentage tends to increase on the approach to the Ambassador Bridge. Commercial vehicle composition increases significantly during off-peak periods (up to 60% trucks during some off-peak periods).

EXHIBIT 4. HIGHWAY 3 TRAFFIC VOLUMES (MTO CLASS STATION: 2.5 KILOMETRES WEST OF HOWARD AVENUE, AUGUST 2005) – BOTH DIRECTIONS AM PEAK HOUR



Note: EB Monday data is unavailable

EXHIBIT 5. HIGHWAY 3 TRAFFIC VOLUMES (MTO CLASS STATION: 2.5 KILOMETRES WEST OF HOWARD AVENUE, AUGUST 2005) – BOTH DIRECTIONS PM PEAK HOUR



Note: WB Saturday data is unavailable

EXHIBIT 6. EXISTING (2006) AM PEAK HOUR VOLUMES

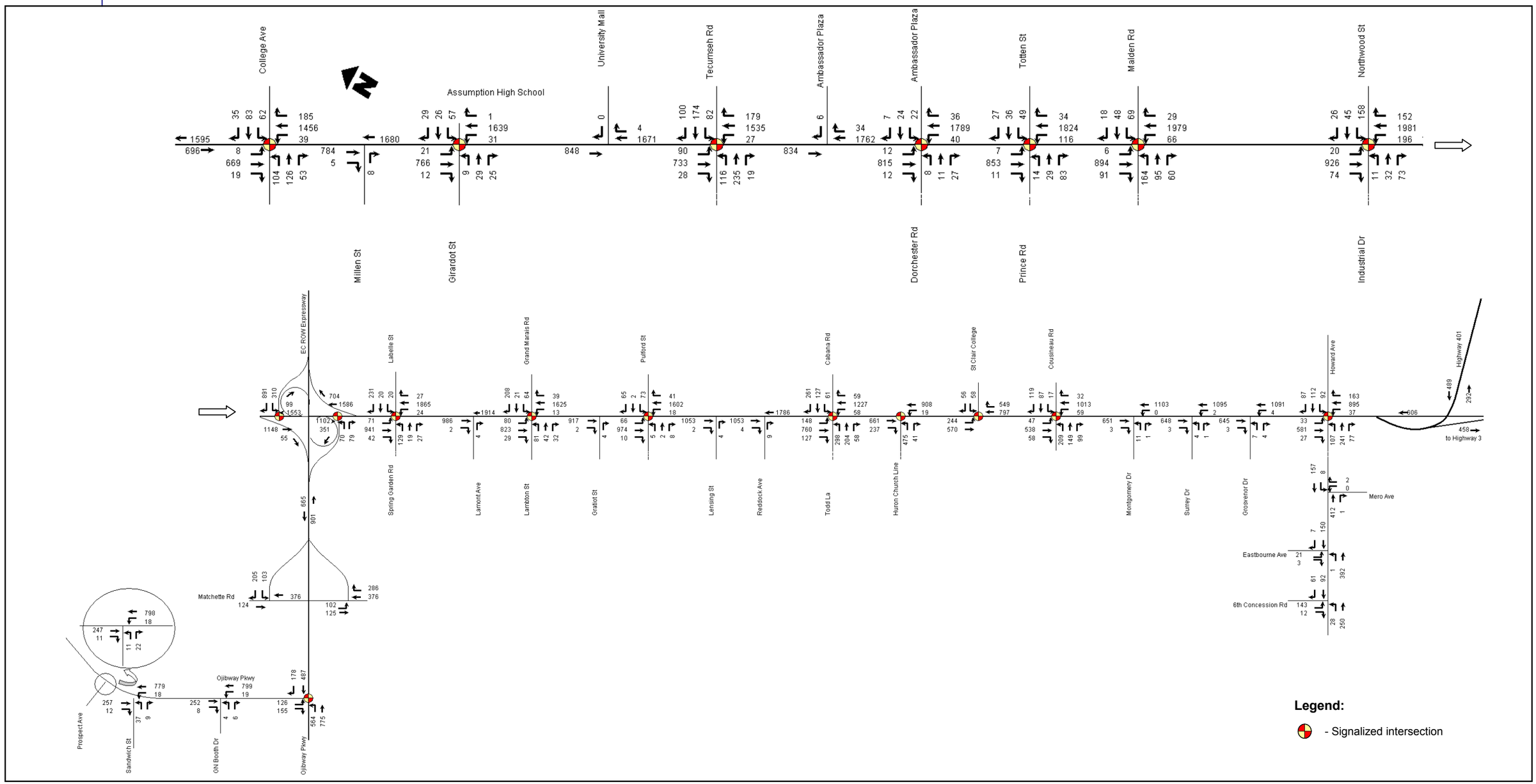


EXHIBIT 7. EXISTING (2006) PM PEAK HOUR VOLUMES

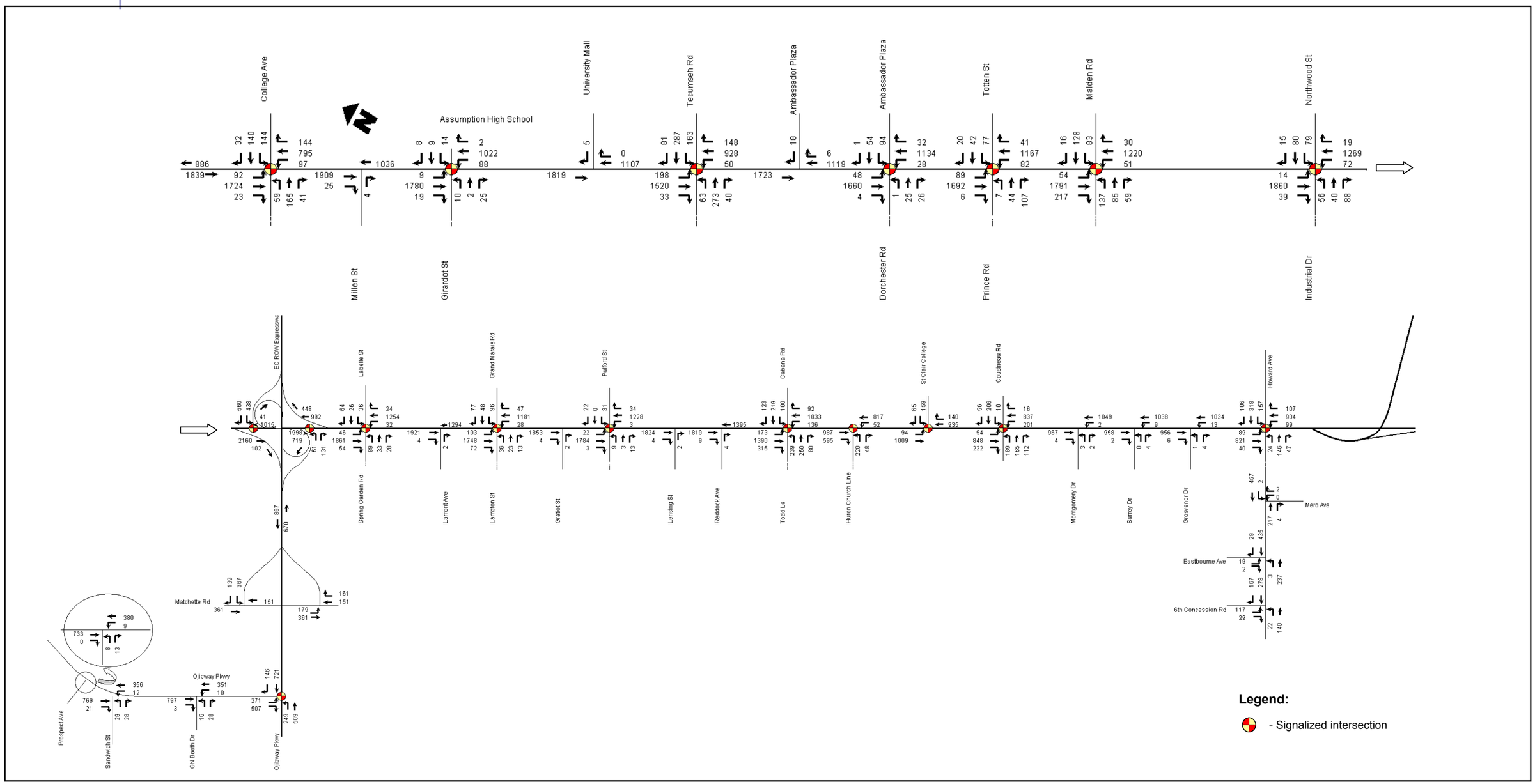
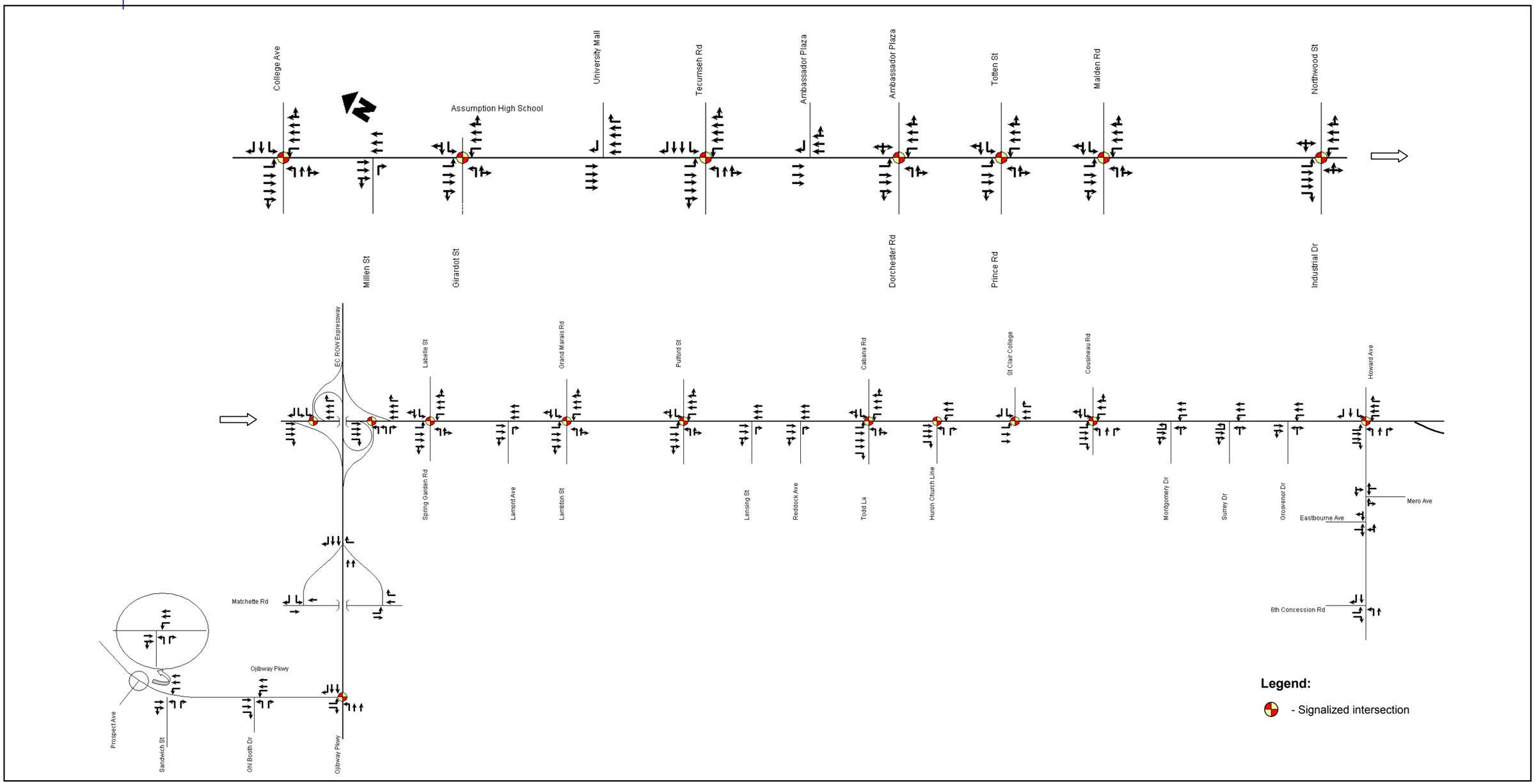


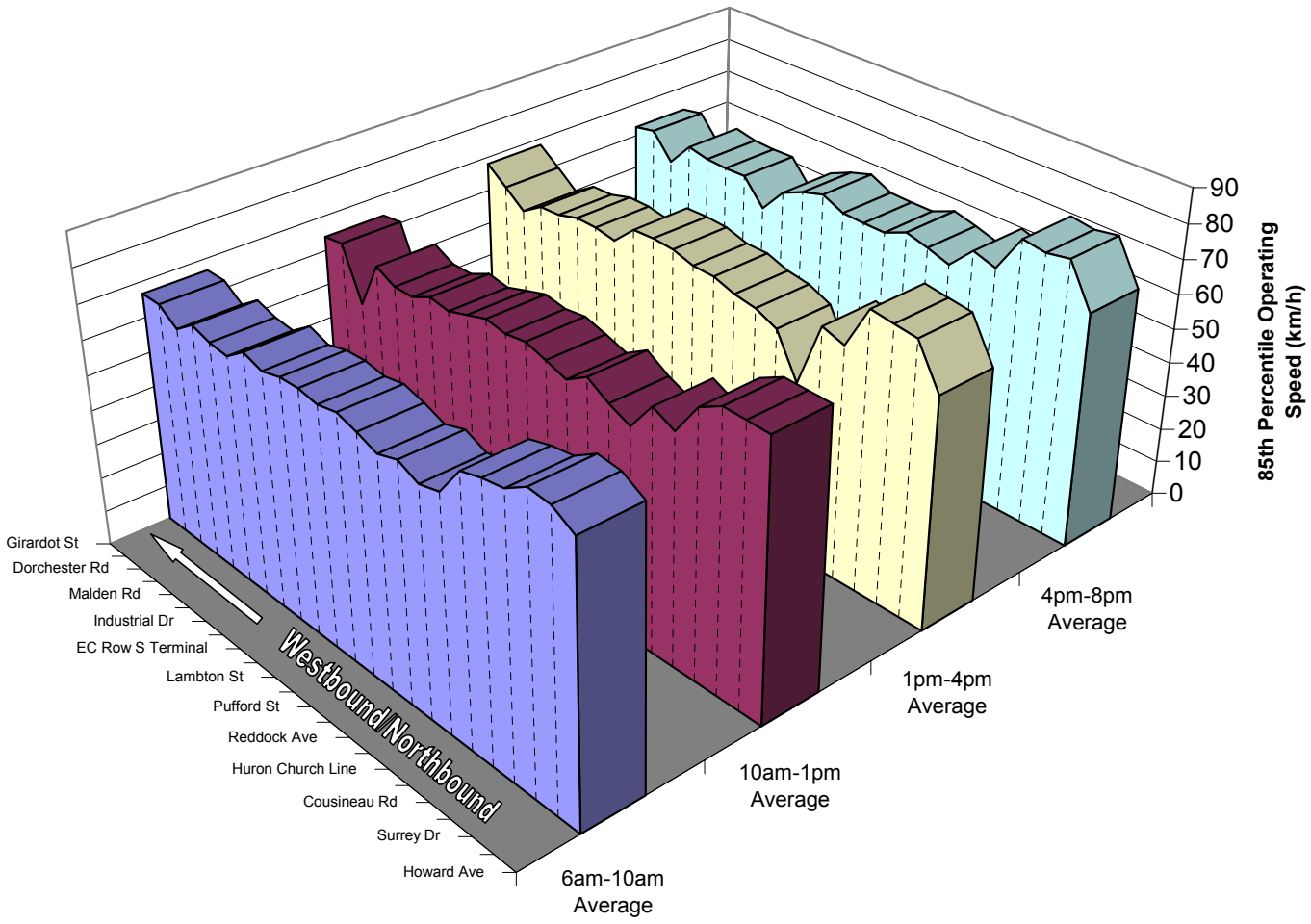
EXHIBIT 8. EXISTING INTERSECTION LANE CONFIGURATIONS



2.3.2. Travel Time and Delay Surveys

Travel time and delay surveys were undertaken on Thursday, February 16, 2006 along the corridor between Highway 401 and the Ambassador Bridge Plaza (6 AM to 8 PM). As shown in Exhibit 9, operating speeds in the westbound/northbound direction (toward the Ambassador Bridge) are consistent throughout the AM peak period (7 AM to 10 AM), averaging 60 km/h with some slowdowns at Tecumseh Road and Howard Avenue. The average travel time along the corridor between Howard Avenue and College Avenue (9.4 km) was approximately ten minutes (7 AM to 10 AM). In fact, average travel times for other time periods were found to be comparable and are within the 10-minute range. Field observations revealed short queues on Huron Church Road approaching the plaza (at College Avenue). Traffic queues were noted to dissipate within the next available green phase.

EXHIBIT 9. SPEED/DELAY SURVEY SUMMARY – WESTBOUND/NORTHBOUND DIRECTION



Traffic in the southbound/eastbound direction, shown in Exhibit 10, peaks during the PM peak periods. Average travel times (College Avenue to Howard Avenue) range between 10 minutes during the morning peak period and 13 minutes 20 seconds during the PM peak period (5 PM to 8 PM, refer to Exhibit 11). Operating speeds, averaging about 47 km/h, were noted to decrease on approaches to Tecumseh Road, Malden Road, Pulford Street, St Clair College and Howard Avenue; however, traffic queues would normally dissipate within the next available green time in the peak direction.

EXHIBIT 10. SPEED/DELAY SURVEY SUMMARY – SOUTHBOUND/EASTBOUND DIRECTION

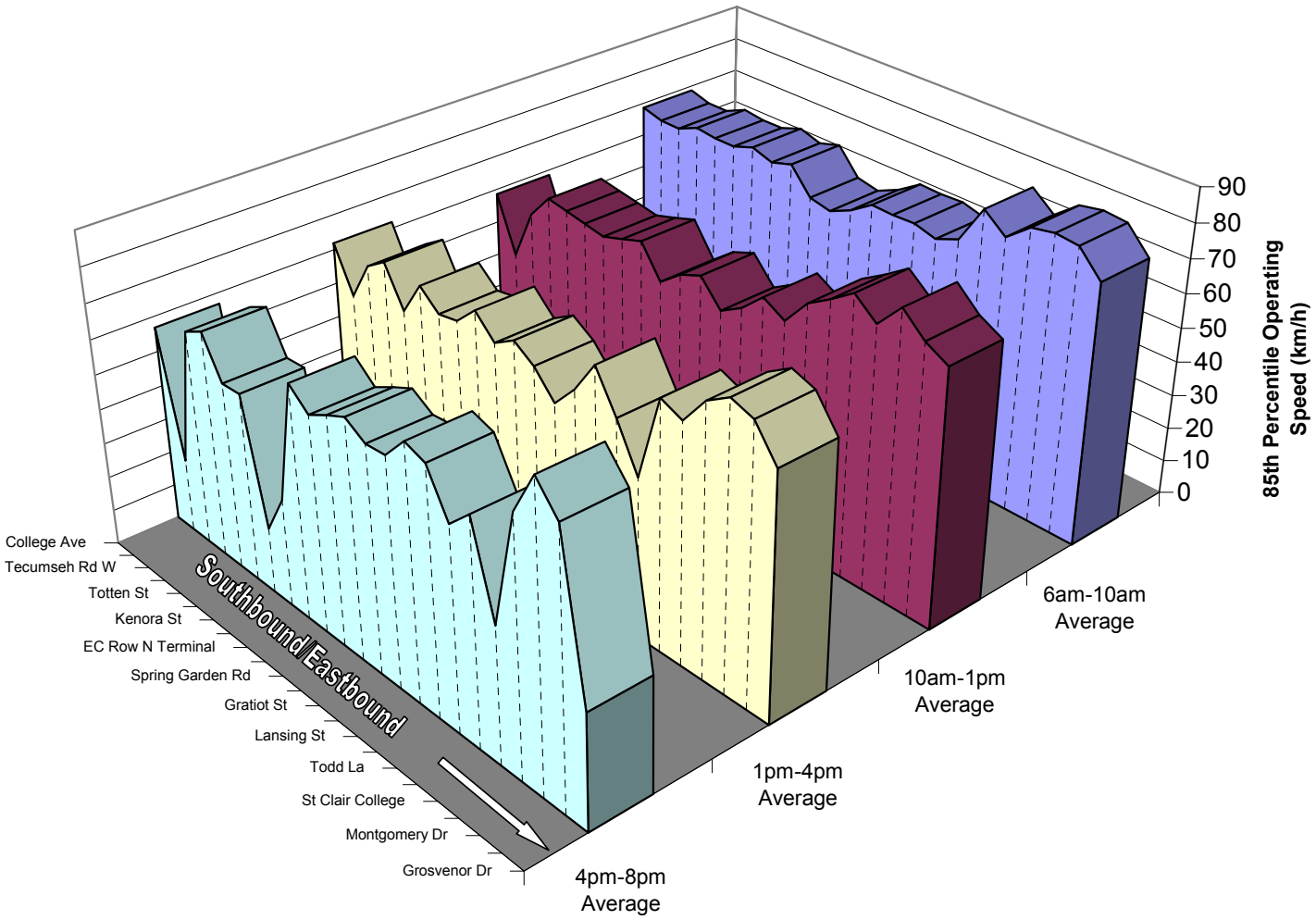
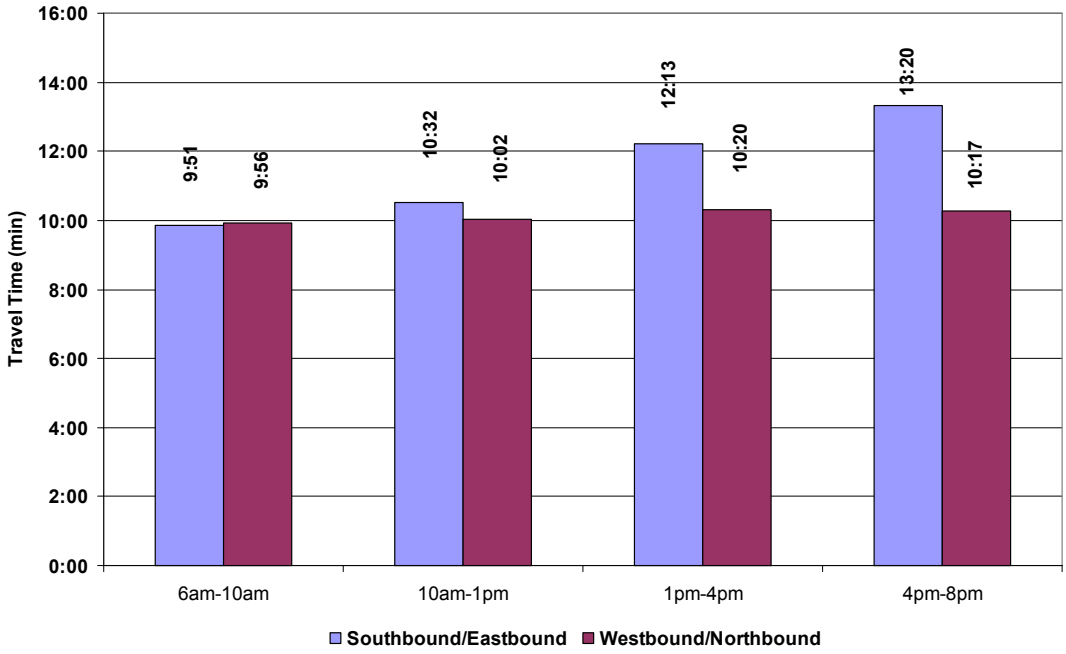


EXHIBIT 11. TRAVEL TIMES ON HIGHWAY 3/HURON CHURCH ROAD BETWEEN HOWARD AVENUE AND COLLEGE AVENUE



As can be seen from the graph, observed travel times in the southbound/eastbound direction are slightly longer then those recorded in the westbound/northbound direction. The difference in travel times is more pronounced in the PM peak period.

2.3.3. Saturation Flow Rate Surveys

Saturation flow rate can be described as the number of vehicles per lane that can pass through an intersection during one hour of continuous green time. Saturation flow rate is affected by variables including but not limited to heavy vehicle percentage, lane width and flow speed. For the purposes of this study, the saturation flow rate is used as an input into the traffic models used for the analysis of existing and future traffic.

Surveys of saturation flow rates were carried out at six locations along the corridor on February 16, 2006. The locations were selected at the intersections of Highway 3 with Howard Avenue, Cousineau Avenue/Sandwich West Parkway and Todd Lane/Cabana Road, and on Huron Church Road at Tecumseh Road, Malden Road and College Avenue. The observations were timed to coincide with the collection of the travel time and delay data discussed above, and were surveyed during morning and evening peak periods.

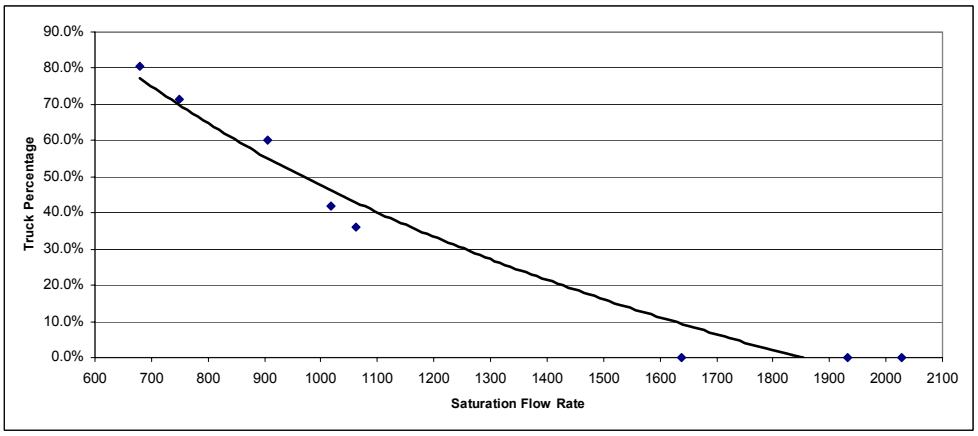
The surveys were carried out using the methodology described in the ITE Manual of

Transportation Engineering Studies, and using the field saturation flow rate study worksheets from the FHWA Highway Capacity Manual.

All observations noted the significant impact of trucks on the saturation flow rate, noting saturation flow rates for through lanes as low as 700 vehicles per hour per lane where more than 70% of the flow consisted of trucks, as shown in Exhibit 12. Where observations without trucks in the traffic stream were possible, saturation flow rates for through lanes of up to 2,000 vehicles per hour per lane were observed.

Overall, the average through lane saturation flow calculated for the Highway 3 intersections without trucks in the traffic stream was approximately 1,780 vehicles per hour per lane. The saturation flow calculations on Huron Church Road indicated an average through lane saturation flow of approximately 1,850 vehicles per hour per lane. To ensure a consistent and conservative approach, ideal saturation flows of 1,750 vehicles per hour per lane were used in the Synchro analysis of existing and future conditions. The delays predicted in the Synchro analysis using existing traffic volumes and traffic signal timings with the ideal saturation flow rate of 1,750 vehicles per hour per lane were compared with the results of the travel time surveys. The comparison indicated that the delays and travel times predicted by Synchro closely replicated the results of the travel time surveys.

EXHIBIT 12. THROUGH LANE SATURATION FLOW RATE VS. TRUCK PROPORTION, HURON CHURCH ROAD



2.4. Existing Traffic Operations

2.4.1. Description of Level of Service and V/C Ratio

Levels of service (LOS) were calculated using Highway Capacity Manual (HCM) methodology contained within the Synchro 6.0 traffic modelling/analysis software package for the studied intersections. LOS evaluation uses a six-letter grade scale (A to F) to rank the overall traffic handling ability of an intersection or a network based on delay per

vehicle. LOS A indicates excellent traffic operations with minimal delays, while LOS F represents failing conditions with long delays. Levels of service E and F are generally considered undesirable. Tables 2 and 3 summarize the associated delays and description of each level of service for signalized and unsignalized intersections, respectively.

TABLE 2. LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Control Delay per Vehicle (s/veh)	Description
A	0 – 10	Operations with very low delay
B	> 10 – 20	This LOS generally occurs with good progression.
C	> 20 – 35	These higher delays may result from fair progression.
D	> 35 – 55	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, longer cycle lengths, or high volume-to-capacity (v/c) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable. This level is considered by many agencies to be the limit of acceptable delay.
E	> 55 – 80	These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
F	> 80	This level, considered to be unacceptable to most drivers, often occurs with over-saturation; that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and cycle lengths may also be major contributing causes to such delay levels.

TABLE 3. LEVEL OF SERVICE CRITERIA FOR TWO-WAY STOP-CONTROLLED INTERSECTIONS

Level of Service	Control Delay per Vehicle (s/veh)	Description
A	0 – 10	Little or no delay
B	> 10 – 15	Short traffic delays
C	> 15 – 25	Average delays
D	> 25 – 35	Long delays
E	> 35 – 50	Very long delays
F	> 50	Extremely long delays with significant queuing and congestion

Synchro was also used to calculate volume-to-capacity (V/C) ratios at the studied intersections. V/C is a measure of effectiveness (MOE) that measures the ability of a roadway facility (typically a link or intersection) to accommodate its associated demand. It is calculated by dividing the actual demand on the facility by its theoretical capacity. The

capacity of an intersection is an adjustment of the saturation flow rate that takes into account signal timings. A V/C ratio less than 0.85 generally indicates that the facility has the capacity to accommodate the existing demand, and vehicles will not experience undue congestion and delay. A V/C below 0.85 also indicates that the facility likely has the excess capacity to accommodate future demand. As the V/C ratio approaches 1.0, delay and congestion may begin to occur, along with traffic instability. Finally, when the V/C ratio exceeds 1.0, it indicates that the facility is operating over capacity, with no accommodations for future growth. Motorists will typically experience undue delay and congestion, and may have to wait through multiple signal cycles before proceeding through an intersection.

It is possible for some intersections with V/C ratios at or approaching capacity to operate with good or acceptable levels of service, which indicate low to average delay per vehicle at the intersections. There are two important points to note with respect to this situation:

- LOS is calculated based on the average delay per vehicle at the intersection. Delay is defined as the sum of control (or signal) delay and queue delay, which is the amount of time spent stopped while the traffic signal is green; and
- The intersection V/C ratio is calculated based on the theoretical capacity of the intersection and takes into consideration variables such as saturation flow rate, flow speed, signal timing and progression, number of lanes and lane geometrics.

Due to the different measurements they represent, these two methods of quantifying traffic operations can yield seemingly contradictory results. For this reason, they are often used in conjunction with each other. An intersection with an acceptable LOS and poor V/C ratio can often be explained by looking at the cross-street volumes, signal timings and signal progression throughout the corridor. If an intersection is operating at capacity but with low overall delay, it may indicate that cross-street volumes are low enough that a high percentage of green time can be dedicated to the peak direction through movement. Such is the case on Huron Church Road, where most intersections only provide green time to turning movements and side streets when actuated by a vehicle. The signals dwell on green for Huron Church Road at all other times.

In addition, if signals are timed so as to provide good corridor progression, as is the case for the studied intersections north of Huron Church Line, vehicles arriving at the intersection will experience minimal delay, because the signal will either be green upon arrival or changing to green shortly thereafter. However, a V/C ratio of 1.0 indicates that the theoretical capacity of the intersection has been reached and any additional vehicles that use the intersection will contribute to increased delay for all vehicles.

Levels of Service A through C are desirable levels of service while LOS D is typically considered to be an acceptable level of service especially at major urban intersections during peak hours. Levels of service E and F are generally considered undesirable. Given the strategic importance of a Detroit River international crossing to the local, regional and national economies, it may be appropriate to design to ensure a higher level of service for facilities that define the routing to the international crossing. This recognizes that there are limited opportunities to divert international traffic to other facilities, and providing better

level of service margin is desirable should traffic demands be higher than projected and/or to allow smoother operations during periods where there may be surges or spikes in demand.

2.4.2. Analysis of Existing Operations

Synchro 6.0 traffic modelling/analysis software was used to evaluate existing traffic conditions in the Area of Continued Analysis. For the evaluation, the collected traffic volumes, existing lane configurations and other inputs were entered into Synchro to develop a model for the existing conditions. The model was calibrated based on the observed saturation flows and travel times. SimTraffic, Synchro's associated traffic simulation software, was used to assist in the development of a model that accurately replicates existing traffic conditions.

The PM peak hour represents the worst-case conditions along the corridor, with peak direction (southbound/eastbound) volumes ranging from approximately 1,000 vehicles per hour at Howard Avenue to approximately 2,000 vehicles per hour at Malden Road. The off-peak direction carries approximately 1,200 vehicles per hour.

Tables 4 and 5 summarize Synchro output for peak direction LOS, delay per vehicle, V/C ratio and overall intersection LOS for the AM and PM peak hour, respectively. During the AM peak hour, only the intersection of Highway 3 and Todd Lane/Cabana Road is operating at an overall LOS below LOS C. There are no peak-direction through movements operating below LOS C. The intersection of Huron Church Road and Malden Road is currently operating with a V/C ratio of 0.86, indicating that this intersection is approaching its theoretical capacity.

TABLE 4. EXISTING AM PEAK HOUR & DIRECTION INTERSECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College Ave.	A	2.9	0.59	B
Girardot St.	B	11.0	0.54	B
Tecumseh Rd.	C	28.7	0.75	C
Dorchester Rd.	A	2.3	0.49	A
Prince Rd / Totten St.	A	2.8	0.65	A
Malden Rd.	B	10.7	**0.86**	B
Northwood St. / Industrial Dr.	A	9.5	0.81	B
E.C. Row Ramp	A	1.8	0.53	A

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
North				
E.C. Row Ramp South	A	4.0	0.48	A
Labelle St.	A	7.7	0.76	B
Grand Marais Rd. / Lambton St.	B	13.9	0.73	B
Pulford St.	B	12.8	0.58	B
Cabana Rd. / Todd Ln.	C	33.9	0.80	D
Huron Church Line	B	13.7	0.74	C
St. Clair College	B	12.4	0.56	A
Cousineau Rd.	C	22.4	0.74	C
Howard Ave.	C	27.3	0.75	C

For the PM peak hour, the intersection of Highway 3 and Cabana Road/Todd Lane is again operating below LOS C, with the eastbound through movement also operating at LOS D. This indicates that all traffic at this intersection is beginning to experience delay that is approaching unacceptable levels. Four intersections, spanning the length of the studied corridor are currently operating with V/C ratios of 0.85 or above, indicating that these intersections are approaching their theoretical capacity.

TABLE 5. EXISTING PM PEAK HOUR & DIRECTION INTERSECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College Ave.	C	27.6	0.87	C
Girardot St.	A	6.3	0.66	A
Tecumseh Rd.	B	15.8	0.73	C
Dorchester Rd.	A	2.6	0.62	A
Prince Rd / Totten St.	A	4.8	0.69	A
Malden Rd.	B	11.9	0.85	B
Northwood St. / Industrial Dr.	A	6.2	0.76	B
E.C. Row Ramp	A	8.3	0.81	B

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
North				
E.C. Row Ramp South	A	2.9	0.62	A
Labelle St.	B	11.8	0.70	B
Grand Marais Rd. / Lambton St.	B	13.8	0.76	B
Pulford St.	A	8.3	0.54	A
Cabana Rd. / Todd Ln.	D	45.5	0.86	D
Huron Church Line	B	14.5	0.52	B
St. Clair College	A	5.6	0.56	B
Cousineau Rd.	C	27.4	0.75	C
Howard Ave.	D	39.6	0.90	C

Travel time and arterial LOS are other means of evaluating traffic operations along a corridor. The calibrated existing conditions Synchro model reports an AM peak hour northbound travel time of over 13 minutes (800 seconds) along the entire corridor. The PM peak hour southbound travel time is nearly 13 minutes (770 seconds). These times are generally consistent with travel times observed in the field.

Table 6 shows arterial level of service. Generally, roadway links along the corridor operate with arterial LOS of C or better, supporting the overall corridor LOS. However, deficiencies were found around Tecumseh Road, Malden Road, Todd Lane/Cabana Road, Huron Church Line and Howard Avenue, which report lower LOS ranging from D to F. The arterial operating conditions on these links are consistent with the traffic volumes, turning movements, capacity and delay found at their associated intersections.

TABLE 6. EXISTING ARTERIAL LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Segment	AM Peak Hour		PM Peak Hour	
	WB/NB	SB/EB	WB/NB	SB/EB
Ambassador Bridge-College St.	B	N/A	B	N/A
College St.-Girardot St.	B	B	A	B
Girardot St.-Tecumseh Rd. W	F	B	E	C
Tecumseh Rd. W-Dorchester St.	C	B	C	C
Dorchester St.-Prince Rd.	C	C	C	C
Prince Rd.-Malden Rd.	B	C	B	D

Segment	AM Peak Hour		PM Peak Hour	
	WB/NB	SB/EB	WB/NB	SB/EB
Malden Rd.-Industrial Rd.	C	B	B	B
Industrial Rd.-E.C. Row (north ramp)	B	B	C	C
E.C. Row (north ramp)-E.C. Row (south ramp)	B	B	B	B
E.C. Row (south ramp)-Spring Garden Rd.	B	C	B	C
Spring Garden Rd.-Lambton St.	C	B	C	C
Lambton St.-Pulford St.	B	B	B	B
Pulford St.-Todd Lane	F	C	F	D
Todd Lane-Huron Church Line	A	D	A	D
Huron Church Line-St. Clair College	A	A	A	A
St. Clair College-Cousineau Rd.	A	A	A	B
Cousineau Rd.-Howard Ave.	C	A	D	B
Overall	**B**	**B**	**B**	**C**

Overall, the results indicate that corridor operations are constrained at select intersections throughout its length. These intersections create bottlenecks at critical locations, resulting in the degraded traffic operations shown at intersections such as Tecumseh Road and Todd Lane/Cabana Road. It should also be noted that the results shown in this table and other existing conditions tables represent a snapshot of traffic conditions in February 2006, when traffic data was collected for this study.

Seasonal variations in traffic and other factors may result in different operating conditions at other times of the year. However, regardless of season, traffic operations have improved considerably since July 2004 when U.S.-bound border processing capacity was added at the bridge, even though truck traffic has continued to increase. The improvements from pre-July 2004 traffic operations are due mostly to this expanded border processing capacity.

3. Future Conditions with Base Case

3.1. Traffic Growth and Travel Patterns

The Level 2 Traffic Operations Analysis presented in subsequent sections is based on forecasts of international and domestic traffic volumes and origin-destination travel patterns developed using the DRIC Travel Demand Model (the "Model"). The international component of the Model is based on extensive travel origin-destination surveys of cross-border passenger car and commercial vehicle traffic at the Detroit River crossings. The domestic component is adopted from existing regional models on both sides of the border, consisting of the Essex-Windsor Regional Transportation Master Plan and the Southeast Michigan Council of Governments (SEMCOG) models.

The Model includes detailed representation of the road and highway system in the greater Windsor-Detroit areas and all major roads/highways in the rest of Southeast Michigan and Southwest Ontario. The Model has been validated against 2004 data and considers the impacts of various extreme events (e.g. 9/11, SARS, Iraq War) and socio-economic trends (e.g. exchange rate, fuel prices) that have significantly affected trends in cross-border trade and travel in recent years. A complete description of the development of the Model is provided in the DRIC ***Travel Demand Model Update Working Paper*** (September 2005).

3.1.1. Regional Traffic Growth

Future growth in traffic in the Study Area of Continued Analysis was determined separately in the Model for international passenger cars and commercial vehicles and domestic cars and trucks. For international cars and trucks, future growth in traffic was determined using a market segmentation approach. For cars, trends in same-day work/business, same-day discretionary/recreation and overnight/vacation travel were related to regional (i.e. Southwest Ontario/Southeast Michigan) population and employment. Forecasts of these were used then to estimate future travel for each market. For commercial vehicles, national forecasts of trade by commodity type were applied to the mix of goods transported within the Area of Continued Analysis to estimate future travel for each market. For details of this process, see the ***Travel Demand Forecasts Working Paper*** (September 2005).

The Model predicts traffic at each crossing (existing or new) using a two-step process. First, traffic is split amongst the two ports (i.e. Windsor-Detroit and Sarnia-Port Huron) using a port choice model. Second, the traffic in Windsor-Detroit is subsequently split amongst the crossings there based on a user-equilibrium route assignment procedure. As such, the future traffic volumes at each port and crossing are not fixed. Rather, they are dependent on the overall regional transportation system performance and level of service (i.e. the travel times and costs of each facility and the respective access roads).

The total projected Base Case two-way 2004 to 2035 annual cross-border traffic volumes

and growth at the two Detroit River crossings combined are presented in Table 7. The projected volumes at each individual crossing are specific to each scenario and are presented in the next section.

TABLE 7. DETROIT RIVER CROSSINGS BASE CASE FORECAST ANNUAL TWO-WAY VEHICLE VOLUMES

Vehicle Type	Two-Way Volumes by Horizon Year				2004 to 2035 Growth		
	2004	2015	2025	2035	Total	%	CAGR[1]
Passenger Cars	11,950,000	16,280,000	17,570,000	18,740,000	6,790,000	57%	1.5%
Commercial Vehicles	3,530,000	5,180,000	6,630,000	8,060,000	4,530,000	128%	2.7%
Total	15,490,000	21,460,000	24,200,000	26,800,000	11,310,000	73%	1.8%

[1] Compound annual growth rate.

Future year domestic passenger car traffic was derived from the Essex-Windsor Regional Transportation Master Plan and the Southeast Michigan Council of Governments models. Domestic traffic growth is approximately 23% (0.7% per annum) and 15% (0.4% per annum) in each area, respectively. This growth is consistent with expected population and employment growth in each region.

3.1.2. Peak Hour Crossing Volumes

For this traffic operations analysis, forecasts have also been prepared to represent peak hour flows. The forecast Base Case peak hour and direction volumes on the Detroit River crossings is presented in Table 8. As can be seen, the PM peak hour will still represent the peak period of travel within the day. The growth is generally consistent with the levels presented in Section 3.1.1, with the volume shares amongst the crossings dependent on the volumes and resulting level of service of the access roads to the crossings and the crossings themselves.

3.1.3. Travel Patterns

Exhibit 13 illustrates the future 2035 Base Case local travel patterns for Canada-bound cars and trucks in the PM peak hour, representing the peak demand time period and direction. To allow for more equal comparison, both volumes are shown in Passenger Car Equivalents (PCEs) where one car is equivalent to one PCE and one truck is equivalent to 2.5 PCEs for travel on roads and highways.

TABLE 8. DETROIT RIVER CROSSINGS BASE CASE FORECAST PEAK HOUR & DIRECTION VOLUMES

A. AM PEAK HOUR (CANADA TO U.S.)

Crossing	Year	Cars		Trucks		Total	
		Volume	% Growth	Volume	% Growth	Volume	% Growth
Ambassador Bridge	2004	1,160	0%	230	0%	1,390	0%
	2015	1,400	21%	310	35%	1,710	23%
	2025	1,550	34%	390	70%	1,940	40%
	2035	1,700	47%	470	104%	2,170	56%
Detroit-Windsor Tunnel	2004	800	0%	5	0%	805	0%
	2015	970	21%	10	100%	980	22%
	2025	1,080	35%	30	500%	1,110	38%
	2035	1,170	46%	40	700%	1,210	50%
Total	2004	1,960	0%	235	0%	2,195	0%
	2015	2,370	21%	320	36%	2,690	23%
	2025	2,630	34%	420	79%	3,050	39%
	2035	2,870	46%	510	117%	3,380	54%

B. PM PEAK HOUR (U.S. TO CANADA)

Crossing	Year	Cars		Trucks		Total	
		Volume	% Growth	Volume	% Growth	Volume	% Growth
Ambassador Bridge	2004	1,180	0%	390	0%	1,570	0%
	2015	1,500	27%	510	31%	2,010	28%
	2025	1,670	42%	680	74%	2,350	50%
	2035	1,880	59%	770	97%	2,650	69%
Detroit-Windsor Tunnel	2004	930	0%	10	0%	940	0%
	2015	1,220	31%	40	300%	1,260	34%
	2025	1,310	41%	60	500%	1,370	46%
	2035	1,300	40%	150	1400%	1,450	54%
Total	2004	2,110	0%	400	0%	2,510	0%
	2015	2,720	29%	550	38%	3,270	30%
	2025	2,980	41%	740	85%	3,720	48%
	2035	3,180	51%	920	130%	4,100	63%

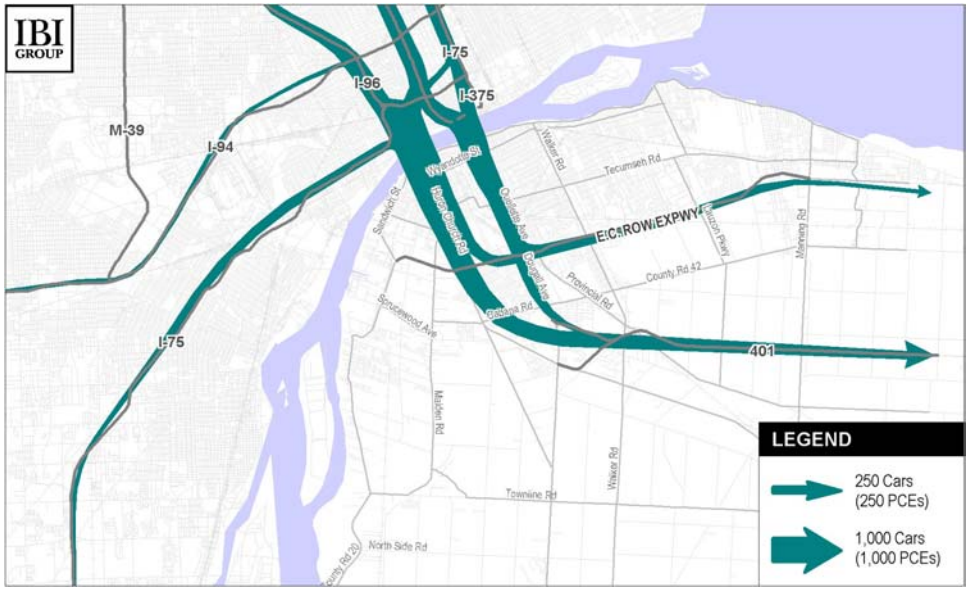
The car and truck plots contrast the differences in their respective travel patterns. Cross-border passenger car trips are predominately local, with approximately 80% of these trips

starting and ending within the Windsor-Detroit area. This results in higher flows on the more centrally-located road facilities between central Detroit and central Windsor and lower flows on road facilities leading beyond the local area such as on Highway 401 and I-75 (south to Toledo).

The commercial vehicle plots are indicative of their longer-distance nature with approximately one-half of the trips travelling through the Windsor-Detroit area, largely using Highway 401 in Ontario and I-75 (south to Toledo) and I-96 (west to Lansing) in Michigan. Approximately one-third of commercial vehicle trips start or end in the Windsor area and these trips are distributed across numerous Windsor road facilities. The remaining two-thirds of commercial vehicle trips utilize Highway 401 to make longer-distance trips beyond the Windsor area. On the U.S. side, a significant proportion of the longer-distance commercial vehicle trips travel to/from locations south of the Detroit area utilizing I-75 (south to Toledo).

EXHIBIT 13. 2035 BASE CASE PM PEAK HOUR U.S. TO CANADA TRAFFIC FLOWS

A. PASSENGER CARS



B. COMMERCIAL VEHICLES

3.2. Planned Road Network Improvements

There are a number of planned improvements to the Area of Continued Analysis road network that are expected to be completed prior to future horizon years. These improvements were explicitly represented in the Model and affect the results presented in this report. All improvements are assumed to be completed by 2015, the first horizon year for this study. The following includes all known improvements in the Windsor-Essex area, including those outside the analysis area, as indicated in the Essex-Windsor Regional Transportation Master Plan:

- Howard Avenue widening (Four lanes; Highway 3 to Provincial Road);
- Cabana Road widening (Four lanes; Highway 3 to Essex CR 25); and
- Huron Church Line widening (Four lanes; Highway 3 to Sandwich West Parkway);

The following improvements are expected within the Windsor-Essex region, but outside of the Area of Continued Analysis:

- Lauzon Road widening (Edgar to Wyandotte);
- Tecumseh Road widening (Jefferson to Banwell);
- Walker Road widening (Tecumseh to City Limit);
- Talbot Trail extension (Essex CR 34 to Essex CR 20);
- Provincial Road/Division Road widening (Howard to south City Limit);
- Essex CR 25 realignment (near Wallace Woods);
- Essex CR 19 (Manning) capacity improvements (Jamesyl to Hwy 3);

- Essex CR 22 widening (Essex CR 43 to West River Road);
- Malden Road widening (Todd to south City Limits);
- Laurier Drive extension (Malden to Howard);
- Lauzon Road widening (EC Row to Highway 3);
- EC Row widening (Huron Church to Banwell); and
- Highway 401 widening (Highway 3 to Essex CR 42).

3.3. Base Case Traffic Operations Analysis

In order to undertake a transportation assessment of alternatives for future horizon years within the Area of Continued Analysis, it is necessary to establish a future Base Case baseline condition that reflects projected future volumes, committed area transportation improvements and travel patterns, but not include the proposed new crossing and supporting infrastructure or its associated impacts to the corridor. The following sections describe expected traffic operations for the 2015, 2025 and 2035 horizon years under the Base Case.

3.3.1. Access Road Volumes

The DRIC Travel Demand Model was used to determine traffic volumes on the corridor for the horizon years of 2015, 2025 and 2035. The resulting volumes on major road segments are shown in Table 9 for the peak hour and direction. Overall, between 2006 and 2035, total traffic on the corridor (consisting of the combined domestic and international car and truck traffic) is projected to grow by about 20% in the AM peak hour and by about 25% in the PM peak hour, using the available capacity. The overall proportions of international trucks on the corridor is expected to increase by about 12 and 16 percentage points in the AM and PM peak hours, respectively.

The model constrains growth on the corridor due to capacity limitations, with excess demand redistributed to other feasible adjacent routes. That is, given the existing congestion on Huron Church Road/Highway 3, only about one-third of the growth in international traffic is estimated to use the corridor in 2035, with the remaining two-thirds of the international traffic spilling over to other Windsor-area roads. With the expected increases in domestic, international car and, in particular, international truck traffic, a significant portion of domestic car and truck trips currently using Huron Church Road also divert to use other routes in the future Base Case. Without this model redistribution of traffic, the traffic volumes, levels of congestion and delay on Huron Church Road would be significantly higher than the model predicts while adjacent facilities remained uncongested. In the recent past (i.e. prior to the opening of U.S.-bound border processing capacity at the bridge in July 2004), very high levels of congestion and queuing have existed on Huron Church Road and, as a result, some traffic has diverted to other adjacent routes. While the model may not predict perfectly the amount and extent of this diversion (as it appears that some drivers are willing to remain on Huron Church Road despite faster alternative

routes), it is far closer to observed behaviour than the highly unlikely result of no diversion at all.

TABLE 9. BASE CASE PEAK HOUR & DIRECTION CORRIDOR VOLUMES

A. AM PEAK HOUR (WESTBOUND/NORTHBOUND)

To	From	2006		2015		2025		2035		2006 to 2035 Growth		
		Veh	% Int. Trucks	Veh	% Int. Trucks	Veh	% Int. Trucks	Veh	% Int. Trucks	Veh	Veh %	% Int. Trucks
Amb. Bridge	College	1,600	22%	1,780	25%	1,860	24%	1,920	27%	320	20%	5%
College	Girardot	1,680	12%	1,860	17%	1,940	19%	1,990	23%	310	18%	11%
Girardot	Tecumseh	1,670	11%	1,860	16%	1,930	19%	1,990	23%	320	19%	12%
Tecumseh	Dorchester	1,800	11%	2,000	15%	2,080	19%	2,140	23%	340	19%	12%
Dorchester	Prince	1,870	11%	2,070	15%	2,160	18%	2,230	22%	360	19%	11%
Prince	Malden	2,070	10%	2,310	14%	2,410	18%	2,490	21%	420	20%	11%
Malden	Northwood	2,070	12%	2,310	17%	2,410	22%	2,490	27%	420	20%	15%
Northwood	ECR North	2,330	11%	2,610	15%	2,740	18%	2,840	22%	510	22%	12%
ECR North	ECR South	1,650	16%	1,810	22%	1,920	26%	1,970	31%	320	19%	15%
ECR South	Labelle	2,290	10%	2,550	15%	2,740	17%	2,850	20%	560	24%	10%
Labelle	Grand Marais	1,920	12%	2,090	17%	2,220	20%	2,270	24%	350	18%	12%
Grand Marais	Pulford	1,680	14%	1,830	19%	1,940	22%	1,990	26%	310	18%	12%
Pulford	Cabana	1,660	14%	1,810	19%	1,920	23%	1,970	26%	310	19%	12%
Cabana	HC Line	1,340	13%	1,470	18%	1,570	22%	1,610	25%	270	20%	12%
HC Line	St. Clair	930	15%	1,040	23%	1,010	30%	1,080	35%	150	16%	20%
St. Clair	Cousineau	1,350	15%	1,540	23%	1,580	30%	1,690	35%	340	25%	20%
Cousineau	Howard	1,100	14%	1,240	16%	1,230	20%	1,310	22%	210	19%	9%

B. PM PEAK HOUR (SOUTHBOUND/EASTBOUND)

From	To	2006		2015		2025		2035		2006 to 2035 Growth		
		Veh	% Int. Trucks	Veh	% Int. Trucks	Veh	% Int. Trucks	Veh	% Int. Trucks	Veh	Veh %	% Int. Trucks
Amb. Bridge	College	1,840	22%	2,110	26%	2,240	30%	2,300	31%	460	25%	9%
College	Girardot	1,820	19%	2,090	25%	2,210	29%	2,270	35%	450	25%	15%
Girardot	Tecumseh	1,810	19%	2,070	25%	2,200	29%	2,250	35%	440	24%	15%
Tecumseh	Dorchester	1,710	16%	1,960	21%	2,080	27%	2,140	34%	430	25%	18%
Dorchester	Prince	1,790	15%	2,050	20%	2,170	25%	2,230	31%	440	25%	16%
Prince	Malden	2,060	15%	2,360	20%	2,510	25%	2,590	31%	530	26%	16%
Malden	Northwood	1,910	18%	2,190	25%	2,330	33%	2,390	35%	480	25%	17%
Northwood	ECR North	2,260	15%	2,510	21%	2,690	26%	2,790	32%	530	23%	17%
ECR North	ECR South	2,720	13%	3,020	18%	3,250	23%	3,400	28%	680	25%	15%
ECR South	Labelle	1,960	15%	2,180	22%	2,330	24%	2,420	28%	460	23%	12%
Labelle	Grand Marais	1,920	17%	2,140	24%	2,290	27%	2,380	31%	460	24%	14%
Grand Marais	Pulford	1,810	18%	2,010	25%	2,150	27%	2,220	31%	410	23%	13%
Pulford	Cabana	1,830	19%	2,030	26%	2,170	28%	2,250	32%	420	23%	13%
Cabana	HC Line	1,580	16%	1,680	24%	1,760	26%	1,880	27%	300	19%	11%
HC Line	St. Clair	1,100	20%	1,140	32%	1,170	38%	1,250	44%	150	14%	24%
St. Clair	Cousineau	1,160	20%	1,220	32%	1,280	38%	1,360	44%	200	17%	24%
Cousineau	Howard	1,030	17%	1,070	23%	1,110	26%	1,180	29%	150	15%	12%

Note: Corridor results are affected by traffic redistribution to other feasible adjacent routes.

To illustrate the extent of traffic redistribution predicted by the Model, a screenline analysis of traffic growth on facilities adjacent to the corridor was carried out. This analysis is shown in Exhibit 14. The exhibit shows that peak direction domestic vehicle (i.e. car and truck) volumes on Huron Church Road are actually predicted to decrease by about 19% in the AM peak hour and 10% in the PM peak hour (despite significant new development expected in LaSalle). This is due to the substantial increase in international car (about 48% and 34%) and truck (about 106% and 85%) volumes, with truck proportions of total traffic expected to increase by about 12 and 10 percent points. In effect, international traffic will push domestic traffic to other routes.

While this international growth is significant, it is still not at the levels predicted for the Ambassador Bridge as shown above and is lower than the total screenline growth. This, again, is due to traffic redistribution. Very large growth above that of the total is expected at other facilities on the screenline, such that the total growth in international traffic is similar to that expected at the Ambassador Bridge.

EXHIBIT 14. SCREENLINE ANALYSIS OF BASE CASE PEAK HOUR & DIRECTION VOLUMES

A. SCREENLINE

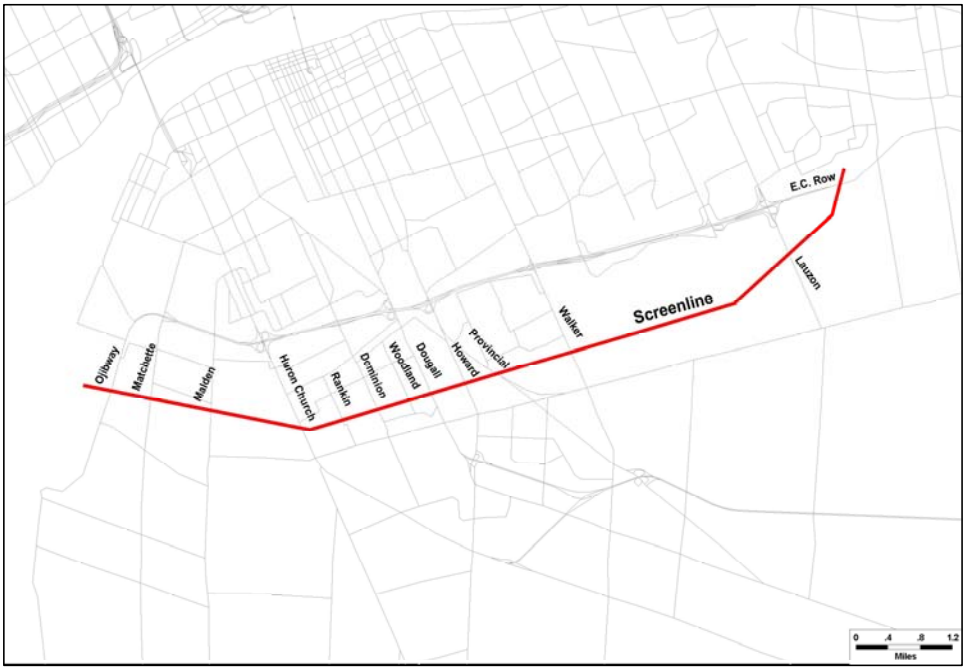


EXHIBIT 14 (CONT.). SCREENLINE ANALYSIS OF BASE CASE PEAK HOUR & DIRECTION VOLUMES

B. AM PEAK HOUR VOLUMES BY FACILITY (WESTBOUND/NORTHBOUND)

Facility	2004				2035				2004 to 2035 % Growth			
	Dom. Veh.	Int. Cars	Int. Trucks	% Trucks	Dom. Veh.	Int. Cars	Int. Trucks	% Trucks	Dom. Veh.	Int. Cars	Int. Trucks	% Trucks
Ojibway	1,120	120	0	1.9%	1,240	170	0	1.9%	11%	42%	N/A	-0.1%
Matchette	310	40	0	0.0%	380	40	0	0.0%	23%	0%	N/A	0.0%
Malden	320	60	0	1.9%	470	70	0	1.9%	47%	17%	N/A	-0.1%
HCR	720	270	170	15.6%	580	400	350	27.6%	-19%	48%	106%	11.9%
Rankin	170	0	0	0.0%	170	0	0	0.0%	0%	N/A	N/A	0.0%
Dominion	170	0	0	0.0%	200	20	0	0.0%	18%	N/A	N/A	0.0%
Woodland	50	0	0	0.0%	50	0	0	0.0%	0%	N/A	N/A	0.0%
Dougall	550	70	30	6.1%	650	150	30	5.4%	18%	114%	0%	-0.7%
Howard	500	10	0	1.8%	690	50	40	6.6%	38%	400%	N/A	4.7%
Provincial	700	60	10	4.1%	740	110	30	7.1%	6%	83%	200%	3.0%
Walker	880	0	0	4.3%	1,000	20	0	4.5%	14%	N/A	N/A	0.1%
Lauzon	690	0	0	4.2%	1,220	10	0	5.6%	77%	N/A	N/A	1.4%
E.C. Row	2,330	120	0	1.4%	3,720	360	0	1.5%	60%	200%	N/A	0.1%
Total	**8,510**	**760**	**200**	**4.1%**	**11,110**	**1,380**	**440**	**5.7%**	**31%**	**82%**	**120%**	**1.5%**

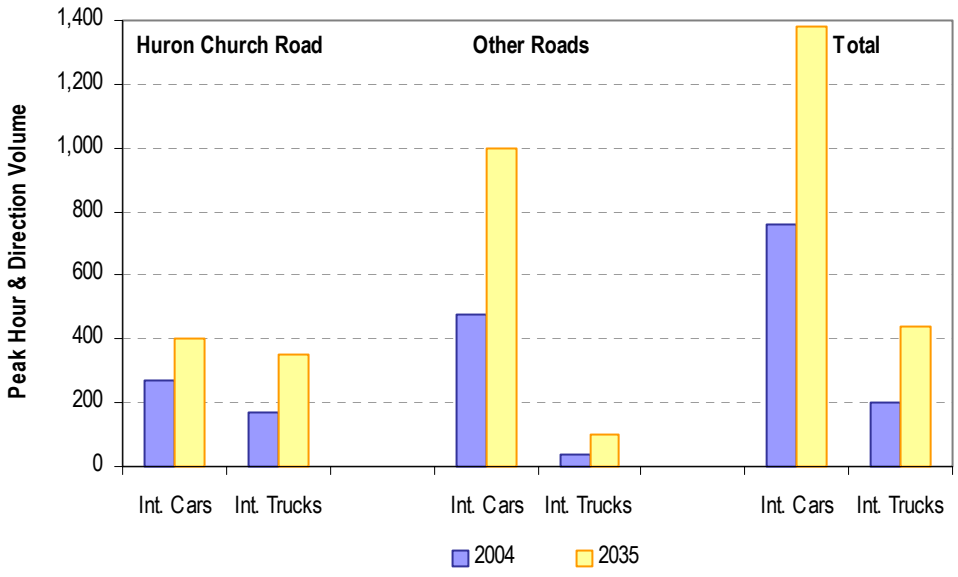


EXHIBIT 14 (CONT.). SCREENLINE ANALYSIS OF BASE CASE PEAK HOUR & DIRECTION VOLUMES

C. PM PEAK HOUR VOLUMES BY FACILITY (SOUTHBOUND/EASTBOUND)

Facility	2004				2035				2004 to 2035 % Growth			
	Dom. Veh.	Int. Cars	Int. Trucks	% Trucks	Dom. Veh.	Int. Cars	Int. Trucks	% Trucks	Dom. Veh.	Int. Cars	Int. Trucks	% Trucks
Ojibway	1,240	80	0	1.6%	1,430	110	0	2.2%	15%	38%	N/A	0.5%
Matchette	380	40	0	0.0%	430	50	0	0.0%	13%	25%	N/A	0.0%
Malden	330	40	0	2.4%	530	70	0	2.1%	61%	75%	N/A	-0.2%
HCR	820	290	260	20.6%	740	390	480	30.6%	-10%	34%	85%	10.0%
Rankin	210	0	0	0.0%	210	0	0	0.0%	0%	N/A	N/A	0.0%
Dominion	260	20	0	0.0%	370	30	0	0.0%	42%	50%	N/A	0.0%
Woodland	80	0	0	0.0%	90	0	0	0.0%	13%	N/A	N/A	0.0%
Dougall	820	60	50	6.6%	750	150	130	15.1%	-9%	150%	160%	8.5%
Howard	590	10	0	1.6%	800	70	90	10.7%	36%	600%	N/A	9.0%
Provincial	940	60	0	2.6%	1,140	110	0	4.2%	21%	83%	N/A	1.6%
Walker	1,200	0	0	3.9%	1,300	10	0	4.3%	8%	N/A	N/A	0.4%
Lauzon	910	0	0	3.2%	1,800	10	0	5.6%	98%	N/A	N/A	2.4%
E.C. Row	2,510	90	0	1.3%	4,010	290	0	1.8%	60%	222%	N/A	0.5%
Total	**10,300**	**690**	**310**	**4.6%**	**13,610**	**1,290**	**700**	**6.9%**	**32%**	**87%**	**126%**	**2.4%**

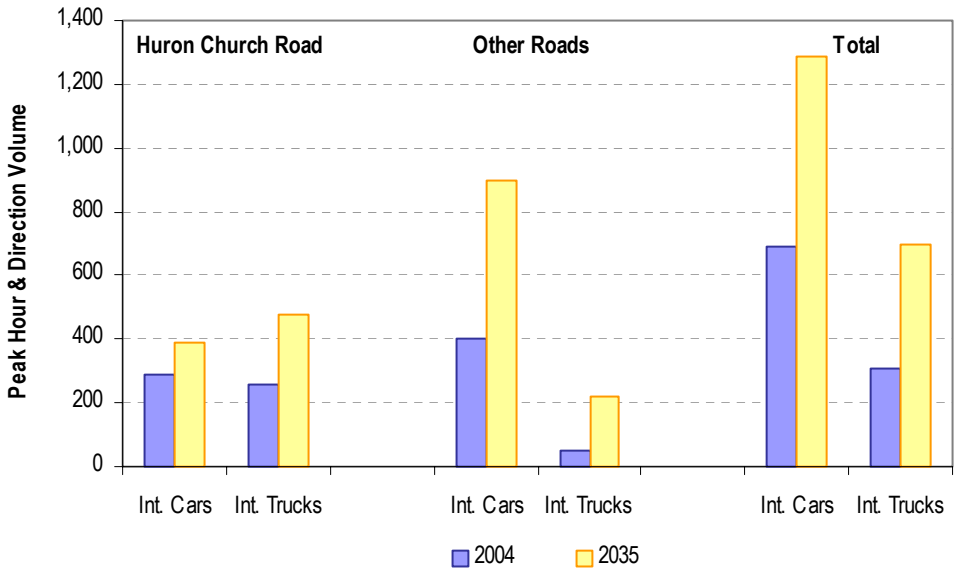
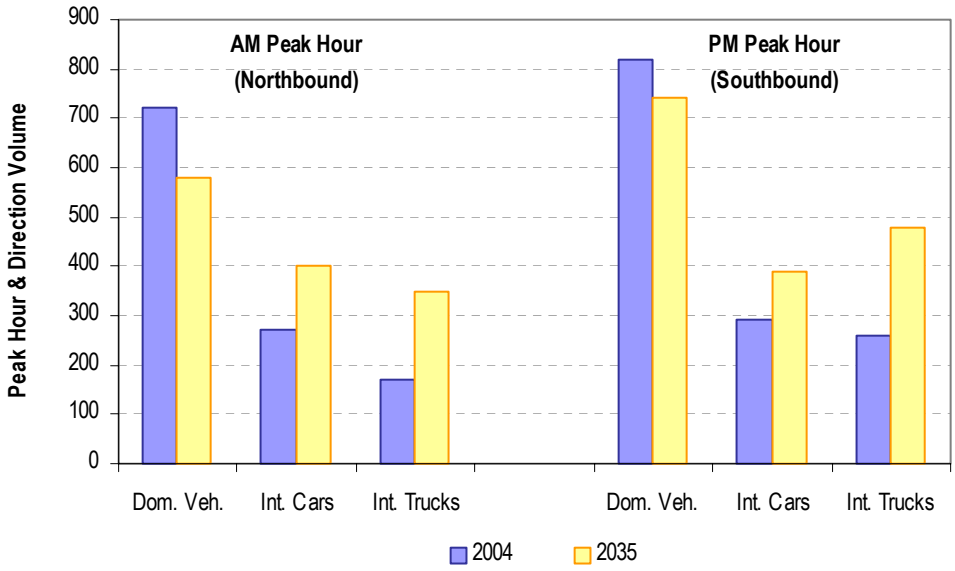


EXHIBIT 14. (CONT.). SCREENLINE ANALYSIS OF BASE CASE PEAK HOUR & DIRECTION VOLUMES

D. 2004 TO 2035 SCREENLINE GROWTH AT HURON CHURCH ROAD



3.3.2. Level Of Service and Volume/Capacity Ratio

Base Case turning movement volumes at key intersections for the 2015 horizon year and AM and PM peak hours are illustrated in Exhibits 15 and 16. Tables 10 through 15 summarize Synchro output for peak direction LOS, delay per vehicle, V/C ratio and overall intersection LOS for the AM and PM peak hour of the 2015, 2025 and 2035 horizon years, respectively. Exhibits 17 and 18 provide a summary of Synchro output for peak direction LOS and intersection V/C ratio for the AM and PM peak hours of the 2006 existing conditions scenario and the Base Case 2015, 2025 and 2035 horizon years. For the AM, the analysis shows a LOS of D at the intersection of Highway 3 with Todd Lane/Cabana Road by 2015. All other intersections operate at LOS C or better. In addition, five intersections are operating with V/C ratios greater than 0.85, indicating that these intersections are approaching their theoretical capacity.

It can be seen that some intersections with V/C ratios at or approaching 1.0 are still operating with good or acceptable levels of service, which indicate low to average delay per vehicle at the intersections. Please refer to Section 2.4.1 for a discussion of LOS and V/C, their relationship, and an explanation of what may appear to be seemingly contradictory results. The important point to note in this section is that a V/C ratio of 1.0 indicates the theoretical capacity of the intersection has been reached and any additional vehicles that use the intersection will contribute to increased delay for all vehicles.

EXHIBIT 15. 2015 BASE CASE AM PEAK HOUR TRAFFIC VOLUMES

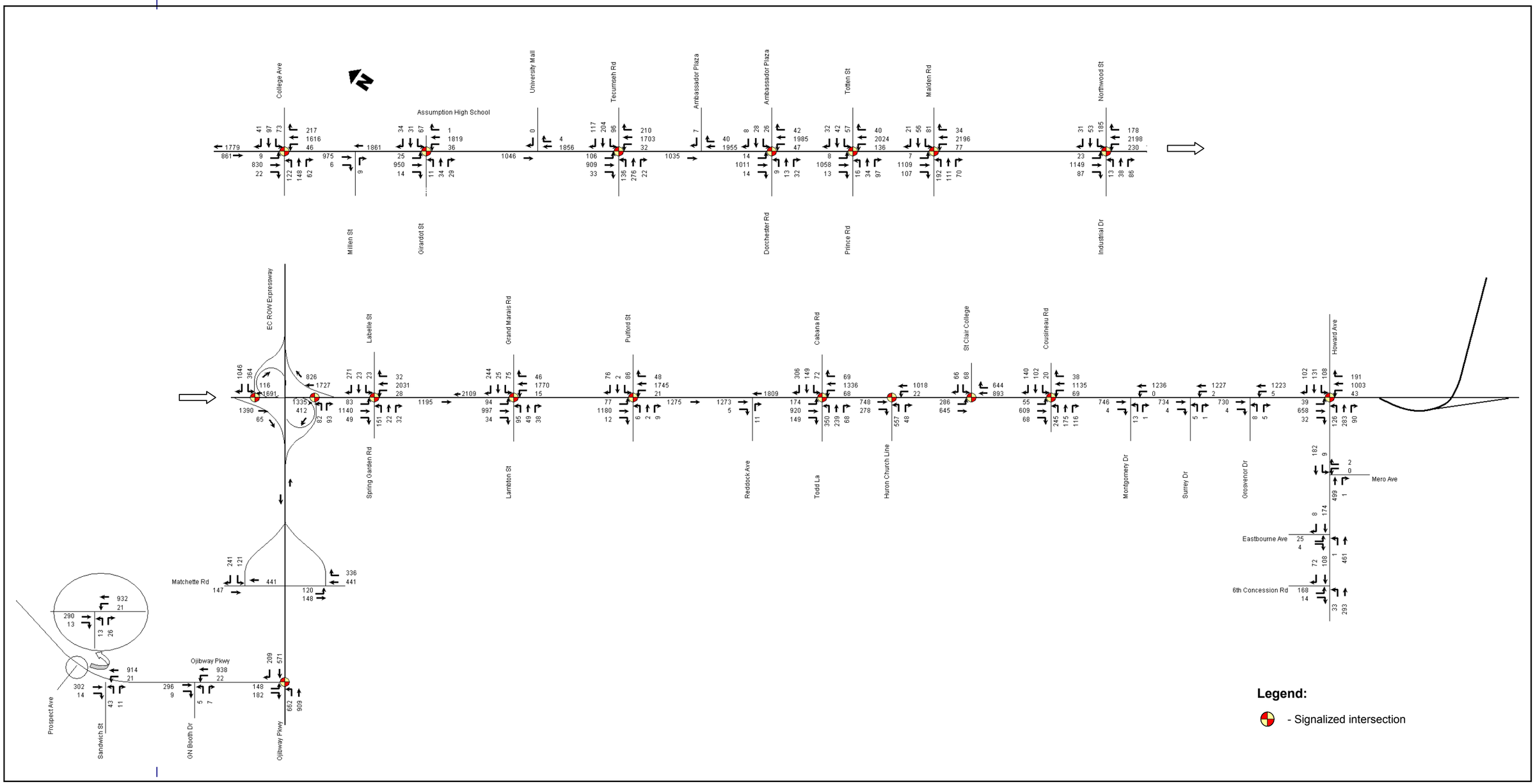


EXHIBIT 16. 2015 BASE CASE PM PEAK HOUR TRAFFIC VOLUMES

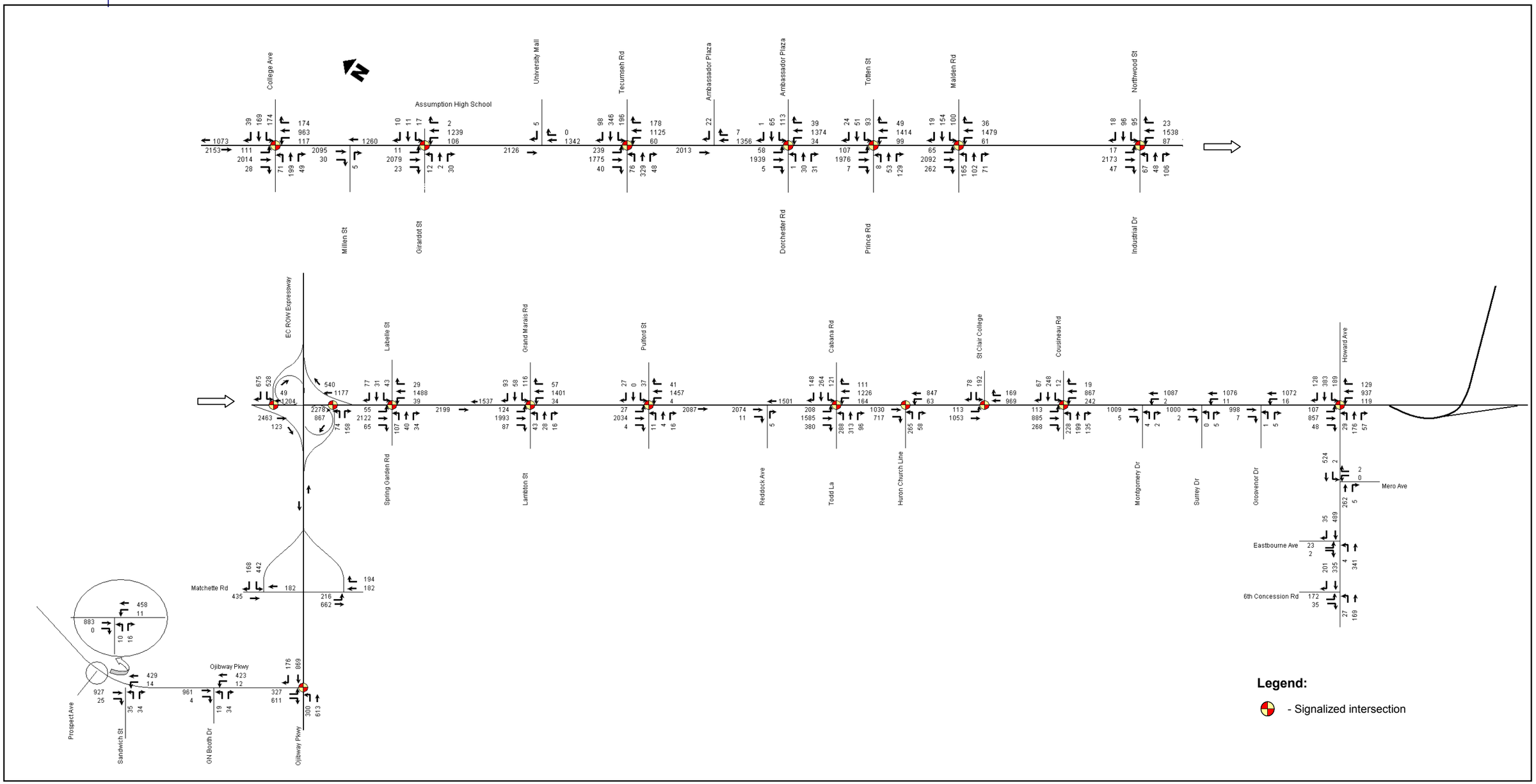


TABLE 10. 2015 BASE CASE AM PEAK HOUR & DIRECTION INTERSECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College Ave.	A	4.8	0.67	B
Girardot St.	B	12.1	0.62	B
Tecumseh Rd.	C	33.6	**0.88**	C
Dorchester Rd.	A	3.0	0.63	A
Prince Rd / Totten St.	A	3.9	0.68	A
Malden Rd.	B	13.6	**0.94**	B
Northwood St. / Industrial Dr.	B	17.0	**0.94**	C
E.C. Row Ramp North	A	2.2	0.59	A
E.C. Row Ramp South	A	5.6	0.56	A
Labelle St.	B	11.6	**0.88**	C
Grand Marais Rd. / Lambton St.	B	12.9	0.81	B
Pulford St.	B	13.9	0.67	B
Cabana Rd. / Todd Ln.	D	43.4	**0.90**	D
Huron Church Line	B	19.8	0.83	C
St. Clair College	B	13.5	0.57	A
Cousineau Rd.	C	28.5	0.84	C
Howard Ave.	C	32.1	0.83	C

TABLE 11. 2015 BASE CASE PM PEAK HOUR & DIRECTION INTERSECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College Ave.	D	52.5	**1.02**	D
Girardot St.	B	10.3	0.78	A
Tecumseh Rd.	C	27.3	**0.92**	D
Dorchester Rd.	A	5.1	0.78	A
Prince Rd / Totten St.	B	12.7	**0.88**	B
Malden Rd.	D	46.7	**1.06**	D
Northwood St. / Industrial Dr.	B	12.7	**0.98**	B
E.C. Row Ramp North	C	25.8	**1.01**	B
E.C. Row Ramp South	A	3.6	0.75	A
Labelle St.	C	22.6	**0.89**	B
Grand Marais Rd. / Lambton St.	C	24.2	**0.93**	C
Pulford St.	B	12.9	0.69	B
Cabana Rd. / Todd Ln.	D	52.2	**0.98**	D
Huron Church Line	B	15.9	0.55	B
St. Clair College	A	6.1	0.60	B
Cousineau Rd.	D	44.3	**0.91**	D
Howard Ave.	D	48.6	**0.95**	C

TABLE 12. 2025 BASE CASE AM PEAK HOUR & DIRECTION INTERSECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College Ave.	A	6.9	0.73	B
Girardot St.	B	12.2	0.67	B
Tecumseh Rd.	D	42.0	**0.97**	D
Dorchester Rd.	A	3.1	0.68	A
Prince Rd / Totten St.	A	4.9	0.74	A
Malden Rd.	C	23.2	**1.01**	C
Northwood St. / Industrial Dr.	C	29.4	**1.01**	C
E.C. Row Ramp North	A	2.8	0.66	B
E.C. Row Ramp South	A	7.2	0.61	A
Labelle St.	B	18.8	**0.96**	D
Grand Marais Rd. / Lambton St.	B	13.8	**0.88**	C
Pulford St.	B	13.7	0.74	B
Cabana Rd. / Todd Ln.	**E**	75.1	**1.05**	D
Huron Church Line	C	21.1	0.84	D
St. Clair College	B	14.1	0.58	B
Cousineau Rd.	C	30.0	**0.86**	C
Howard Ave.	C	31.8	0.83	C

TABLE 13. 2025 BASE CASE PM PEAK HOUR & DIRECTION INTERSECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College Ave.	F	88.7	1.12	E
Girardot St.	B	14.5	0.88	B
Tecumseh Rd.	D	49.1	1.03	D
Dorchester Rd.	A	7.0	0.87	A
Prince Rd / Totten St.	C	25.5	0.99	C
Malden Rd.	F	86.9	1.15	E
Northwood St. / Industrial Dr.	E	57.8	1.10	D
E.C. Row Ramp North	E	72.3	1.13	D
E.C. Row Ramp South	A	4.1	0.84	A
Labelle St.	C	33.8	0.98	C
Grand Marais Rd. / Lambton St.	D	44.1	1.03	C
Pulford St.	B	16.8	0.75	B
Cabana Rd. / Todd Ln.	F	93.2	1.11	E
Huron Church Line	B	17.1	0.59	B
St. Clair College	A	6.6	0.63	B
Cousineau Rd.	E	57.4	0.98	D
Howard Ave.	E	59.8	1.00	D

TABLE 14. 2035 BASE CASE AM PEAK HOUR & DIRECTION INTERSECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College Ave.	B	10.6	0.81	C
Girardot St.	B	12.6	0.72	B
Tecumseh Rd.	**E**	66.4	**1.06**	D
Dorchester Rd.	A	3.8	0.72	A
Prince Rd / Totten St.	A	6.5	0.80	A
Malden Rd.	D	47.0	**1.07**	D
Northwood St. / Industrial Dr.	D	53.8	**1.07**	D
E.C. Row Ramp North	A	3.3	0.70	B
E.C. Row Ramp South	A	8.3	0.64	A
Labelle St.	C	31.4	**1.02**	E
Grand Marais Rd. / Lambton St.	B	15.7	**0.93**	C
Pulford St.	B	14.7	0.80	B
Cabana Rd. / Todd Ln.	**F**	109.3	**1.14**	E
Huron Church Line	C	30.6	**0.93**	D
St. Clair College	B	16.1	0.65	B
Cousineau Rd.	D	37.8	**0.94**	D
Howard Ave.	D	46.4	**0.95**	C

TABLE 15. 2035 BASE CASE AM PEAK HOUR & DIRECTION INTERSECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College Ave.	F	126.0	1.21	F
Girardot St.	B	18.7	0.96	B
Tecumseh Rd.	F	93.6	1.14	E
Dorchester Rd.	B	10.8	0.95	B
Prince Rd / Totten St.	E	60.5	1.09	D
Malden Rd.	F	138.3	1.26	F
Northwood St. / Industrial Dr.	F	108.6	1.21	E
E.C. Row Ramp North	F	116.3	1.22	E
E.C. Row Ramp South	A	5.0	0.89	A
Labelle St.	E	57.0	1.06	D
Grand Marais Rd. / Lambton St.	E	69.3	1.10	D
Pulford St.	B	18.4	0.79	B
Cabana Rd. / Todd Ln.	F	121.8	1.18	E
Huron Church Line	B	18.3	0.64	B
St. Clair College	A	7.5	0.68	B
Cousineau Rd.	F	81.4	1.07	E
Howard Ave.	F	81.5	1.07	D

EXHIBIT 17. BASE CASE PEAK HOUR AND DIRECTION LOS AND V/C RATIO, 2006 TO 2035

A. AM PEAK HOUR (WESTBOUND/NORTHBOUND)

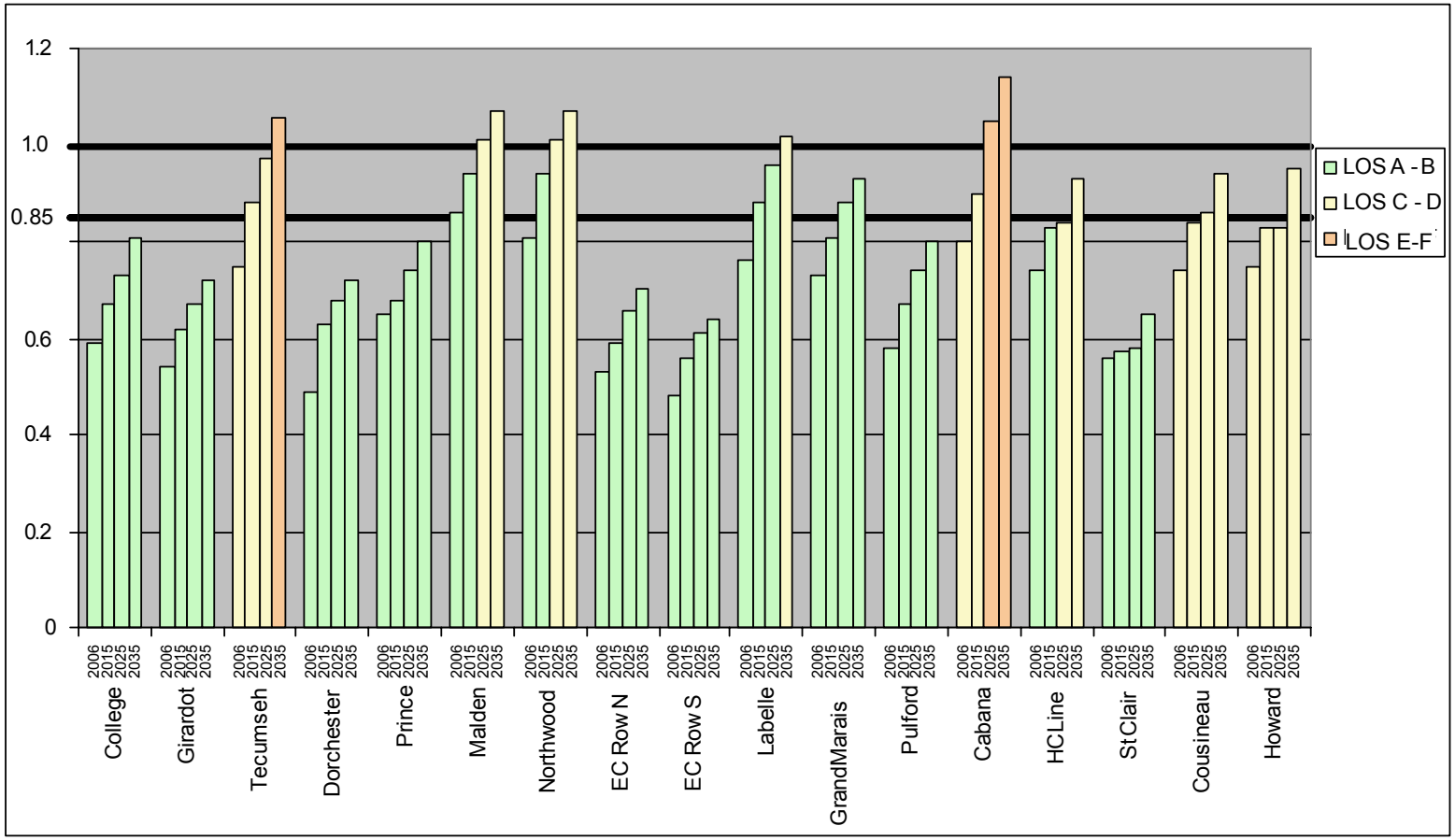
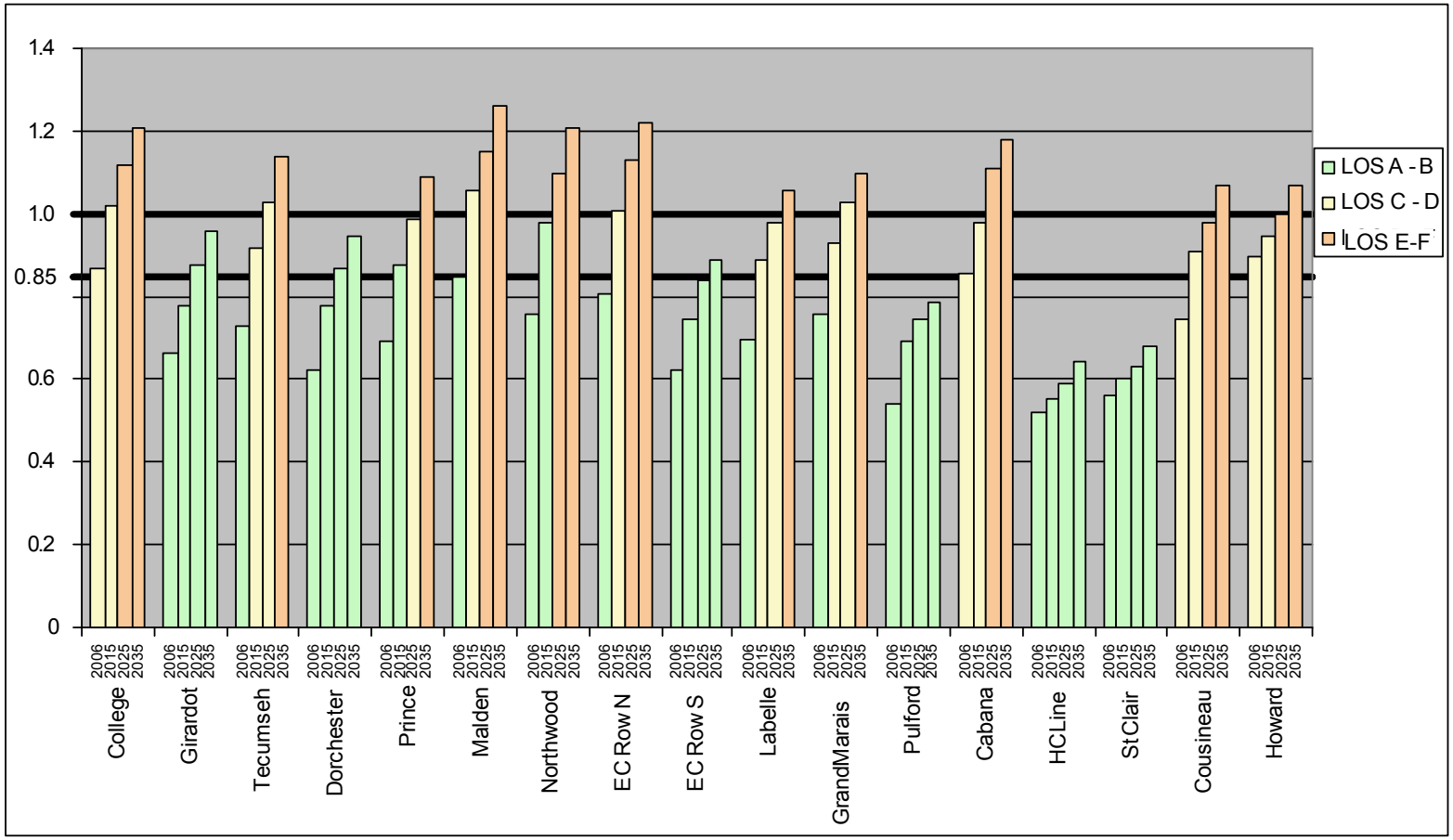


EXHIBIT 18. BASE CASE PEAK HOUR AND DIRECTION LOS AND V/C RATIO, 2006 TO 2035

B. PM PEAK HOUR (SOUTHBOUND/EASTBOUND)



This increased delay is illustrated in the 2025 and 2035 Base Case. Each scenario sees more intersections at or approaching capacity, and with it an increase in the number of intersections operating at LOS E or F. By 2035, nine intersections are operating with V/C ratios of 0.93 or above, two intersections operate at LOS E or F, and an additional four intersections operate at LOS D.

For the PM peak hour southbound/eastbound traffic, as with existing conditions and other MOEs such as travel time and speed, it can be seen that PM operations are typically worse than AM operations. For example, in 2015, eleven studied intersections operate with a V/C ratio of 0.85 or greater, with three intersections exceeding a V/C of 1.0, indicating that these intersections have already exceeded their theoretical capacity. By 2035, all but six intersections operate at LOS E or F, and all but three intersections exceed V/C of 0.85. Eleven intersections exceed V/C of 1.0 in 2035.

The analysis of Base Case future conditions indicates that significant capacity problems begin to occur by the 2015 horizon for both AM and PM peak hour operations. Conditions deteriorate further by the 2035 horizon to a point where most intersections operate over capacity and with unacceptable delay during the PM peak hour.

The exhibits are particularly effective in illustrating that capacity problems are not isolated to particular locations within the corridor. During the AM peak hour, it can be seen that the intersections of Huron Church Road with Tecumseh Road in the north and Cabana Road in the south are the worst performing by 2035. However, intersections in between, including Malden, Northwood/Industrial and Labelle all experience capacity problems, as do the intersections of Highway 3 with Cousineau and Howard in the far south of the corridor. Similar results are seen for the PM peak hour, with the primary difference being that the effects of traffic are both more pronounced (i.e. higher V/C ratios and worse LOS) and more widespread through the corridor.

A corridor such as Huron Church Road can be considered analogous to a chain, in that it is only as strong as its weakest link. When even one intersection operates over capacity or with heavy delay, the chain “breaks” and creates a bottleneck that decreases overall corridor throughput and the ability to move international traffic to and from the Ambassador Bridge. Given that 2015 PM peak hour deficiencies are widespread throughout the length of the corridor, these bottlenecks will occur at several locations, and traffic operations will break down along the entire corridor. As a result, corridor-wide improvements would be justified, as isolated capacity improvements (e.g. additional lanes) at select intersections would not be enough to increase throughput and decrease delay throughout the corridor.

It should also be noted that, without the redistribution of traffic to alternate routes discussed in the previous section, the congestion on Huron Church Road would be significantly worse.

3.3.3. Travel Time and Delay

The Base Case Synchro models were used to calculate existing and future peak hour travel times along the corridor from College Avenue in the north to Howard Avenue in the south. Table 16 indicates an expected AM peak direction (westbound/northbound) travel time increase of 38 percent between 2006 and the 2035 horizon year, resulting in a trip duration in excess of 18 minutes, an increase of five minutes over the calibrated existing conditions Synchro model. The largest increase between horizon years is from 2025 to 2035, when travel times are predicted to increase by nearly three minutes, or 18 percent. AM travel times in the off-peak direction are not expected to increase as quickly, with an extra 50 seconds to the 2006 trip by 2035.

TABLE 16. BASE CASE HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR PEAK HOUR TRAVEL TIME

A. AM PEAK HOUR

Year	Travel Time (s)		Increase Between Horizon Years		Increase from 2006	
	WB/NB	SB/EB	WB/NB	SB/EB	WB/NB	SB/EB
2006	800	680	N/A	N/A	N/A	N/A
2015	850	690	6%	1%	6%	1%
2025	930	720	9%	4%	16%	6%
2035	1,100	730	18%	1%	38%	7%

B. PM PEAK HOUR

Horizon Year	Travel Time (s)		Increase Between Horizon Years		Increase from 2006	
	WB/NB	SB/EB	WB/NB	SB/EB	WB/NB	SB/EB
2006	770	770	N/A	N/A	N/A	N/A
2015	790	920	3%	19%	3%	19%
2025	820	1,190	4%	29%	6%	55%
2035	850	1,550	4%	30%	10%	101%

Note: Corridor results are affected by traffic redistribution to other feasible adjacent routes.

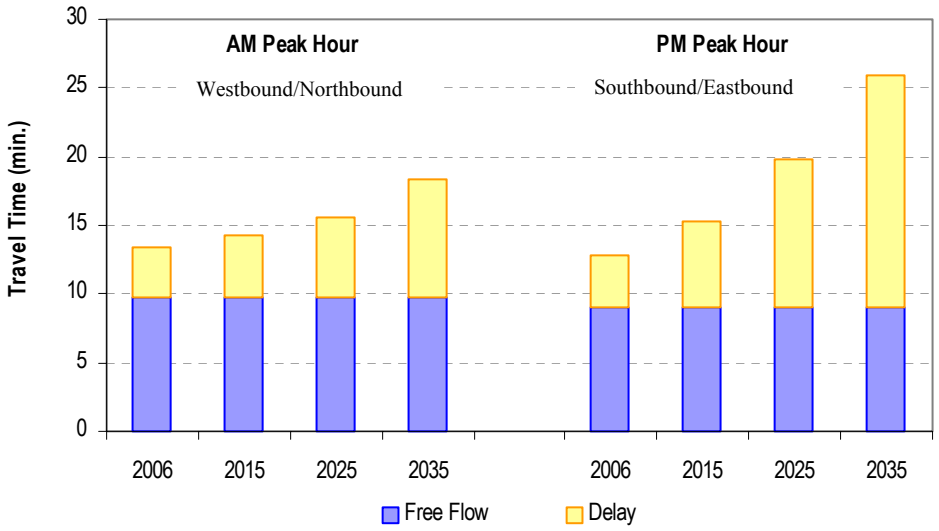
While the AM peak direction growth in travel time is considerable, expected traffic growth will have a far greater impact on the PM peak hour. The PM peak direction (southbound/eastbound) travel times are expected to double between 2006 and 2035. Today's southbound/eastbound trip takes approximately 13 minutes. By 2035, the same trip is expected to take nearly 26 minutes. Similar to the AM peak, off-peak direction travel times are not expected to grow significantly between 2006 and 2035, increasing by 80 seconds.

As there are no changes in posted speed limit or road design/alignment in the Base Case,

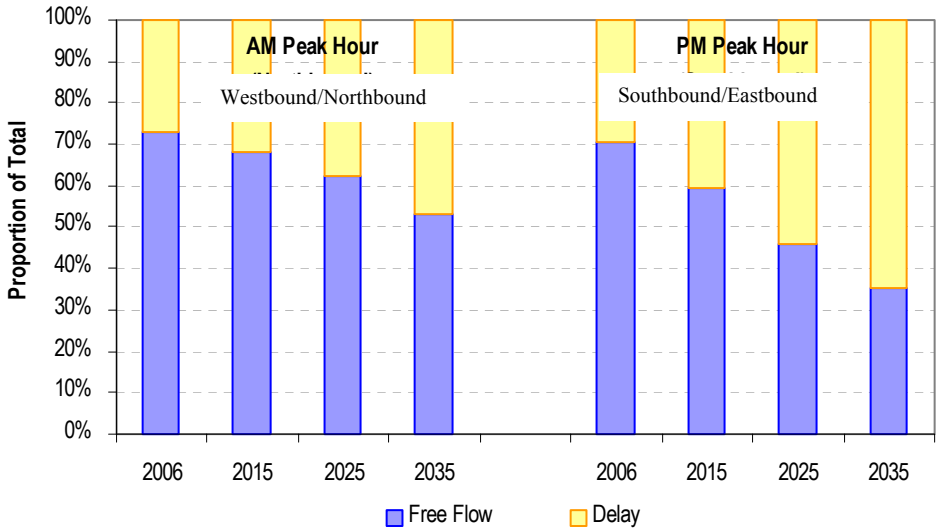
all of the increases in travel times noted above come from delay due to congestion; that is, the baseline, or free flow, travel time remains the same in all years. Exhibit 19 depicts the travel times shown above in terms of the baseline and delay components. As can be seen, the existing delay currently represents about 4 minutes, or about 30%, of total travel time in both time periods. This is expected to increase to about 9 minutes in the AM peak hour and 17 minutes in the PM peak hour, representing almost half and two-thirds of the total time, respectively.

EXHIBIT 19. BASE CASE HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR PEAK HOUR & DIRECTION DELAY

A. ABSOLUTE



B. PROPORTION OF TOTAL



Note: Corridor results are affected by traffic redistribution to other feasible adjacent routes.

Again, these results include the effect of excess traffic redistributed to adjacent routes and would be significantly worse had this not occurred.

3.3.4. Queue Length

Table 17 shows peak direction through-movement queues for the AM and PM peak hours in metres and passenger car equivalent (PCE) lengths. The length of one PCE and the space between adjacent vehicles is 7.5 metres. The queues shown represent the median queue that motorists are projected to experience in each through lane in each of the horizon years. Note that the values do not reflect the number of vehicles (i.e. total cars and trucks) but rather are shown here in terms of equivalent cars to allow for equal comparison.

TABLE 17. BASE CASE HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR QUEUE LENGTHS, AM AND PM PEAK HOURS

Intersection	Queue Length - Metres (Passenger Car Equivalents)							
	AM Peak Hour (WB/NB)				PM Peak Hour (SB/EB)			
	2006	2015	2025	2035	2006	2015	2025	2035
College	13 (2)	18 (3)	20 (3)	33 (5)	144 (20)	225 (30) [1]	257 (35) [1]	283 (38) [1]
Girardot	120 (16)	148 (20)	176 (24)	184 (25)	40 (6)	82 (11)	98 (14)	112 (15)
Tecumseh	128 (18)	158 (22)	163 (22)	228 (31)[1]	46 (7)	196 (27)	220 (30) [1]	249 (34) [1]
Dorchester	18 (3)	27 (4)	27 (4)	28 (4)	16 (3)	20 (3)	22 (4)	23 (4)
Prince	14 (2)	29 (4)	45 (6)	49 (7)	18 (3)	37 (5)	230 (31) [1]	256 (35) [1]

Intersection	Queue Length - Metres (Passenger Car Equivalents)							
	AM Peak Hour (WB/NB)				PM Peak Hour (SB/EB)			
	2006	2015	2025	2035	2006	2015	2025	2035
Malden	79 (11)	143 (20)	253 (34) [1]	276 (37) [1]	58 (8)	265 (36) [1]	301 (41) [1]	332 (45) [1]
Northwood	59 (8)	43 (6)	43 (6)	43 (6)	21 (3)	33 (5)	275 (37) [1]	309 (42) [1]
EC Row N	6 (1)	8 (2)	15 (2)	22 (3)	45 (6)	264 (36) [1]	310 (42) [1]	343 (46) [1]
EC Row S	32 (5)	44 (6)	86 (12)	102 (14)	45 (6)	60 (8)	70 (10)	78 (11)
Labelle	42 (6)	52 (7)	71 (10)	89 (12) [1]	86 (12)	186 (25)	208 (28) [1]	281 (38) [1]
Grand Marais	149 (20)	168 (23)	187 (25)	197 (27)	62 (9)	102 (14)	245 (33) [1]	270 (36) [1]
Pulford	121 (17)	138 (19)	153 (21)	167 (23)	46 (7)	172 (23)	189 (26)	200 (27)
Todd/Cabana	109 (15)	136 (19)	169 (23) [1]	183 (25) [1]	151 (21)	178 (24) [1]	203 (28) [1]	223 (30) [1]
HC Line	49 (7)	69 (10)	71 (10)	87 (12)	40 (6)	46 (7)	51 (7)	57 (8)
St. Clair	41 (6)	48 (7)	48 (7)	60 (8)	30 (4)	33 (5)	35 (5)	40 (6)
Cousineau	97 (13)	121 (17)	119 (16)	136 (19)	80 (11)	102 (14)	109 (15)	130 (18) [1]
Howard	89 (12)	108 (15)	103 (14)	125 (17) [1]	84 (12)	90 (12)	96 (13)	115 (16) [1]

[1] Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
Note: Corridor results are affected by traffic redistribution to other feasible adjacent routes.

Select peak direction queue lengths from the table can be illustrated as follows:

- **Tecumseh Road –** The existing modelled AM northbound queue extends to approximately the driveway of the shopping centre to the south. By 2035, this queue is projected to extend further south, almost to the intersection with Dorchester Street. The existing PM peak hour southbound queue is only seven passenger cars long. By 2035, the queue is projected to extend halfway to Girardot Street;
- **Malden Road –** The existing southbound AM queue is approximately the length of the left turn storage lane. By 2035, it is projected that the queue will grow to block access to the storage lane, extending more than halfway to Northwood Street. Similar growth is seen during the PM peak hour, with an existing queue approximately the length of the left turn storage lane, extending to Prince Road by 2035;
- **EC Row Expressway North Ramp –** Queuing is not a significant issue during the AM peak hour, but during the PM, the 2035 queues are projected to extend almost to Industrial Drive / Northwood Street;
- **Grand Marais Road –** AM peak queues do not increase significantly at this intersection, although the existing queues are the longest of any studied intersection. During the PM, the existing queue is modelled as less than the length of the left turn storage lane, but is projected to block access to the lane and extend halfway to Labelle Street by 2035; and
- **Todd Lane / Cabana Road –** AM queues are currently approximately the length of the left turn storage lane. By 2035, not only will the queues grow long enough to block access to this lane, they will extend through the intersection of Huron Church Line. In the PM, southbound/eastbound queues are already longer than the length of the left

turn storage lane, and are expected to grow by 50 percent by 2035.

It should be noted that the existing queues represent what was modelled in the traffic analysis. The inputs to the traffic model represent a snapshot of traffic in February 2006 and may not reflect what can be seen at other times of the year.

Some queues may be longer than the table reports, as there are a number of locations where the approach volume exceeds the intersection capacity. These locations are marked with a footnote. Given that volumes exceeding capacity have the potential to create queues of infinite length, the queues shown in the table represent the maximum after two signal cycles, which is a standard means of representing queues under these circumstances.

As shown in the above discussion, there are locations such as at Todd Lane/Cabana Road where the projected queue is long enough to block the adjacent upstream signal. These queues will have a significant impact on the upstream intersection, serving to effectively deny access to the intersection, and significantly reducing capacity.

The findings are generally consistent with the level-of-service findings presented above. Currently, no queues are such that the volume exceeds capacity. In future, however, significant increases in queue length are expected, particularly during the PM peak hour, such that capacity is exceeded. In these situations, vehicles may be delayed for more than one or more signal cycles. As expected, queue lengths are longest at intersections with poor V/C ratios, including intersections such as College Avenue, Tecumseh Road, Malden Road, and Todd Lane/Cabana Road.

3.4. Summary

The primary conclusion that can be drawn from an analysis of the future Base Case is one of reduced mobility. While current traffic operations within the corridor are at a reasonable level of service, they are expected to break down by 2015 and will be significantly deteriorated by 2035. The traffic demands of Huron Church Road come at the expense of its cross streets in the form of lengthy main street green phases and traffic signals that are optimized to move traffic to and from the Ambassador Bridge as quickly and efficiently as possible. It can be seen through the previous analysis that a continuation of such operations will not be sufficient for future traffic demands.

The corridor currently carries a mix of international, regional and local traffic and will be required to continue to do so in the future in order to maintain its intended role. The projected traffic increases, including in particular an approximate doubling in international truck traffic by 2035, combined with the capacity constraints of the corridor will create a situation where traffic operations throughout the entire corridor break down. As such, not only will the corridor increasingly not be able to serve its intended functions, it will increasingly act as a physical barrier between existing and planned development areas.

Huron Church Road is one of two designated Class I Arterial Roads in the City of Windsor,

(Lauzon Parkway is the other). The role of this facility is to carry high volumes of passenger and commercial traffic for intra-city travel at moderate speeds[1]. Since Huron Church Road represents the most direct route for international traffic travelling between Highway 401 and the Ambassador Bridge, local and regional traffic will be increasingly unable to use the road as it is intended. Furthermore, the high volumes, capacity constraints and traffic signals will also create a situation where traffic is increasingly unable to achieve and maintain moderate speeds.

Prior to the recent increase in border processing capacity at the bridge (July 2004), traffic congestion along the corridor was often sufficiently high that international traffic used the network of intersecting arterial and collector roads instead of Huron Church Road to access/egress the bridge. Roads such as Dougall Avenue, Wyandotte Street and Tecumseh Road were used in an attempt to bypass Huron Church Road congestion and access the Ambassador Bridge as far downstream as possible or leave the corridor as far upstream as possible.

While in the past this situation was caused by inadequate border processing capacity, it will be caused by inadequate corridor road capacity in the future. As road traffic volumes increase, local and regional traffic may find it easier to use adjacent arterial roads and avoid Huron Church Road congestion as it moves within and across Windsor and LaSalle. The result of this diversion is increased traffic infiltration to adjacent arterials and an overall heightened neighbourhood-level sensitivity towards traffic intrusion. The projected increase in traffic will serve to encourage more domestic travel to divert from Huron Church Road and into the surrounding neighbourhoods, as described in Section 3.3.1.

In addition to the strong growth in traffic from outside of the Area of Continued Analysis, moderate to strong population growth is projected for the southern area of the corridor, from Todd Lane/Cabana Road and to the west in the Bouffard/Howard area of LaSalle. In addition, employment growth is projected southwest of Todd/Cabana and Huron Church Road, along with strong employment growth further south in LaSalle. Specific Secondary Plans have been submitted that show how various development will access Huron Church Road via Huron Church Line, but as with the other impacts, the increased international traffic will reduce the capacity of Huron Church Road to serve as an arterial for intra-city travel for these development areas.

It is recognized that the new access road in the corridor represents an opportunity to address improvements in the local road network/accessibility. Identified opportunity areas include:

- The partial interchange of Highway 401 and Highway 3, which currently does not serve movements to and from the south and west;
- Incorporation of Howard Avenue into the Highway 401/Highway 3 interchange, providing increased connectivity to other north-south corridors; and
- Area roads such as Todd Lane/Cabana Road, E.C. Row Expressway, Ojibway

[1] Windsor Official Plan, Section 7.2.6.3(b) (i)

Parkway and Huron Church Line do not have direct access to Highway 401.

Further to the above, specific destinations and traffic generators within and around the corridor have accessibility requirements that will be hindered by the projected future growth and capacity constraints. Institutions such as St. Clair College, the University of Windsor, Windsor Crossing outlets, Windsor Hospital and Windsor Raceway will experience a negative impact if corridor traffic increases to the projected levels without associated capacity and mobility improvements.

4. Future Conditions with New Crossing

The Practical Alternatives were generated upon completion of the Level 1 Analysis of the Illustrative Alternatives. Three Practical Alternatives were short-listed for further analysis and are described in the following sections. Detailed illustrations are provided in Appendix A. All Practical Alternatives incorporate a new freeway facility with a six-lane cross-section between the Highway 3/Highway 401 junction and the new plaza. There are sub-alternatives for Practical Alternatives 1 and 2 that incorporate a combination of at-grade and below-grade sections.

4.1. Traffic Growth and Travel Patterns

4.1.1. Peak Hour Crossing Volumes

The forecast Practical Alternatives peak hour and direction volumes on the Detroit River crossings are presented in Table 18 (Detroit River crossings include the Ambassador Bridge, the Detroit-Windsor Tunnel and the new crossing). These values represent those for all crossing and access road alternatives considered in this report, as there is only a small range of travel time differences for all possible combinations of alternatives considered This is because of the very close proximity of the two crossings and the similarity in the access road alignments. While the DRIC Model projected some modest differences in the estimated volumes, they are not considered to be significant and are well within the model range of uncertainty. Also, as noted in Section 3.1.1., total Detroit River crossing volumes are somewhat higher than in the Base Case as the additional capacity reduces congestion/travel times and attracts traffic from the Blue Water Bridge.

TABLE 18. PRACTICAL ALTERNATIVES FORECAST DETROIT RIVER CROSSINGS PEAK HOUR & DIRECTION VOLUMES

A. AM PEAK HOUR (CANADA TO U.S.)

Crossing	Year	Cars		Trucks		Total	
		Volume	% Growth	Volume	% Growth	Volume	% Growth
Ambassador Bridge	2004	1,160	0%	230	0%	1,390	0%
	2015	1,150	-1%	10	-96%	1,160	-17%
	2025	1,180	2%	10	-96%	1,190	-14%
	2035	1,260	9%	10	-96%	1,270	-9%
Detroit-Windsor Tunnel	2004	800	0%	5	0%	805	0%
	2015	780	-3%	5	0%	785	-2%
	2025	840	5%	5	0%	845	5%
	2035	900	13%	5	0%	905	12%
New Crossing	2004	N/a	N/a	N/a	N/a	N/a	N/a
	2015	450	N/a	340	N/a	790	N/a
	2025	620	N/a	430	N/a	1,050	N/a
	2035	720	N/a	540	N/a	1,260	N/a
Total	2004	1,960	0%	235	0%	2,195	0%
	2015	2,380	21%	355	51%	2,735	25%
	2025	2,640	35%	445	89%	3,085	41%
	2035	2,880	47%	555	136%	3,435	56%

TABLE 18 (CONT.). PRACTICAL ALTERNATIVES FORECAST DETROIT RIVER CROSSINGS PEAK HOUR & DIRECTION VOLUMES

B. PM PEAK HOUR (U.S. TO CANADA)

Crossing	Year	Cars		Trucks		Total	
		Volume	% Growth	Volume	% Growth	Volume	% Growth
Ambassador Bridge	2004	1,180	0%	390	0%	1,570	0%
	2015	880	-25%	120	-69%	1,000	-36%
	2025	940	-20%	160	-59%	1,100	-30%
	2035	1,020	-14%	200	-49%	1,220	-22%
Detroit-Windsor Tunnel	2004	930	0%	10	0%	940	0%
	2015	920	-1%	20	100%	940	0%
	2025	960	3%	30	200%	990	5%
	2035	1,000	8%	40	300%	1,040	11%
New Crossing	2004	N/A	N/A	N/A	N/A	N/A	N/A
	2015	950	N/A	470	N/A	1,420	N/A
	2025	1,090	N/A	620	N/A	1,710	N/A
	2035	1,200	N/A	780	N/A	1,980	N/A
Total	2004	2,110	0%	400	0%	2,510	0%
	2015	2,750	30%	610	53%	3,360	34%
	2025	2,990	42%	810	103%	3,800	51%
	2035	3,220	53%	1,020	155%	4,240	69%

Note: Values are representative of all crossing and access road alternatives considered in this report.

4.1.2. Travel Patterns

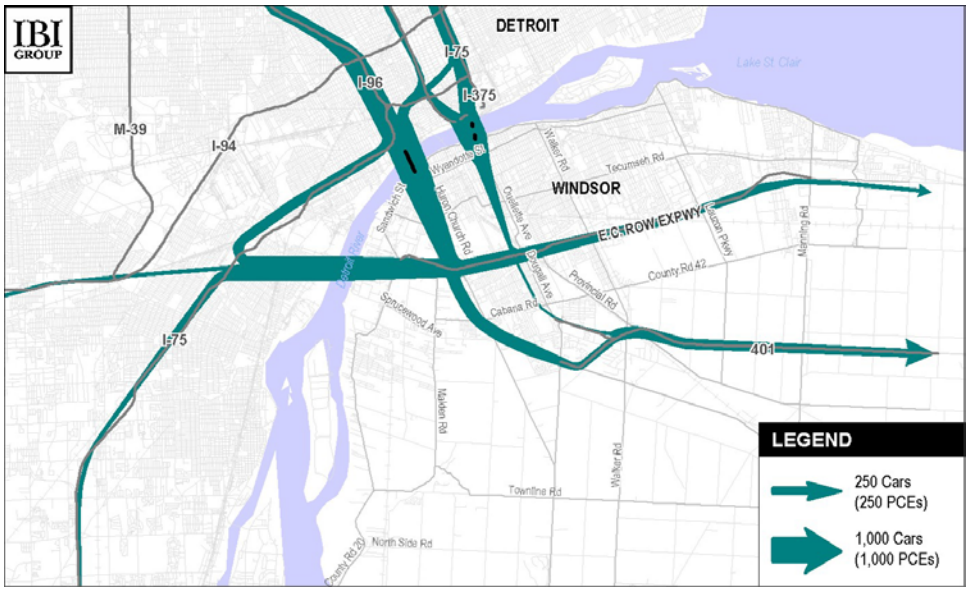
Exhibit 20 illustrates in general how the Canada-bound PM peak hour car and truck travel flows would change with the implementation of the Practical Alternatives discussed in this report, all of which would traverse the Detroit River somewhere between LaSalle and the Ambassador Bridge. The travel patterns of these alternatives are expected to be very similar given their close proximity to each other, leading to very similar travel times amongst them.

As noted in the previous section, while the introduction of the new crossing would draw some new traffic from the Blue Water Bridge, it is expected to draw most of its traffic from the existing tunnel and, in particular, bridge crossings. Significant future passenger car traffic would be diverted from both existing facilities for travel flows where travel time was improved, leading to a near-even spread in car traffic amongst the three crossings. The impact on truck traffic, however, is expected to be much more significant, with the new crossing accommodating a much higher proportion of total traffic, most of which now uses

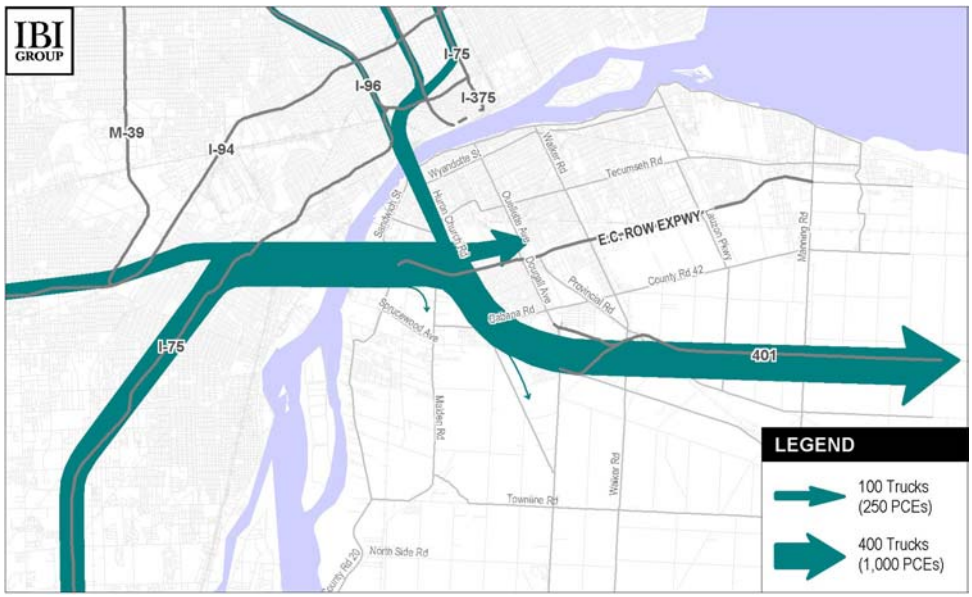
the bridge, due to the improved connection to Highway 401.

EXHIBIT 20. 2035 PRACTICAL ALTERNATIVES PM PEAK HOUR U.S. TO CANADA TRAFFIC FLOWS

A. PASSENGER CARS



B. COMMERCIAL VEHICLES



4.2. Practical Alternative 1 – New Corridor and Service Road System

There are two sub-alternatives within this Practical Alternative:

Practical Alternative 1A incorporates a cross section that is primarily at-grade for the six-lane controlled-access freeway facility with one-way two-lane service roads on either side of the highway. As properties on either side of the access road would have direct access to a service road with only one direction of travel, crossings over the highway to allow vehicles to access the other service road providing traffic flow in the opposite direction is provided at selected locations. In Alternative 1A connections between the two service roads are provided at Todd Lane/Cabana Road West, St. Clair College, Cousineau Road/Sandwich Parkway and Howard Avenue, as well as an indirect access at Lambton Road/Grand Marais Road. Exhibits 21 and 22 summarize 2035 AM and PM peak hour volumes at key locations[2].

Practical Alternative 1B incorporates a cross-section that is primarily below-grade ("depressed") for the six-lane highway with one-way service roads on either side of the highway. As properties on either side of the access road would have direct access to a service road with only one direction of flow, crossings over the freeway to allow vehicles to access the other service road providing traffic flow in the opposite are provided at Lambton Road/Grand Marais Road West, Todd Lane/Cabana Road West, St. Claire College, Cousineau Road/Sandwich West Parkway, Montgomery Drive and Howard Avenue direction. Exhibits 23 and 24 summarize 2035 AM and PM peak hour volumes at key locations.

4.3. Practical Alternative 2 – New Corridor Adjacent to Huron Church Road/Highway 3

There are two sub-alternatives within this Practical Alternative:

Practical Alternative 2A incorporates a cross section that is primarily at-grade for the six lane highway parallel to existing Huron Church Road/Highway 3 on the west side. Existing Huron Church Road/Highway 3 will remain in use for local traffic, although the number of streets crossing the highway would be limited to major intersections such as Lambton Road/Grand Marais Road, Todd Lane/Cabana Road West, Huron Church Line, Cousineau Road/Sandwich Parkway and Howard Avenue. Exhibits 25 and 26 summarize 2035 AM and PM peak hour volumes at key locations.

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[2] The analysis of all Practical Alternatives was based on Plaza B and C layouts, which incorporate a Highway 401 interchange at Ojibway Parkway. Plaza A layout precludes this interchange. Other interchanges south of E.C. Row Expressway are not affected by any particular plaza layout.

Practical Alternative 2B incorporates a cross section that is primarily below-grade ("depressed") for the six lane highway parallel to existing Huron Church Road/Highway 3 on the west side. Existing Huron Church Road/Highway 3 will remain in use for local traffic, although the number of streets crossing the highway would be limited to major intersections such as Lambton Road/Grand Marais Road, Todd Lane/Cabana Road West, Huron Church Line, Cousineau Road/Sandwich West Parkway, Montgomery Drive and Howard Avenue. Exhibits 27 and 28 summarize 2035 AM and PM peak hour volumes at key locations.

4.4. Practical Alternative 3 – Tunnel

Practical Alternative 3 incorporates a cross-section with a six-lane highway that is primarily tunnelled from east of the plaza alternatives to Howard Avenue. A reconstructed at-grade, four lane, two-way Huron Church Road/Highway 3 would be aligned at-grade, directly overtop of the tunnel providing for local access. As the at-grade roadway would be two-way with no separation of the north and southbound lanes by the highway, there are opportunities to maintain east-west road connections (at-grade intersections with crossing roads), as well as direct access to properties fronting the roadway. Exhibits 29 and 30 summarize 2035 AM and PM peak hour volumes at key locations for this alternative.

EXHIBIT 21. ALTERNATIVE 1A 2035 AM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 A.M. Peak WB	2035 A.M. Peak EB
1	E. of Hwy 3 merge/split	1540	1340
2	W. of Howard Ave	1486	1285
3	At Grand Marais Rd	1183	1390
4	E. of Malden Rd	779	960
5	To/From Canadian Plaza	1260	650

	HIGHWAY 401 Ramps	2035 A.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	564
2	401 WB On Ramp	529
3	401 EB Off Ramp	670
4	401 EB On Ramp	732
	At St. Clair College	
5	401 WB Off Ramp	576
6	401 WB On Ramp	273
7	401 EB Off Ramp	483
8	401 EB On Ramp	378
	At Huron Church Rd	
9	401 WB Off Ramp	404
10	401 EB On Ramp	430
	At Malden Rd	
11	401 WB On Ramp	300
12	401 EB Off Ramp	300
	Hwy 401 to EC Row Expressway	
13	401 EB Off Ramp	970
	Ojibway Pkwy IC	
14	401 WB Off Ramp	410
15	401 WB On Ramp	250
16	401 EB Off Ramp	20
17	401 EB On Ramp	1600
	EC Row Expressway to Hwy 401	
18	401 WB On Ramp	341

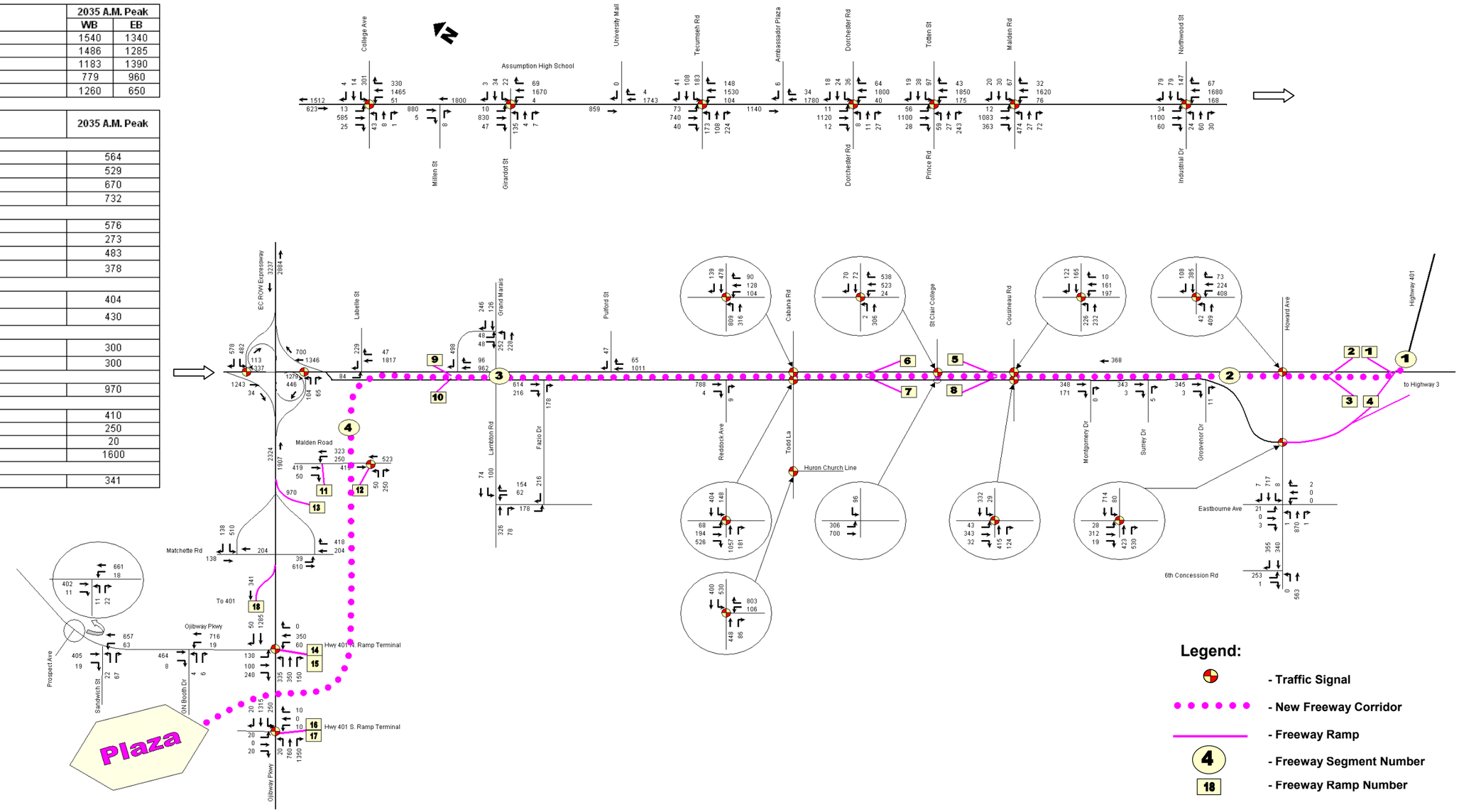


EXHIBIT 22. ALTERNATIVE 1A 2035 PM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 P.M. Peak WB	2035 P.M. Peak EB
1	E. of Hwy 3 merge/split	1720	2120
2	W. of Howard Ave	1560	2068
3	At Grand Marais Rd	1463	2362
4	E. of Malden Rd	477	1365
5	To/From Canadian Plaza	580	1970

	HIGHWAY 401 Ramps	2035 P.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	869
2	401 WB On Ramp	695
3	401 EB Off Ramp	635
4	401 EB On Ramp	678
	At St. Clair College	
5	401 WB Off Ramp	453
6	401 WB On Ramp	356
7	401 EB Off Ramp	648
8	401 EB On Ramp	354
	At Huron Church Rd	
9	401 WB Off Ramp	986
10	401 EB On Ramp	997
	At Malden Rd	
11	401 WB On Ramp	260
12	401 EB Off Ramp	400
	Hwy 401 to EC Row Expressway	
13	401 EB Off Ramp	1325
	Ojibway Pkwy IC	
14	401 WB Off Ramp	330
15	401 WB On Ramp	40
16	401 EB Off Ramp	160
17	401 EB On Ramp	1280
	EC Row Expressway to Hwy 401	
18	401 WB On Ramp	133

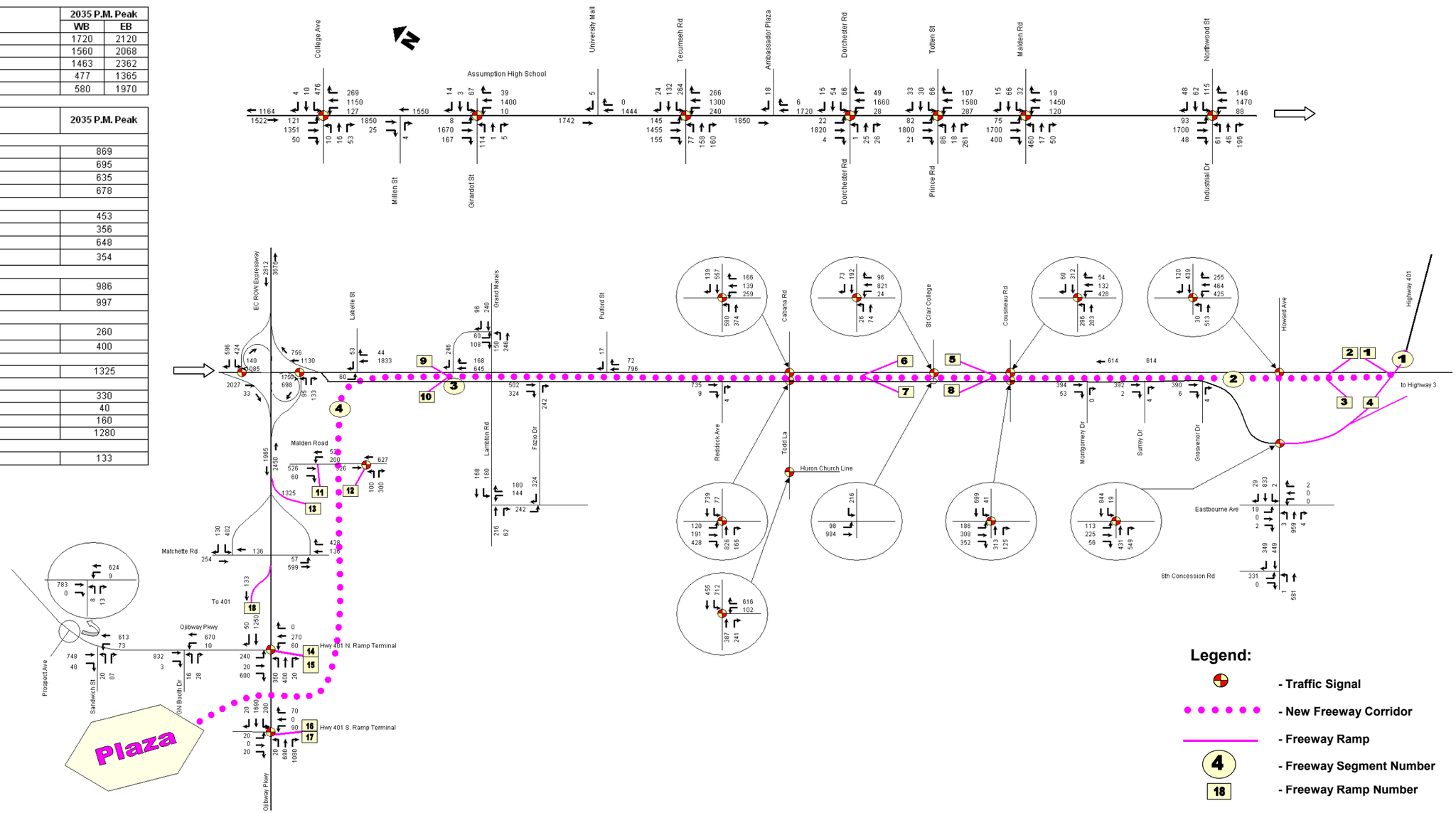


EXHIBIT 23. ALTERNATIVE 1B 2035 AM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 A.M. Peak WB	2035 A.M. Peak EB
1	E. of Hwy 3 merge/split	1540	1340
2	W. of Howard Ave	1516	1305
3	At Grand Marais Rd	1983	1872
4	E. of Malden Rd	779	960
5	To/From Canadian Plaza	1260	650

	HIGHWAY 401 Ramps	2035 A.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	564
2	401 WB On Ramp	529
3	401 EB Off Ramp	670
4	401 EB On Ramp	732
	At St. Clair College	
5	401 WB Off Ramp	576
6	401 WB On Ramp	245
7	401 EB Off Ramp	415
8	401 EB On Ramp	378
	At Pulford St	
9	401 WB On Ramp	798
10	401 EB Off Ramp	530
	At Huron Church Rd	
11	401 WB Off Ramp	1204
12	401 EB On Ramp	912
	At Malden Rd	
13	401 WB On Ramp	300
14	401 EB Off Ramp	300
	Hwy 401 to EC Row Expressway	
15	401 EB Off Ramp	970
	Ojibway Pkwy IC	
16	401 WB Off Ramp	410
17	401 WB On Ramp	250
18	401 EB Off Ramp	20
19	401 EB On Ramp	1600
	EC Row Expressway to Hwy 401	
20	401 WB On Ramp	341

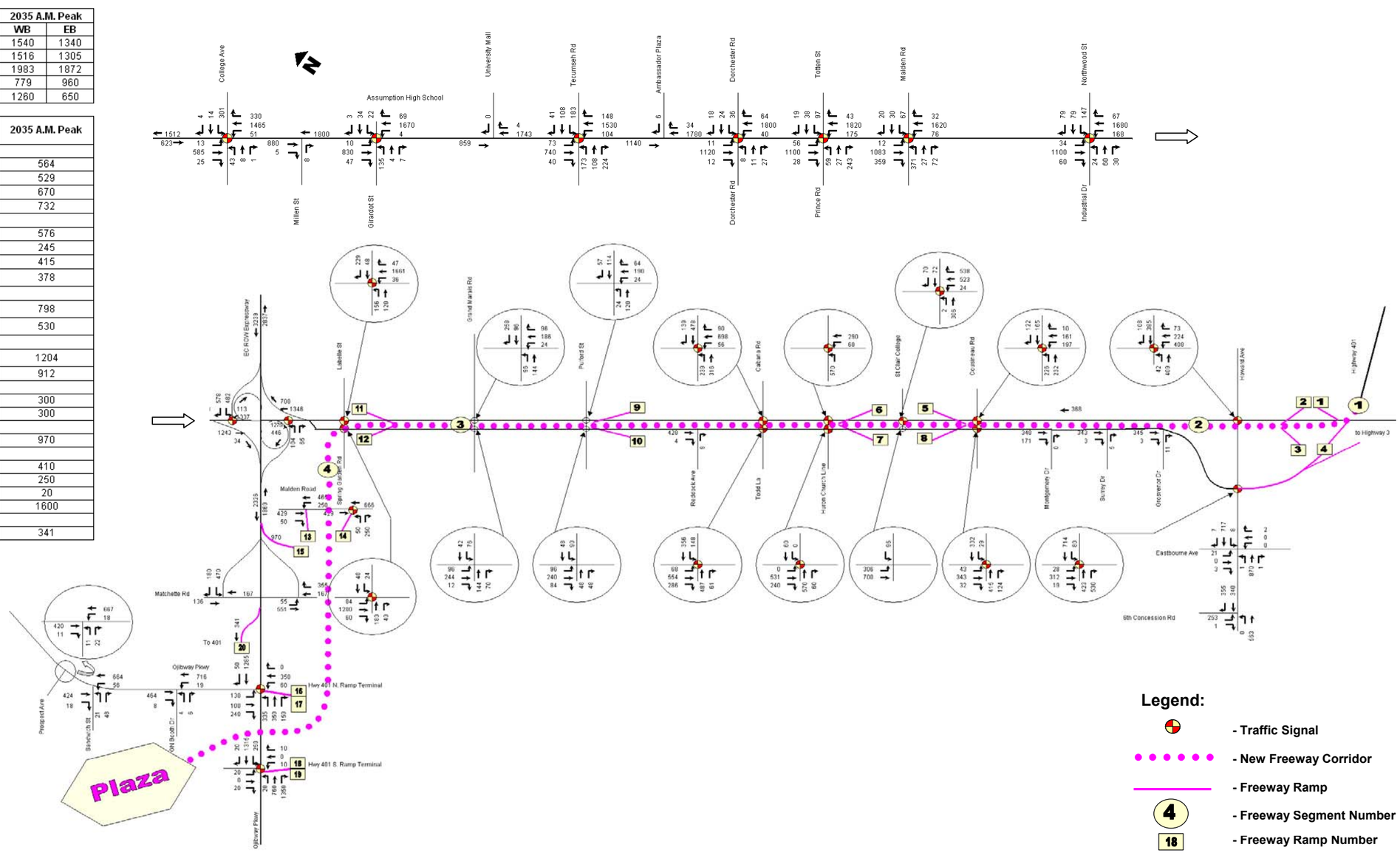


EXHIBIT 24. ALTERNATIVE 1B 2035 PM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 P.M. Peak WB	2035 P.M. Peak EB
1	E. of Hwy 3 merge/split	1720	2120
2	W. of Howard Ave	1580	2073
3	At Grand Marais Rd	1758	2805
4	E. of Malden Rd	477	1365
5	To/From Canadian Plaza	580	1970

	HIGHWAY 401 Ramps	2035 P.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	869
2	401 WB On Ramp	695
3	401 EB Off Ramp	635
4	401 EB On Ramp	678
	At St. Clair College	
5	401 WB Off Ramp	453
6	401 WB On Ramp	292
7	401 EB Off Ramp	584
8	401 EB On Ramp	404
	At Pulford St	
9	401 WB On Ramp	339
10	401 EB Off Ramp	552
	At Huron Church Rd	
11	401 WB Off Ramp	1281
12	401 EB On Ramp	1440
	At Malden Rd	
13	401 WB On Ramp	260
14	401 EB Off Ramp	400
	Hwy 401 to EC Row Expressway	
15	401 EB Off Ramp	1325
	Ojibway Pkwy IC	
16	401 WB Off Ramp	330
17	401 WB On Ramp	40
18	401 EB Off Ramp	160
19	401 EB On Ramp	1280
	EC Row Expressway to Hwy 401	
20	401 WB On Ramp	133

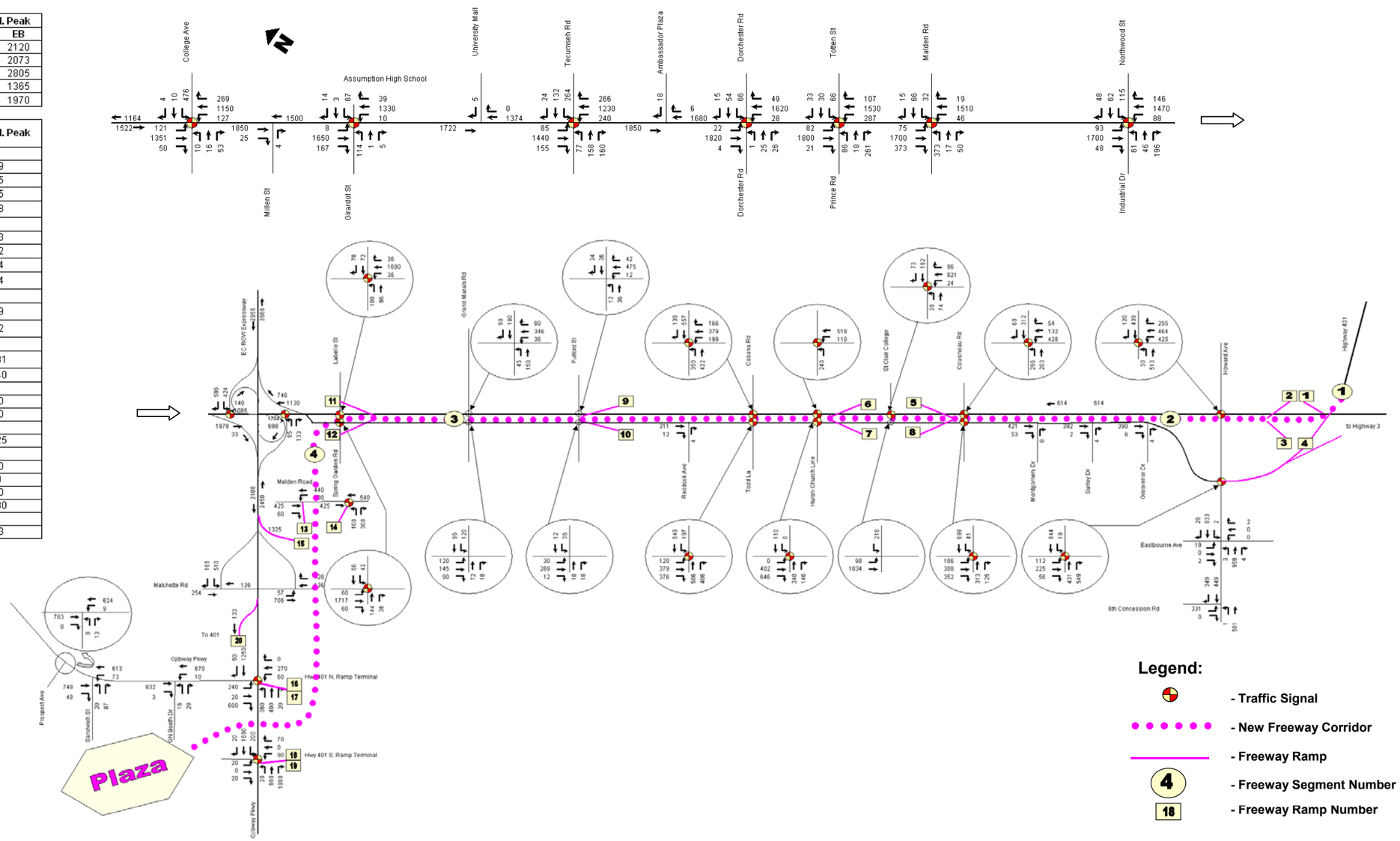


EXHIBIT 25. ALTERNATIVE 2A 2035 AM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 A.M. Peak	
		WB	EB
1	E. of Hwy 3 merge/split	1540	1340
2	W. of Howard Ave	1178	1403
3	At Grand Marais Rd	1514	1772
4	E. of Malden Rd	779	960
5	To/From Canadian Plaza	1260	650

	HIGHWAY 401 Ramps	2035 A.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	958
2	401 WB On Ramp	570
3	401 EB Off Ramp	698
4	401 EB On Ramp	819
	At Todd Lane/Cabana Rd	
5	401 WB Off Ramp	829
6	401 WB On Ramp	1165
7	401 EB Off Ramp	1035
8	401 EB On Ramp	666
	At Huron Church Rd	
9	401 WB Off Ramp	735
10	401 EB On Ramp	812
	At Malden Rd	
11	401 WB On Ramp	300
12	401 EB Off Ramp	300
	Hwy 401 to EC Row Expressway	
13	401 EB Off Ramp	970
	Ojibway Pkwy IC	
14	401 WB Off Ramp	410
15	401 WB On Ramp	250
16	401 EB Off Ramp	20
17	401 EB On Ramp	1600
	EC Row Expressway to Hwy 401	
18	401 WB On Ramp	341

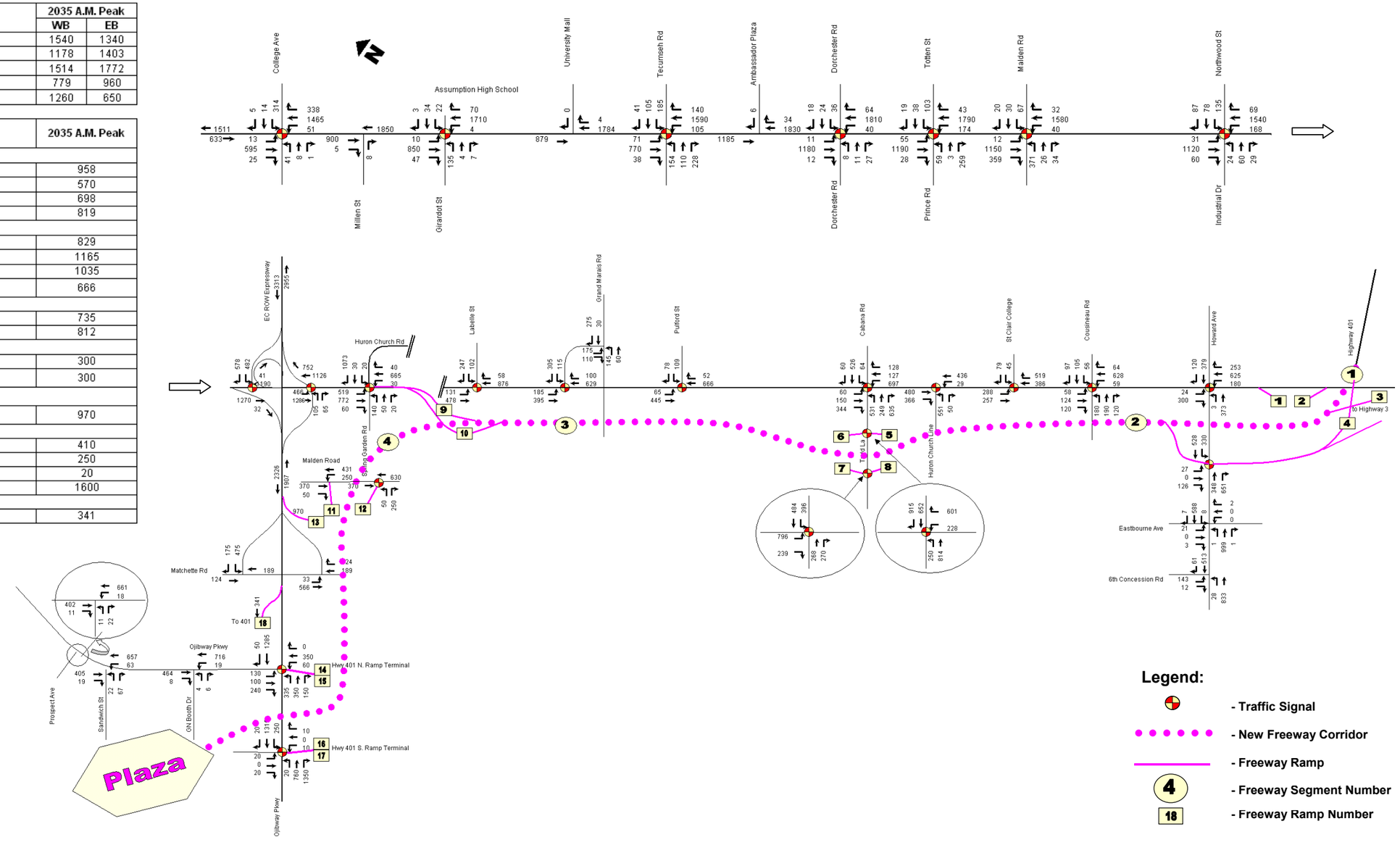


EXHIBIT 26. ALTERNATIVE 2A 2035 PM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 P.M. Peak	
		WB	EB
1	E. of Hwy 3 merge/split	1720	2120
2	W. of Howard Ave	1619	2343
3	At Grand Marais Rd	2020	2927
4	E. of Malden Rd	477	1365
5	To/From Canadian Plaza	580	1970

	HIGHWAY 401 Ramps	2035 P.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	842
2	401 WB On Ramp	709
3	401 EB Off Ramp	647
4	401 EB On Ramp	753
	At Todd Lane/Cabana Rd	
5	401 WB Off Ramp	497
6	401 WB On Ramp	898
7	401 EB Off Ramp	1017
8	401 EB On Ramp	433
	At Huron Church Rd	
9	401 WB Off Ramp	1543
10	401 EB On Ramp	1562
	At Malden Rd	
11	401 WB On Ramp	260
12	401 EB Off Ramp	400
	Hwy 401 to EC Row Expressway	
13	401 EB Off Ramp	1325
	Ojibway Pkwy IC	
14	401 WB Off Ramp	330
15	401 WB On Ramp	40
16	401 EB Off Ramp	160
17	401 EB On Ramp	1280
	EC Row Expressway to Hwy 401	
18	401 WB On Ramp	133

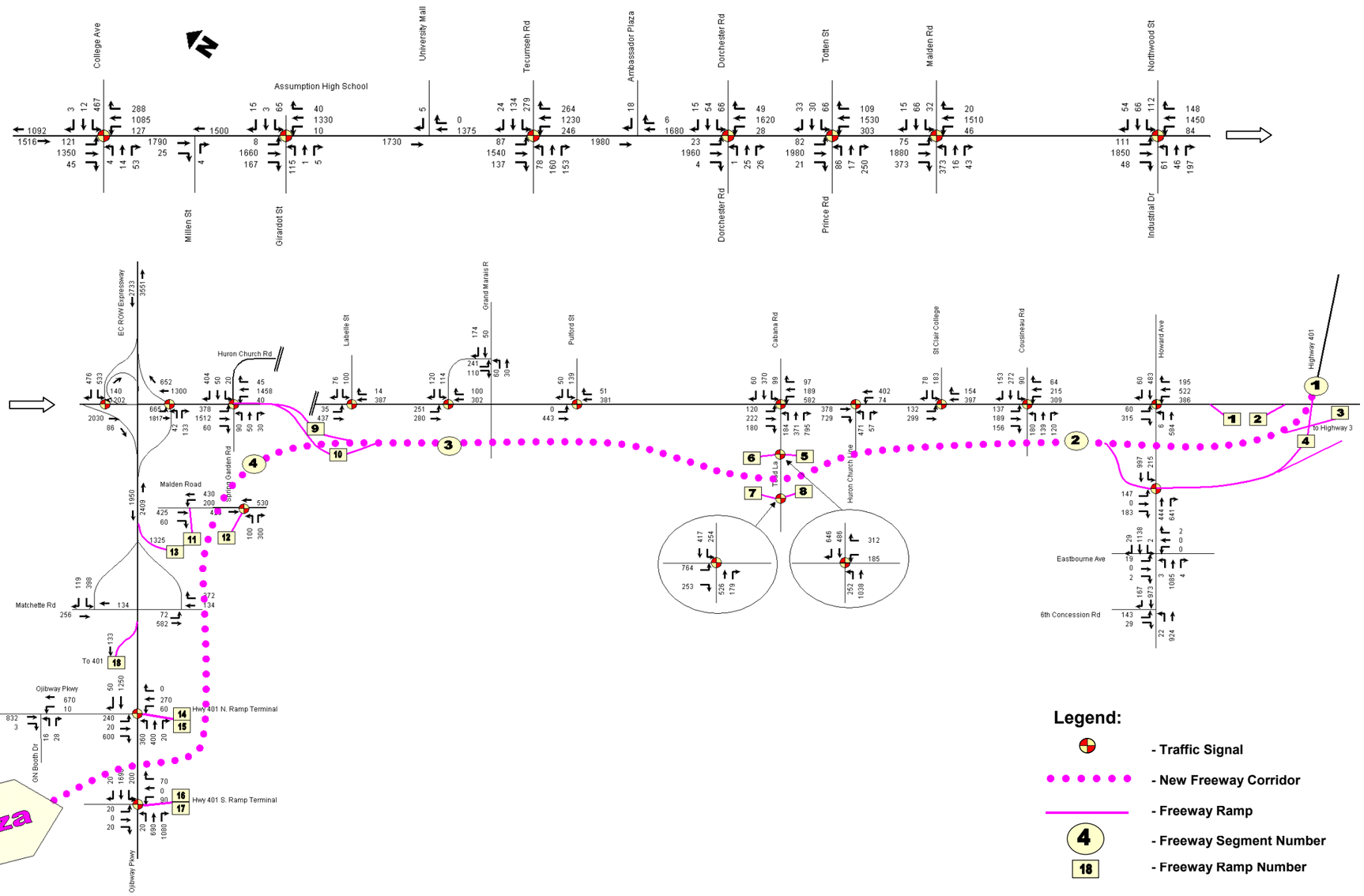


EXHIBIT 27. ALTERNATIVE 2B 2035 AM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 A.M. Peak WB	2035 A.M. Peak EB
1	E. of Hwy 3 merge/split	1540	1340
2	W. of Howard Ave	1178	1403
3	At Grand Marais Rd	1514	1772
4	E. of Malden Rd	779	960
5	To/From Canadian Plaza	1260	650

	HIGHWAY 401 Ramps	2035 A.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	958
2	401 WB On Ramp	570
3	401 EB Off Ramp	698
4	401 EB On Ramp	819
	At Todd Lane/Cabana Rd	
5	401 WB Off Ramp	829
6	401 WB On Ramp	1165
7	401 EB Off Ramp	1035
8	401 EB On Ramp	666
	At Huron Church Rd	
9	401 WB Off Ramp	735
10	401 EB On Ramp	812
	At Malden Rd	
11	401 WB On Ramp	300
12	401 EB Off Ramp	300
	Hwy 401 to EC Row Expressway	
13	401 EB Off Ramp	970
	Ojibway Pkwy IC	
14	401 WB Off Ramp	410
15	401 WB On Ramp	250
16	401 EB Off Ramp	20
17	401 EB On Ramp	1600
	EC Row Expressway to Hwy 401	
18	401 WB On Ramp	341

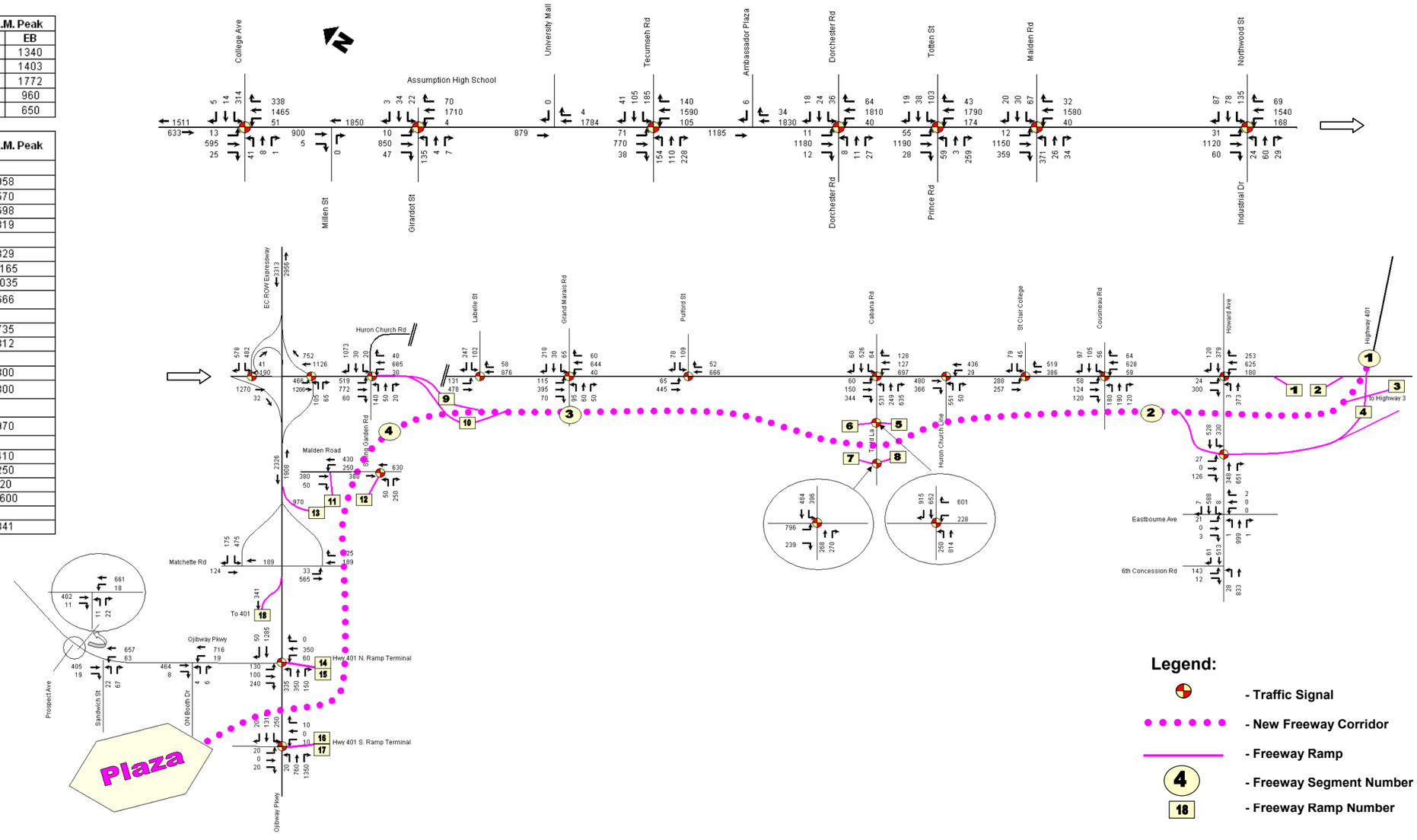


EXHIBIT 28. ALTERNATIVE 2B 2035 PM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 P.M. Peak WB	2035 P.M. Peak EB
1	E. of Hwy 3 merge/split	1720	2120
2	W. of Howard Ave	1619	2301
3	At Grand Marais Rd	2020	2885
4	E. of Malden Rd	477	1365
5	To/From Canadian Plaza	580	1970

	HIGHWAY 401 Ramps	2035 P.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	842
2	401 WB On Ramp	709
3	401 EB Off Ramp	647
4	401 EB On Ramp	753
	At Todd Lane/Cabana Rd	
5	401 WB Off Ramp	497
6	401 WB On Ramp	898
7	401 EB Off Ramp	1017
8	401 EB On Ramp	433
	At Huron Church Rd	
9	401 WB Off Ramp	1543
10	401 EB On Ramp	1520
	At Malden Rd	
11	401 WB On Ramp	260
12	401 EB Off Ramp	400
	Hwy 401 to EC Row Expressway	
13	401 EB Off Ramp	1325
	Ojibway Pkwy IC	
14	401 WB Off Ramp	330
15	401 WB On Ramp	40
16	401 EB Off Ramp	160
17	401 EB On Ramp	1280
	EC Row Expressway to Hwy 401	
18	401 WB On Ramp	133

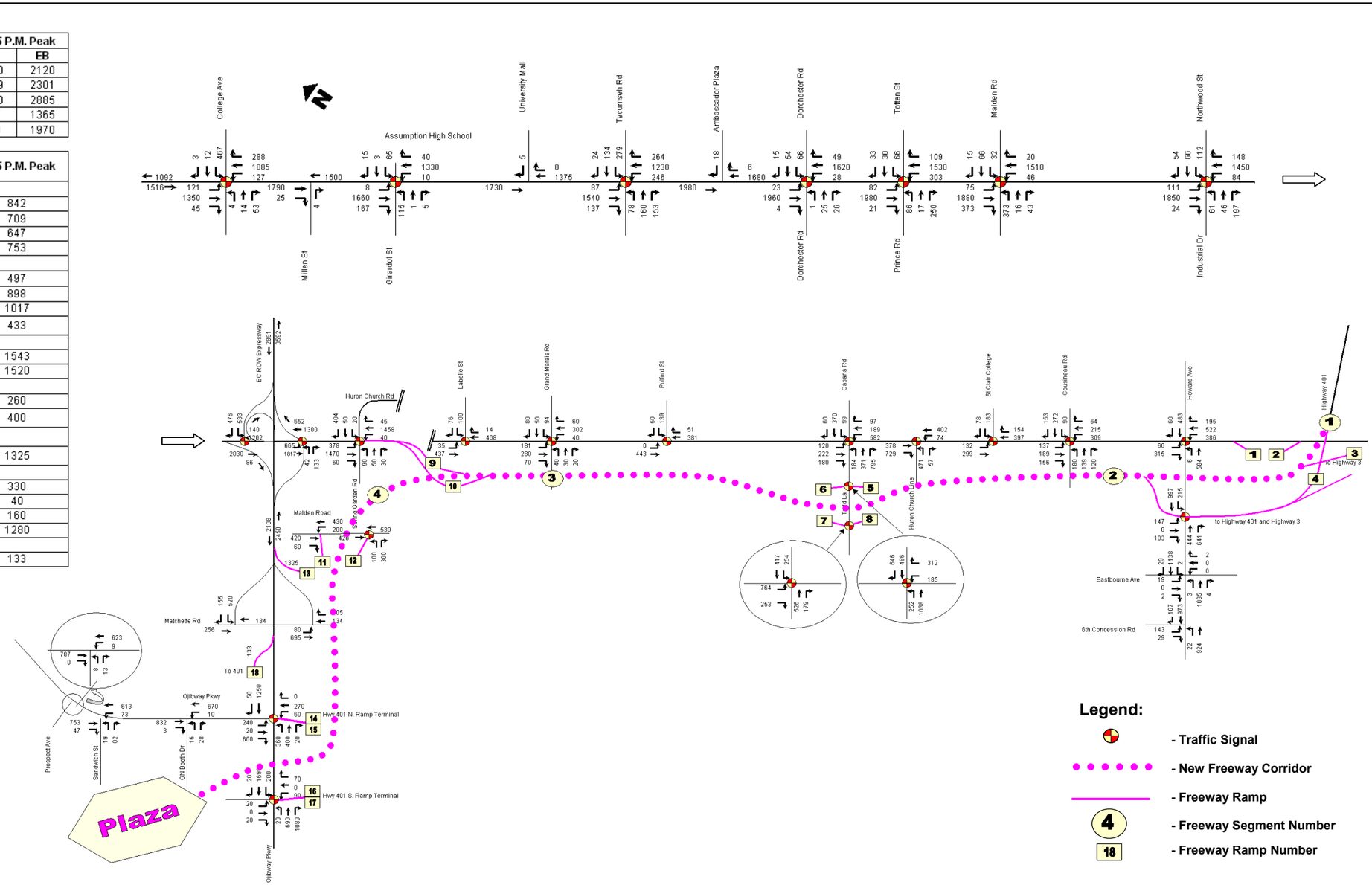


EXHIBIT 29. ALTERNATIVE 3 2035 AM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 A.M. Peak	
		WB	EB
1	E. of Hwy 3 merge/split	1540	1340
2	W. of Howard Ave	1484	1319
3	At Grand Marais Rd	1226	1511
4	E. of Malden Rd	779	960
5	To/From Canadian Plaza	1260	650

	HIGHWAY 401 Ramps	2035 A.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	654
2	401 WB On Ramp	535
3	401 EB Off Ramp	685
4	401 EB On Ramp	723
	At St Clair College	
5	401 WB Off Ramp	564
6	401 WB On Ramp	306
7	401 EB Off Ramp	396
8	401 EB On Ramp	204
	At Huron Church Rd	
9	401 WB Off Ramp	447
10	401 EB On Ramp	551
	At Malden Rd	
11	401 WB On Ramp	300
12	401 EB Off Ramp	300
	Hwy 401 to EC Row Expressway	
13	401 EB Off Ramp	970
	Ojibway Pkwy IC	
14	401 WB Off Ramp	410
15	401 WB On Ramp	250
16	401 EB Off Ramp	20
17	401 EB On Ramp	1600
	EC Row Expressway to Hwy 401	
18	401 WB On Ramp	341

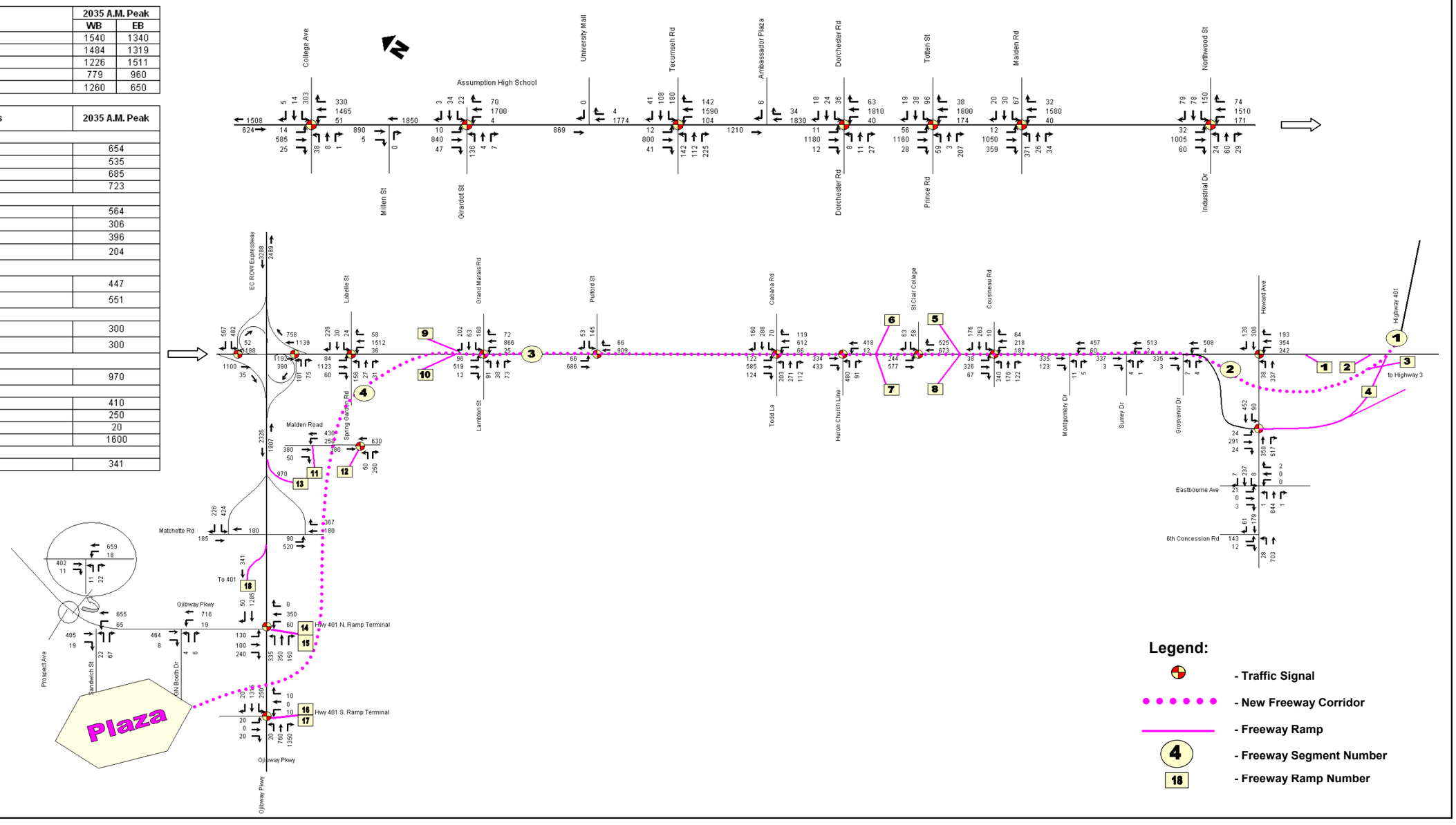
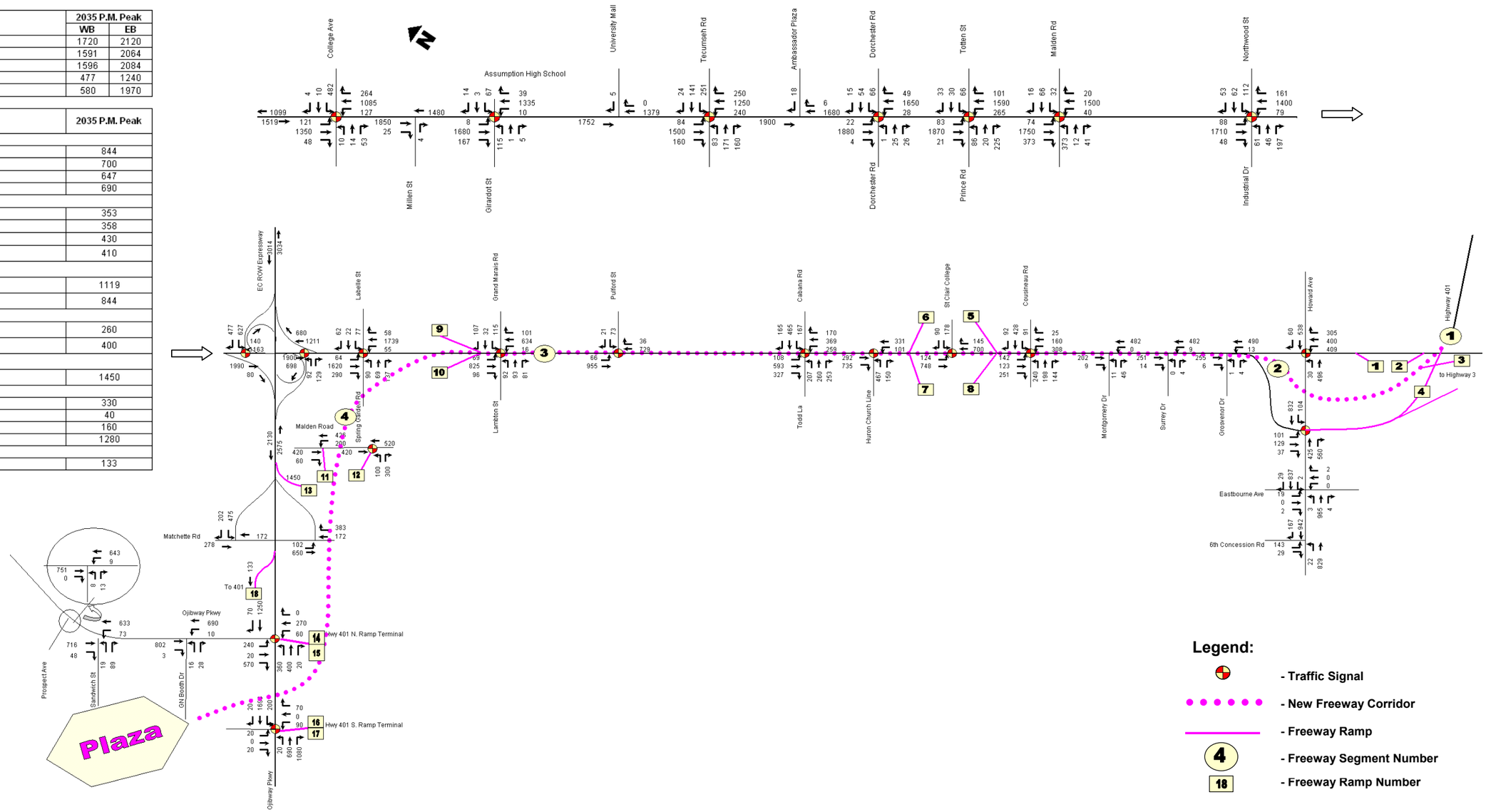


EXHIBIT 30. ALTERNATIVE 3 2035 PM PEAK HOUR TRAFFIC VOLUMES

	HIGHWAY 401 Mainline	2035 P.M. Peak WB	2035 P.M. Peak EB
1	E. of Hwy 3 merge/split	1720	2120
2	W. of Howard Ave	1591	2064
3	At Grand Marais Rd	1596	2084
4	E. of Malden Rd	477	1240
5	To/From Canadian Plaza	580	1970

	HIGHWAY 401 Ramps	2035 P.M. Peak
	Hwy 3 merge/split	
1	401 WB Off Ramp	844
2	401 WB On Ramp	700
3	401 EB Off Ramp	647
4	401 EB On Ramp	690
	At St Clair College	
5	401 WB Off Ramp	353
6	401 WB On Ramp	358
7	401 EB Off Ramp	430
8	401 EB On Ramp	410
	At Huron Church Rd	
9	401 WB Off Ramp	1119
10	401 EB On Ramp	844
	At Malden Rd	
11	401 WB On Ramp	260
12	401 EB Off Ramp	400
	Hwy 401 to EC Row Expressway	
13	401 EB Off Ramp	1450
	Ojibway Pkwy IC	
14	401 WB Off Ramp	330
15	401 WB On Ramp	40
16	401 EB Off Ramp	160
17	401 EB On Ramp	1280
	EC Row Expressway to Hwy 401	
18	401 WB On Ramp	133



4.5. Practical Alternatives Traffic Operations Analysis

All Practical Alternatives were analyzed from the traffic operations/performance standpoint using Synchro 6 and HCS200 software packages for signalized and unsignalized intersections, as well as freeway segments, and multilane arterial roads. The main measures of effectiveness utilized in the analysis were level of service, volume-to-capacity ratios and vehicular delays.

4.5.1. New Freeway Corridor / Mainline Analysis

All Practical Alternatives incorporate a new freeway facility with a six-lane cross-section between the Highway 3/Highway 401 junction and the new plaza. There are sub-alternatives, which incorporate a combination of at-grade and below-grade sections with vertical grades of up to 3%. Short 3% grades would not adversely impact operating speeds of heavy trucks resulting in a marginal decrease in capacity when compared to "at-grade" alternatives. Alternative 3 (Tunnel) will have lower design speed (90 km/h as opposed to 120 km/h for the other alternatives) resulting in slightly reduced capacity (marginal reduction).

As previously noted, given the strategic importance of the Detroit River international crossing to the local, regional and national economies, it may be appropriate to design to ensure a higher level of service for facilities that define the routing to the international crossing. This recognizes that there are limited opportunities to divert international traffic to other facilities, and provision of a better level of service margin is desirable should traffic demands be higher than projected and/or to allow smoother operations during periods where there may be surges or spikes in demand.

Capacity of a six-lane freeway facility (90 km/h to 120 km/h design speed) is typically between 1,950 and 2,200 passenger car units/equivalents (PCE) per lane. Table 19 summarizes ranges of maximum service flows for a given level of service under various geometric and traffic conditions (by design speed and truck percentage) that can be anticipated for the new corridor. For example, the maximum service flow for the level-of-service (LOS) C would be 3,310 vehicles per hour using the MTO methodology for calculating maximum service flows for freeway segments under prevailing geometric and traffic conditions (i.e. 30% trucks in the traffic stream, 120 km/h design speed and 2.5 PCE per truck).

TABLE 19. SERVICE FLOW RANGES FOR GIVEN LOS UNDER VARIOUS GEOMETRIC AND TRAFFIC CONDITIONS

Design Speed →	120 km/h			110 km/h			100 km/h			90 km/h		
Truck % →	20%	30%	40%	20%	30%	40%	20%	30%	40%	20%	30%	40%
LOS A	1750	1570	1430	1570	1410	1280	n/a	n/a	n/a	n/a	n/a	n/a
LOS B	2630	2360	2140	2450	2190	1990	2310	2070	1880	n/a	n/a	n/a
LOS C	3690	3310	3000	3420	3060	2780	3230	2900	2630	3060	2740	2490
LOS D	4480	4010	3640	4110	3680	3340	3970	3560	3230	3780	3390	3070
LOS E	4620	4140	3750	4620	4140	3750	4620	4140	3750	4500	4030	3660

The highest directional volume forecasted for the new facility (2035 horizon) is in the southbound direction in the PM peak hour in the vicinity of Grand Marais Road: approximately 3,000 vehicles per hour, which falls into the LOS C range (Alternative 2A with 27% trucks in the PM peak hour/peak direction). In Practical Alternative 3 with lower design speed, the highest forecasted directional volume is approximately 2,100 vehicles per hour with 35% trucks in the traffic stream, which also falls into the LOS C range.

The six-lane cross-section of the new freeway facility will be sufficient to meet anticipated traffic demand by the 2035 horizon year. With a four-lane cross-section, traffic operations would deteriorate to the LOS E/F threshold by 2035.

4.5.2. Travel Time and Delay

As noted in the New Freeway Corridor/Mainline Analysis section of the report, the new facility (freeway corridor) is expected to operate at free-flow speeds between Howard Avenue and the new plaza (assuming no delays at the U.S. plaza) for all Practical Alternatives. Depending on the new plaza location (Plaza A, B or C), the length of the new freeway corridor varies between approximately 8 and 10 kilometres. With the posted speed of 80 km/h to 100 km/h, travel time from one end of the corridor to the other will be approximately 6 minutes.

Travel time and delay data for the Practical Alternatives (local traffic) was obtained from the Synchro 6 arterial road analysis outputs. Travel times for the Practical Alternatives were calculated along the corridor as well as service roads between Howard Avenue and College Avenue. With the new freeway corridor in place, traffic on the adjacent road network will primarily consist of local traffic. As such, travel times calculated are applicable to local traffic on Highway 3, Huron Church Road and service roads, and represent average travel times it would take a vehicle to travel from one end of the corridor to the other end utilizing facilities listed above. 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.

Travel times calculated for the Practical Alternatives were compared to those under existing and future base geometric and traffic conditions. Exhibits 31 and 32 summarize this comparison (2035 Horizon Year).

Based on the analysis results, all Practical Alternatives revealed similar anticipated travel times ranging between 11.88 minutes and 12.60 minutes in the westbound/northbound direction during the AM peak hour, and 13.27 minutes to 16.52 minutes in the southbound/eastbound direction during the PM peak hour. Calculated travel times for the Practical Alternatives were found to be comparable to those modelled for the existing conditions. Travel times for international traffic on the new corridor (freeway), were found to be around six minutes between Howard Avenue and the new plaza. All Practical Alternatives will result in similar travel times on the new freeway facility.

EXHIBIT 31. TRAVEL TIME COMPARISON: WESTBOUND/NORTHBOUND AM PEAK HOUR, HOWARD AVENUE TO COLLEGE AVENUE (LOCAL TRAFFIC)

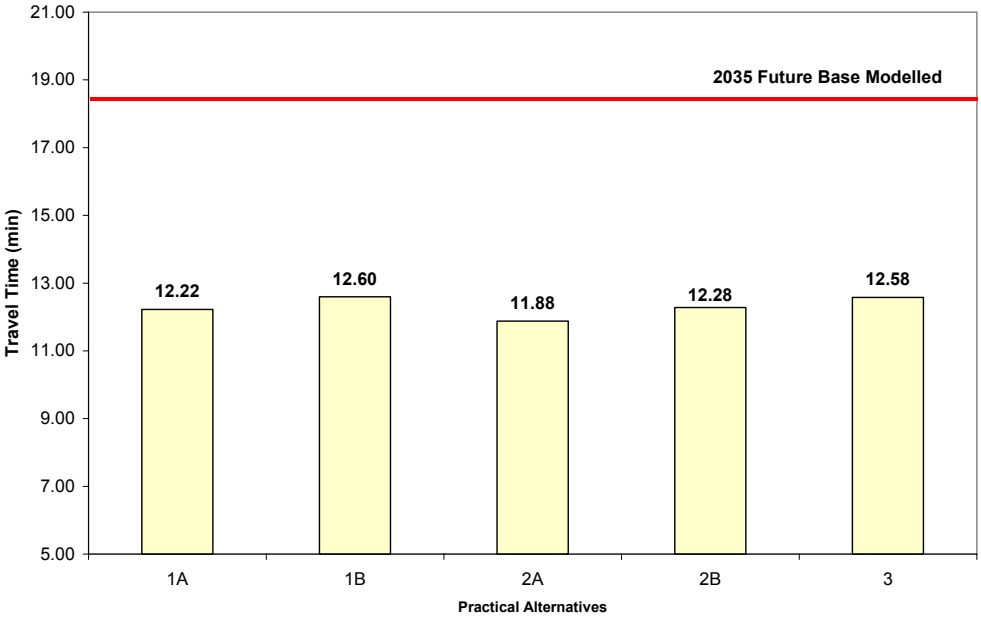
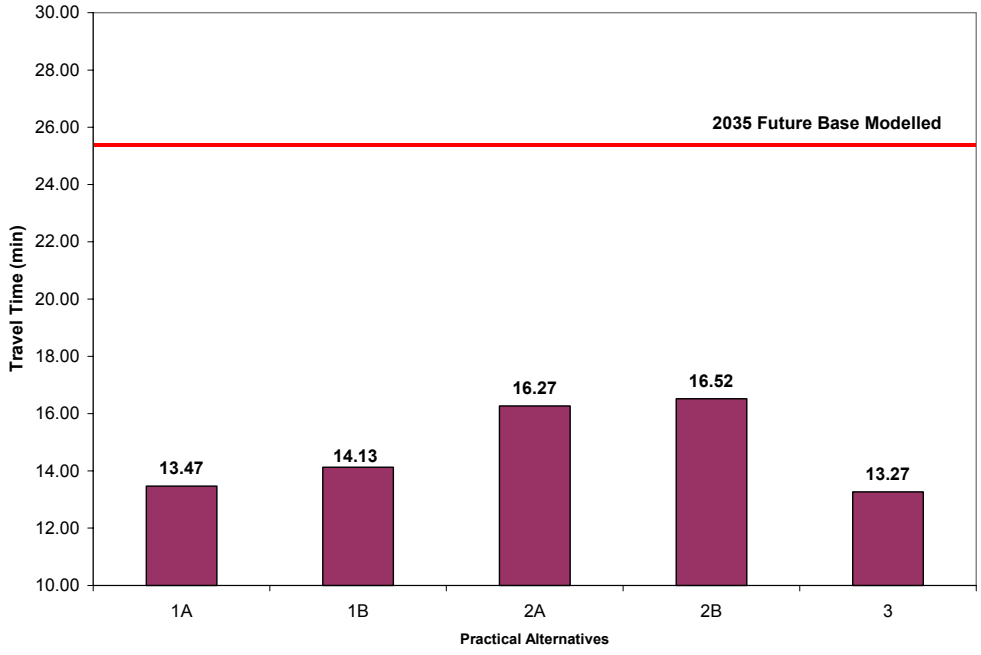


EXHIBIT 32. TRAVEL TIME COMPARISON: SOUTHBOUND/EASTBOUND PM PEAK HOUR, COLLEGE AVENUE TO HOWARD AVENUE (LOCAL TRAFFIC)



From the travel time and delay analysis, Alternatives 1A and 1B resulted in shortest travel times between College Avenue and Howard Avenue in the southbound/eastbound direction during the PM peak hour mainly due to shorter delays to service road traffic at crossing street intersections (no opposing left turns). Although travel times were calculated for local traffic via the local road network between Howard Avenue and College Avenue (Huron Church Road, service roads, etc), the use of the new freeway corridor would further reduce travel times. An overall comparison of travel time is provided in Table 20.

TABLE 20. TRAVEL TIME COMPARISON: 2035 HORIZON YEAR, HOWARD AVENUE TO COLLEGE AVENUE

Time and Dir	Travel Time					Arterial Speed (km/h)					Arterial LOS				
	1A	1B	2A	2B	3	1A	1B	2A	2B	3	1A	1B	2A	2B	3
AM WB/ NB	12:13	12:36	11:53	12:17	12:35	47	46	49	47	48	B	C	B	B	B
AM SB/ EB	13:05	13:35	14:20	14:25	12:34	52	49	46	46	45	B	B	B	B	C
PM WB/ NB	12:10	12:30	12:59	13:51	12:38	50	46	45	42	46	C	C	B	C	C
PM SB/ EB	13:28	14:08	16:16	16:31	13:16	51	48	41	40	43	C	C	C	C	C

It should be noted that although Practical Alternatives 2A and 2B revealed good overall anticipated operating speeds, delays occur to traffic destined to Highway 401 at Todd Lane/Cabana Road by 2035 (westbound left turn at the Todd Ln/Cabana Rd/Highway 3 intersection). Delays associated with this movement were not incorporated in the travel time calculation. In addition, Huron Church Road is not a continuous corridor in Practical Alternatives 2A and 2B. Huron Church Road traffic would need to make either a left turn to go eastbound on Highway 401 or a right turn in order to continue northbound on Huron Church Road just north of Labelle Street. A detailed discussion on the intersection operations and impacts is provided in the following sections.

Overall, 2035 traffic on Huron Church Road in Practical Alternatives 2A and 2B will need an additional two to three minutes to travel between Howard Avenue and College Avenue compared to travel times calculated for Practical Alternatives 1A, 1B and 3.

4.5.3. Intersection Analysis

All key intersections within the Area of Continued Analysis were analyzed using Synchro 6 and HCS2000 software packages. The results of the analysis are summarized in Tables 21 through 30 with an emphasis on levels of service and volume-to-capacity ratios for critical approaches (peak direction). A qualitative discussion on the Practical Alternatives

performance and their comparison in terms of impacts to local residents and businesses, mobility, access and socio-economical impacts is provided in the following section titled *Urban Impacts*.

TABLE 21. PRACTICAL ALTERNATIVE 1A AM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	A	8.0	0.68	B
Girardot	A	2.7	0.58	A
Tecumseh	A	8.8	0.76	B
Dorchester	A	0.6	0.54	A
Prince	A	7.3	0.74	B
Malden	C	22.9	**0.87**	C
Northwood	A	8.6	0.65	B
EC Row N	A	6.0	0.46	B
EC Row S	A	3.2	0.38	A
Labelle*	A	0	0.46	B
Grand Marais Ramp*	A	0	0.41	C
Pulford*	A	0	0.43	A
Cabana	B	16.9	0.26	C
St Clair	B	11.3	0.41	B
Cousineau	B	13.1	0.22	A
Howard	A	7.8	0.20	B
Grand Marais Ramp/Lambton*	SBL - **D**	25.7	0.23	A
Lambton/Fazio*	NBL - C	16.1	0.17	A
HC Line/Todd Lane	WBL - **D**	48.3	**0.95**	C
Malden/Highway 401W-N/S	EBL - C	21.9	0.20	A
Ojibway/Highway 401 W-N/S	NBR - **D**	44.6	**1.05**	B
Ojibway/Highway 401 E-N/S	SEL - **F**	92.3	**0.93**	**D**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 22. PRACTICAL ALTERNATIVE 1A PM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	C	32.1	**0.87**	**D**
Girardot	A	4.8	0.58	A
Tecumseh	C	26.8	**0.86**	C
Dorchester	A	8.0	0.58	A
Prince	B	11.3	0.83	B
Malden	C	26.5	**0.85**	C
Northwood	A	3.0	0.70	B
EC Row N	A	3.0	0.67	A
EC Row S	A	1.7	0.49	A
Fazio Dr*	A	0	0.31	A
Todd	B	13.0	0.51	B
St Clair*	A	0	0.31	**D**
Cousineau	B	14.3	0.59	C
Howard	B	18.0	0.64	B
Grand Marais Ramp/Lambton*	SBL - C	21.4	0.23	A
Lambton/Fazio*	NBL - **D**	30.1	0.53	A
HC Line/Todd Lane	WBL - **D**	44.5	**0.99**	C
Malden/Highway 401W-N/S	EBL - C	21.9	0.34	B
Ojibway/Highway 401 W-N/S	WBL - **D**	42.0	0.48	A
Ojibway/Highway 401 E-N/S	SEL - **F**	140.7	**1.17**	**E**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 23. PRACTICAL ALTERNATIVE 1B AM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	A	9.3	0.68	B
Girardot	A	1.8	0.57	A
Tecumseh	B	16.0	0.76	B
Dorchester	A	0.8	0.54	A
Prince	A	8.6	0.72	B
Malden	B	18.6	**0.87**	B
Northwood	A	7.5	0.63	B
EC Row N	A	5.0	0.45	B
EC Row S	A	3.4	0.39	A
Labelle	A	7.5	0.58	B
Grand Marais*	A	0	0.10	A
Pulford*	A	0	0.08	A
Cabana	B	15.1	0.66	B
HC Line	B	13.7	0.44	A
St Clair	A	9.4	0.38	B
Cousineau	B	13.6	0.22	B
Howard	A	7.8	0.20	B
Malden/Highway 401W-N/S	EBL - C	21.9	0.20	A
Ojibway/Highway 401 W-N/S	NBR - **D**	44.6	**1.05**	B
Ojibway/Highway 401 E-N/S	SEL - **F**	92.3	**0.93**	**D**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 24. PRACTICAL ALTERNATIVE 1B PM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	C	30.0	**0.85**	**D**
Girardot	A	6.8	0.58	A
Tecumseh	C	26.1	**0.85**	C
Dorchester	B	16.3	0.58	B
Prince	B	10.1	0.83	B
Malden	C	20.5	0.79	C
Northwood	A	5.1	0.69	B
EC Row N	A	2.9	0.65	A
EC Row S	A	1.8	0.48	A
Labelle	B	15.4	**0.85**	B
Grand Marais*	A	0	0.09	A
Pulford*	A	0	0.11	A
Cabana	B	10.9	0.56	B
HC Line	B	10.4	0.78	B
St Clair*	A	0	0.33	**D**
Cousineau	B	14.1	0.58	C
Howard	B	18.1	0.65	B
Malden/Highway 401W-N/S	EBL - C	22.9	0.35	A
Ojibway/Highway 401 W-N/S	WBL - **D**	42.0	0.48	A
Ojibway/Highway 401 E-N/S	SEL - **F**	136.0	**1.15**	**E**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 25. PRACTICAL ALTERNATIVE 2A AM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	A	8.4	0.69	B
Girardot	A	1.4	0.57	A
Tecumseh	A	8.4	0.79	B
Dorchester	A	1.0	0.55	A
Prince	A	7.1	0.72	B
Malden	B	15.9	0.70	B
Northwood	A	4.9	0.57	B
EC Row N	A	5.0	0.40	A
EC Row S	B	15.6	0.53	B
Spring Garden	C	21.2	0.53	C
Labelle	A	2.4	0.42	A
Grand Marais	A	1.8	0.35	A
Pulford	A	2.1	0.32	A
Cabana	B	10.9	0.09	**F**
HC Line	A	8.4	0.26	C
St Clair	A	8.3	0.22	B
Cousineau	A	5.2	0.37	B
Howard	A	8.4	0.33	C
Grand Marais Ramp/Lambton*	SBL - C	15.9	0.37	A
Malden/Highway 401W-N/S	EBL - C	34.8	0.23	A
Ojibway/Highway 401 W-N/S	NBR - **D**	44.5	**1.05**	C
Ojibway/Highway 401 E-N/S	NBL - **F**	100.4	**1.09**	**E**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 26. PRACTICAL ALTERNATIVE 2A PM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	C	34.4	**0.89**	**D**
Girardot	A	6.6	0.58	A
Tecumseh	C	24.3	**0.88**	C
Dorchester	B	16.9	0.63	B
Prince	B	18.9	**0.89**	C
Malden	B	12.5	**0.87**	B
Northwood	C	28.5	0.75	C
EC Row N	A	3.6	0.68	B
EC Row S	A	5.0	0.57	C
Spring Garden	A	4.6	0.67	C
Labelle	A	1.6	0.18	A
Grand Marais	A	1.7	0.13	A
Pulford	A	5.3	0.20	A
Cabana	C	22.2	0.32	**D**
HC Line	B	17.9	0.26	C
St Clair	A	3.7	0.13	B
Cousineau	B	15.3	0.39	C
Grand Marais Ramp/Lambton*	SBL - B	12.6	0.36	A
Malden/Highway 401W-N/S	EBL - **C**	26.1	0.23	A
Ojibway/Highway 401 W-N/S	WBL - **D**	40.0	0.45	B
Ojibway/Highway 401 E-N/S	EBL - **F**	157.4	**1.21**	**E**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 27. PRACTICAL ALTERNATIVE 2B AM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	A	9.7	0.69	B
Girardot	A	1.6	0.57	A
Tecumseh	A	8.9	0.79	B
Dorchester	A	0.9	0.55	A
Prince	A	8.6	0.72	B
Malden	A	6.4	0.69	B
Northwood	A	3.3	0.57	B
EC Row N	C	22.4	0.40	B
EC Row S	C	21.6	0.51	B
Spring Garden	C	21.9	0.54	C
Labelle	A	2.9	0.42	A
Grand Marais	A	3.2	0.35	A
Pulford	A	1.7	0.32	A
Cabana	A	6.0	0.19	**F**
HC Line	B	17.5	0.26	C
St Clair	A	8.1	0.23	B
Cousineau	B	10.9	0.46	C
Howard	A	8.4	0.33	C
Malden/Highway 401W-N/S	EBL - C	26.1	0.13	A
Ojibway/Highway 401 W-N/S	NBR - **D**	44.5	**1.05**	C
Ojibway/Highway 401 E-N/S	NBL - **F**	100.4	**1.09**	**E**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 28. PRACTICAL ALTERNATIVE 2B PM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	C	29.8	0.84	**D**
Girardot	A	7.5	0.58	A
Tecumseh	C	24.3	**0.88**	C
Dorchester	B	16.8	0.63	B
Prince	B	18.9	**0.89**	C
Malden	B	12.5	**0.87**	B
Northwood	C	28.5	0.75	C
EC Row N	A	3.6	0.68	B
EC Row S	A	3.1	0.57	C
Spring Garden	B	14.1	0.65	C
Labelle	A	1.4	0.18	A
Grand Marais	A	3.0	0.17	A
Pulford	A	5.8	0.20	A
Cabana	C	20.5	0.39	C
HC Line	B	15.2	0.25	C
St Clair	A	4.7	0.14	B
Cousineau	C	24.4	0.39	C
Malden/Highway 401W-N/S	EBL - C	26.1	0.23	A
Ojibway/Highway 401 W-N/S	WBL - **D**	40.0	0.45	B
Ojibway/Highway 401 E-N/S	EBL - **F**	157.4	**1.21**	**E**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 29. PRACTICAL ALTERNATIVE 3 AM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	A	5.4	0.65	B
Girardot	A	2.7	0.59	A
Tecumseh	A	8.3	0.78	B
Dorchester	A	0.6	0.55	A
Prince	A	6.2	0.70	B
Malden	B	16.3	**0.85**	B
Northwood	A	8.2	0.60	B
EC Row N	A	7.1	0.41	A
EC Row S	A	3.7	0.35	A
Labelle	B	12.7	0.78	B
Grand Marais	A	3.7	0.49	B
Pulford	A	6.7	0.51	A
Cabana	C	25.9	0.71	C
HC Line	A	4.8	0.29	B
St Clair	B	11.1	0.38	B
Cousineau	C	25.1	0.26	C
Howard	A	6.5	0.18	C
Malden/Highway 401W-N/S	EBL - **D**	36.4	0.26	A
Ojibway/Highway 401 W-N/S	NBR - **D**	45.2	**1.05**	C
Ojibway/Highway 401 E-N/S	NBL - **F**	100.2	**1.09**	**E**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

TABLE 30. PRACTICAL ALTERNATIVE 3 PM PEAK HOUR & DIRECTION LEVEL OF SERVICE, HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR (2035)

Intersection	LOS, Peak Through Movement	Delay per vehicle (s), Peak Through Movement	V/C Ratio, Peak Through Movement	Overall Intersection LOS
College	C	32.0	**0.87**	C
Girardot	A	6.1	0.58	A
Tecumseh	C	29.0	**0.89**	C
Dorchester	A	8.9	0.59	A
Prince	C	21.3	0.82	B
Malden	B	18.1	0.82	C
Northwood	A	8.6	0.70	B
EC Row N	A	4.2	0.70	B
EC Row S	A	3.9	0.60	A
Labelle	B	14.0	**0.86**	B
Grand Marais	A	1.6	0.44	A
Pulford	A	4.2	0.39	A
Cabana	C	22.7	0.67	C
HC Line	A	9.5	0.21	B
St Clair	A	3.7	0.34	B
Cousineau	C	22.4	0.18	C
Howard	C	23.4	0.40	A
Malden/Highway 401W-N/S	EBL - **D**	39.6	0.45	A
Ojibway/Highway 401 W-N/S	WBL - **D**	40.9	0.48	A
Ojibway/Highway 401 E-N/S	NBL - **F**	115.4	**1.14**	**E**

- measures of effectiveness are stated for critical movements

* - unsignalized intersection

Most of the key intersections within the Area of Continued Analysis were found to operate at good levels of service during both peak hours with the exception of the Ojibway Parkway/ Highway 401 ramp terminals, which were found to have critical movements (all Practical Alternatives), based on the 2035 peak hour volume forecast. It should be noted that for analysis purposes, Plaza B and C layouts were incorporated in the modelling exercise. Due to the location and configuration of Plaza A, no access from/to Highway 401 at Ojibway Parkway would be provided (no ramp terminal intersections with Highway 401 ramps at Ojibway Parkway). There is another intersection that was found to experience

less than desirable levels of service during peak hours: the intersection of Highway 3/Todd Lane/Cabana Road in Practical Alternatives 2A and 2B.

Ojibway Parkway/Highway 401 (Plaza Layouts B and C)

At the Highway 401 W-N/S ramp terminal, the demand from Ojibway Parkway south to Highway 401 east during the AM peak hour was estimated to be in the range of 1,300 vehicles per hour resulting in LOS E operations (northbound right turn). Further analysis revealed that a percentage of this traffic is local traffic, which is ultimately destined to E.C. Row Expressway eastbound via the Highway 401 to E.C. Row Expressway ramp. Approximately 33% percent of the 970 vehicles on the Highway 401 off-ramp to E.C. Row Expressway originate from Ojibway Parkway. Once traffic in the northbound right turn lane at the Ojibway Parkway/Highway 401 ramp terminal begins to experience delays, local traffic destined to E.C. Row Expressway eastbound would stay on E.C. Row Expressway rather than turning right to access Highway 401 (short-cut). The overall level of service at this location was found to be LOS C during this time period, which is satisfactory.

The Highway 401 E-N/S ramp terminal was found to operate at LOS D/E during both peak hours. The northbound left turn and the southbound through were found to be the critical movements for this intersection. 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. It should be noted that similar operations at this intersection were calculated for all Practical Alternatives. Traffic queuing at this location is discussed in the next chapter.

Huron Church Road/Highway 401

Practical Alternatives 1A, 1B and 3 do not require reconfiguration of the Highway 401/E.C. Row Expressway interchange with the Highway 401 off-ramp terminating at Labelle Street providing a relatively smooth transition. In Practical Alternatives 2A and 2B, N-E, W-N/S and S-E ramps at E.C. Row Expressway are proposed to be realigned to form a half-diamond interchange to accommodate the Highway 401 off-ramp terminal at Huron Church Road. Huron Church Road through traffic would have to make either a left turn to go eastbound on Highway 401 or a right turn in order to continue northbound on Huron Church Road.

It should be noted that a double right turn lane on the westbound approach (Huron Church Road) was utilized in the analysis of Practical Alternatives 2A and 2B, as traffic demand for this movement ranges between 300 and 1,000 vehicles per hour during AM and PM peak hours. Although traffic operations at this intersection were found to be satisfactory with the proposed lane configuration, having two lanes of traffic turning from Huron Church Road and one lane of traffic turning from Spring Garden Road into three lanes on Huron Church Road (toward the Ambassador Bridge) on the same traffic signal phase (although not uncommon) may be undesirable. However, there are also disadvantages of other possible lane configurations including channelization of the right turn or splitting of the westbound and eastbound traffic signal phases.

Right turn channelization (as opposed to the double right turn) would reduce the distance to the E.C Row Expressway ramp terminal, potentially reducing the weaving distance

between the two intersections, which is undesirable. Splitting eastbound and westbound traffic signal phases to avoid simultaneous turns from Huron Church Road and Spring Garden Road would require additional green time assigned to the appropriate traffic signal phases (cross-roads), therefore reducing green time for the off-ramp. As a result, traffic queues on the off-ramp would increase from 140 metres to 240 metres during the PM peak hour. Although the ramp is 400 metres long, the end of queue would be halfway between the ramp terminal and the Highway 401 mainline. Impacts of potential lane configurations at this intersection in Practical Alternatives 2A and 2B will be assessed in the Level 3 (microsimulation) Traffic Report should one of these Practical Alternatives be selected as the Technically Preferred Alternative.

The Highway 401 E-N off-ramp to Huron Church Road was estimated to carry between 800 vehicles per hour and 1,200 vehicles per hour in Practical Alternatives 1A, 1B and 3, and as many as 1,550 vehicles per hour in Practical Alternatives 2A and 2B. In Practical Alternatives 1A, 1B and 3, Highway 401 off-ramp merges with either service road (Practical Alternatives 1A and 1B) or Huron Church Road (Practical Alternative 3) a few hundred metres upstream from the intersection with Labelle Street. Potential for weaving on this section of Huron Church Road (between Highway 401 off-ramp traffic and Huron Church Road traffic approaching the intersection) is low due to low traffic demand to Labelle Street and Bethlehem Road (northbound left and right turns at the intersection). Impacts of the weave (if any) will be assessed in the Level 3 Traffic Report (microsimulation). Traffic queuing at this location is discussed in the next chapter.

Todd Lane/Cabana Road/Highway 401/Highway 3

Access to and from Cabana Road and Todd Lane from to Highway 401 is provided in Practical Alternatives 2A and 2B. Access to Highway 401 westbound and from Highway 401 eastbound is provided in Practical Alternative 1B. No ramps/connections are provided at this location in Practical Alternatives 1A and 3.

With the ramps in place (Practical Alternatives 2A and 2B), this is expected to be a highly utilized interchange with Highway 401 ramps carrying significant amounts of traffic during peak hours. It should be noted that all three intersections on Cabana Road/Todd Lane in the vicinity of the interchange (both ramp terminals and the intersection of Cabana Road and Highway 3) are expected to be signalized, and are closely spaced from one another (within a 300-metre segment). Traffic signal coordination will be required to reduce potential for traffic queues at one intersection impacting operations at the intersection upstream from it. Even though both ramp terminals were found to operate acceptably, the intersection at Highway 3 would have critical movements operating at poor levels of service during peak periods. Traffic destined to Highway 401 westbound would need to make a left turn on Cabana Road/Todd Lane to access the on-ramp (700 vehicles per hour during the AM peak hour). This interchange is the last opportunity for international traffic on Highway 3 (destined to the new plaza) to access Highway 401. Should an additional on-ramp be provided at Spring Garden Road (Highway 401 westbound on-ramp peeling off Spring Garden Road on the west side of Huron Church Road in Practical Alternatives 2A and 2B), the demand for the on-ramp at Cabana Road/Todd Lane would decrease resulting in improved traffic operations at the Cabana Road/Highway 3 intersection

(reduced westbound left turns).

In Practical Alternative 1B access to Highway 401 westbound is provided north of Cabana Road/Todd Lane and off Huron Church Road. All signalized intersections in the vicinity were found to operate satisfactory under this scenario.

Huron Church Line is realigned to Todd Lane in Practical Alternative 1A. The realignment introduces additional out-of-way travel for Huron Church Line traffic, as well as creates potential for additional traffic queues at the service road intersections. There are over 800 left turns from Todd Lane to westbound on service road in the AM peak hour. The distance between the two service road intersections is approximately 60 metres. Although average traffic queues were found to be within the 50-metre range if a double left turn is provided, given the close proximity of the two intersections, the effectiveness of the double left turn provision may be overly optimistic. This configuration makes this Practical Alternative less desirable compared to other alternatives. Traffic queuing at this location is discussed in the next chapter.

Cousineau Road/Highway 3

This intersection was found to operate at the LOS C/LOS D threshold (PM peak hour) in Practical Alternative 3 (the tunnel), while other Practical Alternatives demonstrated LOS C operations or better during peak hours.

St. Clair College Main Entrance/Highway 3

Practical Alternatives 1A, 1B, and 3 provide slip-on/slip-off ramps in the vicinity of the St. Clair College main entrance. In Practical Alternatives 1A and 1B, traffic exiting Highway 401 northbound and destined to St. Clair College would have to weave with through traffic on Highway 3. In Practical Alternative 3 (Highway 401 ramps merge with Highway 3 on the right side), the weave occurs between Highway 401 traffic destined to Highway 3 westbound (through), and traffic on Highway 3 destined to St. Clair College (right turn at the intersection). There are approximately 540 vehicles that turn right to St. Clair College from Highway 3 westbound in the AM peak hour (2035 horizon year). It is anticipated that the majority of the right turns would come from Highway 3 (service road in Practical Alternatives 1A and 1B) rather than Highway 401, thus having the Highway 401 off-ramp merge with Highway 3 /service road on the left (Practical Alternatives 1A and 1B), would result in fewer vehicles having to weave between the merge area and the traffic signal at St. Clair College. However, the situation is reversed in the eastbound direction, where Highway 3 traffic destined to St. Clair College would have to weave with through traffic coming off Highway 401 eastbound (Practical Alternatives 1A and 1B). The extent of the potential weaving problem will be further reviewed in the Level 3 Traffic Report (microsimulation) should either Practical Alternative 1 (A or B) or Practical Alternative 3 be selected as the Technically Preferred Practical Alternative. Highway 401 ramps are not proposed at this location in Practical Alternatives 2A and 2B.

Howard Avenue/Highway 3/Highway 401

Access to Howard Avenue from Highway 401 westbound is provided in all alternatives.

Highway 3 and Highway 401 off-ramp form the westbound approach at the Howard Avenue/Highway 3 intersection. It should be noted that the off-ramp merges with Highway 3 approximately 250 metres upstream from the signalized intersection at Howard Avenue. The weave between Highway 401 traffic destined to Howard Avenue northbound (right turn at the intersection), and Highway 3 traffic destined to Highway 3 and Howard Avenue southbound is expected to be minimal (Highway 401 traffic destined to Howard Avenue northbound is likely to exit at Dougall Parkway). However, Highway 3 traffic destined to Howard Avenue south (left turn at the intersection) would weave with traffic from Highway 401 that is destined to Highway 3 west (through). It should be noted that approximately 80% of the total westbound approach volume (peak hour) consists of Highway 401 off-ramp traffic in all Practical Alternatives.

Access to Howard Avenue from Highway 401 eastbound is only provided in Practical Alternatives 2A and 2B. The off-ramp was estimated to carry 150 to 330 vehicles per hour for AM and PM peak hours, respectively (2035 horizon year). In other alternatives, traffic destined to Howard Avenue would utilize Highway 3 or service road. The intersection of Howard Avenue and Highway 3 was found to operate at good levels of service (2035 peak hour) for every Practical Alternative.

Access to Highway 401 eastbound from Highway 3 westbound is not provided. It should be noted that this movement is not provided under existing conditions and the demand for this movement is deemed to be minimal. Traffic queuing at this location is discussed in the next chapter.

Traffic Signal Warrants

The traffic signal warrant analysis was undertaken for the Grand Marais Road intersection with both service roads in Practical Alternatives 1B utilizing 2035 peak hour volumes. Traffic signals are not warranted at this location as one-way service roads carry relatively low volumes of traffic during peak hours. Traffic signals are not warranted at Pulford Street and both service roads. All four locations were found to operate at good levels of service with 2035 forecasted AM and PM peak hour volumes.

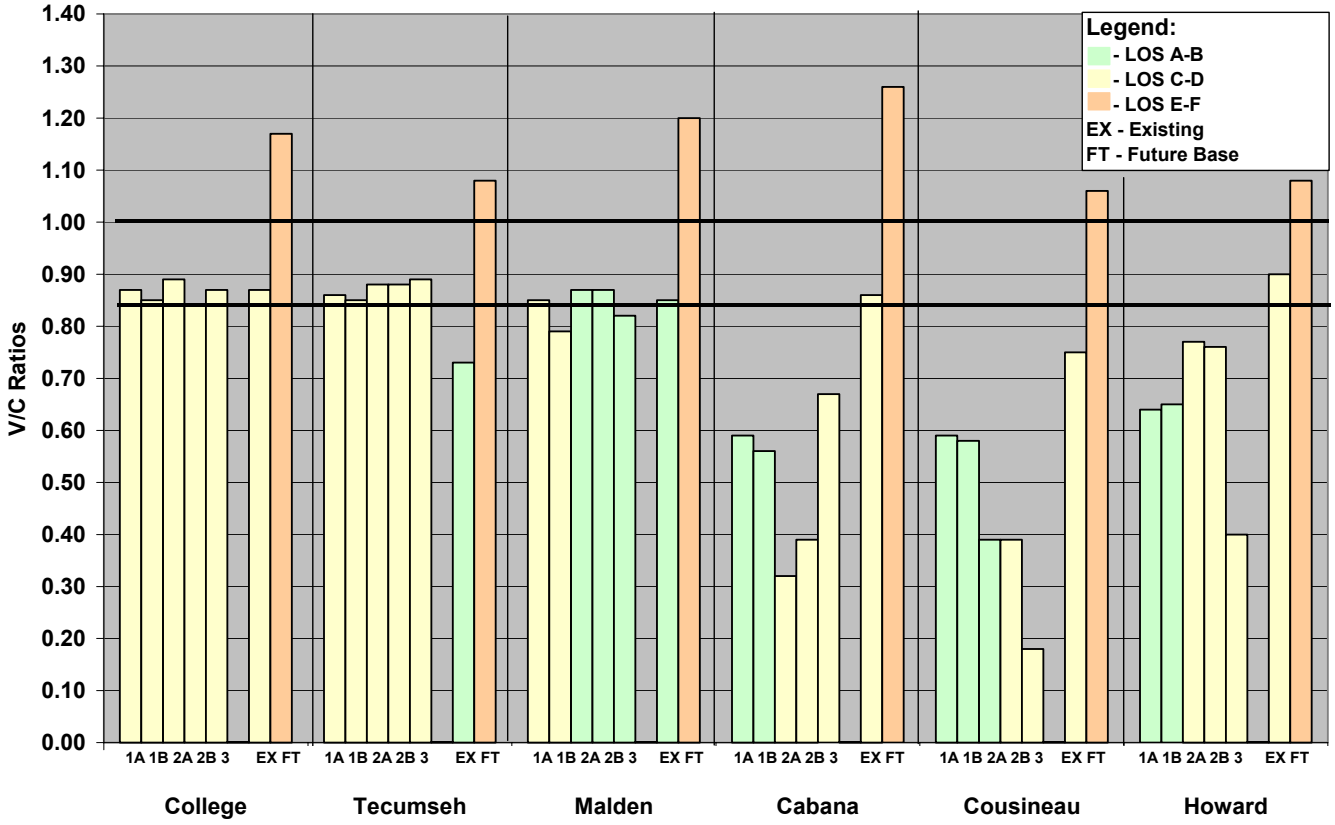
Similarly, traffic signals are not warranted in Practical Alternative 1A at Grand Marais Road, Fazio Drive, and Labelle Street intersections with service roads. This is due to limited movements from cross-roads as there are only right-ins/right/outs permitted given the freeway corridor alignment (at-grade as opposed to depressed).

Sight Distances

During development of Practical Alternatives conceptual plans, preliminary sight distance checks were completed. Additional and more detailed sight distance checks will be conducted upon selection of the Technically Preferred Alternative, and as part of the Preliminary Design work.

Exhibit 33 illustrates a volume-to-capacity and level of service comparison for the existing, 2035 Base Case and 2035 Practical Alternatives for key intersections.

EXHIBIT 33. VOLUME-TO-CAPACITY AND LEVEL OF SERVICE COMPARISON (PEAK DIRECTION, 2035 PM PEAK HOUR)



As can be seen from the graph, anticipated peak hour, peak direction volume-to-capacity ratios as well as levels of service at key intersections for Practical Alternatives are comparable to or better than those under existing conditions, and significantly better than those in the future Base Case. As previously noted, some intersections in Practical Alternatives experience critical movements that are not necessarily through movements in the peak hour direction (i.e. left turns).

4.5.4. Queue Length

Queue lengths were obtained from the Synchro analysis and are summarized in Table 31. It should be noted that queue lengths stated in the table are through lane median queues (in passenger car equivalents) in the peak direction (AM peak hour: westbound/northbound, and PM peak hour: southbound/eastbound) unless otherwise specified.

TABLE 31. HURON CHURCH ROAD/HIGHWAY 3 CORRIDOR QUEUE LENGTHS, AM AND PM PEAK HOURS

Intersection	Queue Length – Metres (Passenger Car Equivalents)									
	AM (westbound/northbound)					PM (southbound/eastbound)				
	1A	1B	2A	2B	3	1A	1B	2A	2B	3
College	18.3 (3)	18.1 (3)	9.2 (2)	9.2 (2)	15.6 (3)	86.9 (12)	85.2 (12)	88.2 (12)	84.6 (12)	86.7 (12)
Girardot	8.6 (2)	8.6 (2)	7.7 (1)	7.7 (1)	3.8 (1)	14.6 (2)	0.4 (1)	1.7 (1)	0.8 (1)	0.4 (1)
Tecumseh	37.0 (5)	40.8 (6)	38.4 (6)	37.4(5)	32.5 (5)	111.5 (15)	106.5 (15)	113.3 (16)	112.8 (16)	112.6 (16)
Dorchester	0.6 (1)	2.4 (1)	3.1 (1)	3.1 (1)	0.9 (1)	106.7 (15)	119.6 (16)	111.7 (15)	111.0 (15)	49.6 (7)
Prince	33.4 (5)	40.5 (6)	77.8 (11)	55.7 (8)	27.8 (4)	19.4 (3)	8.7 (2)	48.1 (7)	48.1 (7)	80.7 (11)
Malden	37.5 (5)	31.2 (5)	32.9 (5)	26.1 (4)	39.3 (6)	71.6 (10)	64.8 (9)	69.5 (10)	69.8 (10)	58.6 (8)
Northwood	81.5 (11)	81.6 (11)	23.3 (4)	16.7 (3)	60.8 (9)	5.8 (1)	16.1 (3)	141.7 (19)	141.7 (19)	25.8 (4)
EC Row N	25.3 (4)	26.1 (4)	50.1 (7)	77.5 (11)	36.7 (5)	19.7 (3)	18.7 (3)	17.9 (3)	17.9 (3)	19.4 (3)
EC Row S	22.0 (3)	22.6 (4)	48.4 (7)	67.6 (9)	20.8 (3)	16.0 (3)	16.4 (3)	27.1 (4)	28.3 (4)	52.3 (7)
Labelle	0*	53.2 (7)	9.7 (2)	10.3 (2)	119.3 (16)	n/a	83.1 (12)	4.3 (1)	3.7 (1)	60.2 (8)
Grand Marais	0*	0*	8.0 (2)	9.0 (2)	11.9 (2)	n/a	0*	2.4 (1)	5.0 (1)	0.8 (1)
Pulford	0*	0*	5.4 (1)	1.3 (1)	18.3 (3)	n/a	0*	13.5 (2)	20.2 (3)	26.7 (4)
Cabana	9.7 (2)	38.5 (6)	5.7 (1)	6.8 (1)	47.0 (7)	25.5 (4)	26.3 (4)	14.8 (2)	14.2 (2)	54.2 (8)
HC Line	n/a	11.2 (2)	15.9 (3)	31.0 (5)	3.8 (1)	n/a	33.4 (5)	23.9 (4)	24.1 (4)	7.7 (1)
St Clair	16.1 (3)	15.1 (3)	20.4 (3)	12.9 (2)	38.8 (6)	0*	0*	7.6 (1)	6.3 (1)	14.2 (2)
Cousineau	5.4 (1)	5.0 (1)	4.2 (1)	45.2 (7)	21.7 (3)	25.3 (4)	27.7 (4)	14.4 (2)	27.8 (4)	10.2 (2)
Howard	8.2 (2)	8.2 (2)	26.6 (4)	26.6 (4)	12.6 (2)	19.9 (3)	18.1 (3)	13.0 (2)	23.0 (4)	13.4 (2)

[1] Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

[2] Unsignalized Intersection (T-intersections with limited movements – traffic signals are not warranted)

[3] Queues are stated for Highway 401 ramp approaches

Intersection[3]	Queue Length – Metres (Passenger Car Equivalents)									
	AM					PM				
	1A	1B	2A	2B	3	1A	1B	2A	2B	3
Howard / W-N/S	n/a	n/a	4.7 (1)	4.7 (1)	n/a	n/a	n/a	25.6 (4)	25.6 (4)	n/a
Todd / W-N/S	n/a	n/a	59.2 (8)	44.9 (6)	n/a	n/a	n/a	58.5 (8)	62.2 (9)	n/a
Todd / E-N/S	n/a	n/a	39.5 (6)	30.8 (5)	n/a	n/a	n/a	27.5 (4)	28.4 (4)	n/a
Malden / W-N/S	5.3 (1)	5.3 (1)	9.2 (2)	7.1 (1)	8.3 (2)	10.6 (2)	10.6 (2)	14.3 (2)	14.3 (2)	17.2 (3)
Ojibway / W-N/S	1.8 (1)	1.8 (1)	1.8 (1)	1.8 (1)	1.7 (1)	15.7 (3)	15.7 (3)	15.5 (3)	15.5 (3)	15.5 (3)
Ojibway / E-N//S	57.9 (8)	57.9 (8)	56.9 (8)	56.9 (8)	65.2 (9)	48.7 (7)	48.7 (7)	50.5 (7)	48.7 (7)	48.7 (7)

Ojibway Parkway/Highway 401 (Plaza Layouts B and C)

Based on the Synchro analysis results and forecasted traffic volumes, average traffic queues on the westbound approach (Highway 401 off-ramp) at the Ojibway Parkway and Highway 401 E-N/S ramp terminal are expected to be in the order of 8 vehicles or approximately 60 metres during the morning peak hour. Traffic queues on Ojibway Parkway on the northbound approach are not anticipated to extend to the W-N/S ramp terminal during peak hours. This is true for all Practical Alternatives

At the W-N/S ramp terminal, average traffic queues on the southbound approach are in the order of 150 metres, and will not extend to the E-N/S ramp terminal. Traffic queues on the northbound approach at this intersection are anticipated to extend to over 250 metres mostly due to a high amount of traffic in the right turn lane destined to Highway 401. Although the heavy right turn volume on the northbound approach was predicted by the Model, upon closer examination it was noted that over 300 vehicles were local traffic destined to E.C. Row Expressway via Highway 401. With increased delays and queues for right turning vehicles, local traffic on the eastbound approach is likely to continue on E.C. Row Expressway to their destination, reducing the potential for queuing. This is true for all Practical Alternatives.

Huron Church Road/Highway 401

The Highway 401 E-N off-ramp to Huron Church Road in Practical Alternatives 2A and 2B is expected to carry up to 1,550 vehicles per hour during the PM peak hour. This translates to a 140-metre queue (50th percentile) on the northbound approach (off-ramp) at the E-N/E/W ramp terminal intersection. The traffic queue on the off-ramp would increase (to 240 metres) if eastbound and westbound phases at the signalized ramp terminal were “split” as discussed in the previous section. It should be noted that the off-ramp to Huron Church Road is approximately 400 metres long. Although the estimated queue is not anticipated to spill back onto the freeway, the back of the queue would be halfway between the bull-nose on the mainline and the ramp terminal intersection during the PM peak hour.

In other Practical Alternatives, traffic queues on the off-ramp approach are anticipated to be shorter due to lower traffic volumes on the off-ramp, as well as on cross roads (longer green time phases can be provided for the off-ramp approach at the signalized ramp terminal intersection). In addition, other Practical Alternatives provide a longer distance between the signalized ramp terminal intersection and the signalized intersection downstream, as well as between both E.C. Row Expressway ramp terminals, which makes these Practical Alternatives even more attractive when compared to Practical Alternatives 2A and 2B.

Todd Lane/Cabana Road/Highway 401/Highway 3

In Practical Alternatives 2A and 2B, where a diamond interchange with Highway 401 is proposed at Cabana Road/Todd Lane, poor traffic operations were identified at the Highway 3/Cabana Road intersection during peak hours. Traffic queues at this intersection

would form on the westbound approach (left turn lane: 130 metres), as well as the northbound approach (left turn and right turn: 130 metres) during peak hours (2035 horizon year). The distance between this intersection and the E-N/S ramp terminal is approximately 120 metes. With 130-metre queues on Highway 3 at this intersection, there is a potential for traffic queues to spill back to the ramp terminal during peak periods. This is the only location along the section of Cabana Road/Todd Lane in the vicinity of the interchange, where traffic queues at one intersection may impact traffic operations at the intersection upstream (Practical Alternatives 2A and 2B).

Howard Avenue/Highway 3/Highway 401

All five Practical Alternatives incorporate two signalized intersections on Howard Avenue in the vicinity of Highway 401. Although no Highway 401 eastbound off-ramp to Howard Avenue is provided in Practical Alternative 3, Highway 3 lanes in the eastbound direction are realigned further south to form an intersection at Howard Avenue. The distance between the two signalized intersections is approximately 200 metres. Traffic queues on Howard Avenue at one intersection are not anticipated to extend to the one upstream. This is true for all five Practical Alternatives.

4.6. Urban Impacts

In addition to quantitative analysis, including volumes, LOS, delay, etc, the Study Team undertook an analysis of urban impacts of the five practical alternatives. Due to the various mainline and service road configurations (i.e. one-way service roads, two-way service roads, mainline tunnel) and their associated access points, ramp location(s), and crossings, each alternative was assessed for its impacts to local residents and businesses in terms of mobility, access, and socio-environmental concerns such as neighbourhood infiltration.

In addition to providing a general overview of the qualitative impacts of the various practical alternatives, the Area of Continued Analysis was divided into four sub-areas for the qualitative evaluation. These areas represent distinct sections of the Area of Continued Analysis, each with their own traffic patterns and demands, access needs, land uses and other socio-economic factors. For the purposes of this evaluation, the sub-areas are as follows:

- Highway 3 from Howard Avenue to Huron Church Line;
- Highway 3/Huron Church Road from Huron Church Line to E.C. Row Expressway;
- Huron Church Road from E.C. Row Expressway to College Avenue; and
- The existing E.C. Row Expressway corridor from Huron Church Road to Ojibway Parkway.

The following sections build on the quantitative analysis discussed above to present a complete picture. The sections begin with a discussion of the overall qualitative differences between the practical alternatives, continue with sub-area analysis, and finally, present

overall strengths and weaknesses.

Practical Alternatives 1A and 1B provide one-way service roads on each side of the mainline between Howard Avenue and the E.C. Row Expressway. The service roads typically operate with two through lanes, with auxiliary turning lanes where necessary at intersections. The primary strength to one-way service roads is the elimination of opposing traffic at intersections, resulting in greater capacity for left turn movements. However, the trade-off is that signal timings at each service road intersection need to be coordinated with their "sister" intersections on the adjacent service road. The result is that a left turn from a service road becomes a through movement at the corresponding intersection on the adjacent service road, requiring more cross-street green time than would be necessary in a two-way service road configuration.

Practical Alternatives 2A and 2B provide a parallel two-way service road corridor beside the mainline. This two-way configuration would result in opposing left turns on Highway 3/Huron Church Road and protected left turn signal phases to accommodate them. The trade-off for this scenario is that cross-street green times can be less than those in Practical Alternatives 1A and 1B, as these phases will only need to accommodate cross-street traffic, and not the additional turns from the service road that are required in Practical Alternatives 1A and 1B.

Practical Alternative 3 is a tunnel option that would leave the Highway 3/Huron Church Road corridor largely unchanged from its existing operations, with the notable exception of ramp access points to and from the tunnel below. From a qualitative standpoint, Alternative 3 presents the least disruptive alternative in terms of effects on cross-street movements, as it would be easier for all existing side-street connections between Howard Avenue and Labelle Street/Spring Garden Road to remain in place under Practical Alternative 3 than under other practical alternatives.

All practical alternatives provide increased local and regional mobility over existing and Base Case operations, primarily due to shifting international traffic away from the Huron Church Road/Highway 3 corridor and onto the new facility. Local traffic will find it easier to access the corridor due to signal timings that are no longer weighted heavily towards main street through movements. Once on Huron Church Road/Highway 3, the reduced international traffic, particularly truck traffic, will give motorists more opportunity to choose their own path and their own lane. The corridor will no longer be a barrier to local and regional traffic. The primary trade-off to this increased mobility is fewer access points to Huron Church Road and Highway 3 when compared to existing conditions or the Base Case.

4.6.1. Highway 3 from Howard Avenue to Huron Church Line

The primary difference between the "A" and "B" Practical Alternatives (both for 1A and 1B, as well as 2A and 2B) is the presence of a Montgomery Drive connection to westbound Highway 3 in the "B" Practical Alternatives. This connection will allow residents of the neighbourhood bounded by Highway 3, Howard Avenue, 6th Concession Road and Huron

Church Line to access the westbound service road without the need for backtracking or increasing the likelihood of minor neighbourhood infiltration. In Alternative 1A, westbound traffic must either take the eastbound service road to Howard Avenue and make a u-turn to access the westbound service road, or it must take neighbourhood roads such as Montgomery Drive and Eastbourne Avenue to access Howard Avenue. A third option would be for neighbourhood traffic to use Montgomery Drive and 6th Concession Road to access either Heritage Drive, which connects to the westbound service road via Sandwich Parkway, or to access the service road via Huron Church Line.

Access restrictions are more pronounced in Alternative 2A than in the others. Under this alternative, no direct access to the service road is provided for local traffic travelling to or from the neighbourhood bounded by Highway 3, Howard Avenue, 6th Concession Road and Huron Church Line. This traffic must instead use one of the alternative routes described above (i.e. Heritage Drive, Eastbourne Avenue) to reach roads that intersect the service road, such as Howard Avenue or Sandwich Parkway.

For purposes of this analysis, the configuration of the interchange linking the existing Highway 401 with the proposed extension was primarily the same across all practical alternatives. It is recognized that several other alternatives are being discussed in consultation with municipalities. Future study of these alternatives will be undertaken as necessary. For the alternative reviewed, the difference lies in the presence of an eastbound off-ramp from the new facility to Howard Avenue in Practical Alternatives 2A and 2B. This ramp will allow eastbound traffic to exit the new facility in order to travel in either direction on Howard Avenue. Under Practical Alternatives 1A, 1B and 3, this traffic will be required to exit the mainline at the proposed St. Clair College interchange and travel the eastbound service road to Howard Avenue.

The proposed interchange provides greater mobility than currently exists, but stops short of providing full movement between Highway 401 and Highway 3. There is no access between the existing Highway 401 and Highway 3 east of Highway 401, although provisions have been made for access between this section of Highway 3 and the proposed Highway 401 extension. This access is most facilitated under Practical Alternatives 1A, 1B and 3, which provide a direct connection between the eastbound service road and both Highway 401 and Highway 3, as well as direct connections from the proposed extension. Under Practical Alternatives 2A and 2B, this traffic must turn right from the eastbound service road to Howard Avenue, then turn left to continue towards the existing Highway 401 or eastbound Highway 3.

At the western end of this sub-area, the practical alternatives provide two different methods of connecting Huron Church Line with the service road(s). Alternative 1A does not provide a direct connection. Rather, Alternative 1A would curve Huron Church Line to the west prior to its existing intersection with Highway 3. This extension would join the existing 10th Street, requiring Huron Church Line traffic to access the service roads via Todd Lane. The remaining practical alternatives provide a direct connection between Huron Church Line and the service road, enhancing accessibility between the new facility and development along Highway 3/Huron Church Road to the south. Without this connection (i.e. if Alternative 1A were to be constructed), much of the local and regional

traffic to and from the south in LaSalle would have to travel along 10th Street and Todd Lane in order to access the service road at this location. The other practical alternatives for this traffic would be Sandwich Parkway or Howard Avenue.

A full interchange between the proposed mainline and service road(s) is provided in this area under three of the five practical alternatives. Practical Alternatives 1A, 1B and 3 locate this interchange at the St. Clair College entrance. Under this configuration, all eastbound and westbound traffic may access the mainline provided it is on the service road before St. Clair College. St. Clair College traffic may also access the mainline from its driveway. These practical alternatives provide the most convenient access for St. Clair College, as many of its trips will not be required to use the service road at all, except in the immediate vicinity of the interchange, resulting in fewer vehicles on the service road between Howard Avenue and Cabana Road/Todd Lane. As St. Clair College is a major traffic generator in the area, the relocation of much of its traffic to the mainline will result in greater mobility for other local traffic.

It is recognized that the Town of Lasalle is proposing a connection between St. Clair College entrance and Huron Church Line via an extension of Normandy Street (Villa Maria Boulevard). The new major collector would provide access to either service roads (Practical Alternatives 1A and 1B) or Highway 3 (Practical Alternatives 2B and 3). The new link would provide additional opportunity for local traffic to access the corridor resulting in some local traffic diversion from Huron Church Line and Sandwich West Parkway. For analysis purposes, the future connection was excluded as a more conservative approach given the uncertainty of the improvement implementation time frame.

When comparing the practical alternatives to the 2035 Base Case within this sub-area, it can be seen that the intersections operate at the same or better levels of service across all practical alternatives with two exceptions:

- The intersection of Highway 3 and St. Clair College operates at LOS D during the PM peak hour under Practical Alternatives 1A and 1B (LOS B in the Base Case); and
- The intersection of Highway 3 and Huron Church Line operates at LOS C during the PM peak hour of Practical Alternatives 2A and 2B (LOS B in the Base Case).

Various intersections degrade slightly in 2035 when compared to existing operations, but only two intersections operate as low as LOS D:

- Highway 3 and St. Clair College entrance during the PM peak of Practical Alternatives 1A and 1B; and
- Highway 3 and Howard Avenue during the PM peak of Practical Alternatives 2A and 2B.

As noted elsewhere in this report, LOS E and LOS F are considered undesirable.

4.6.2. Huron Church Road from Huron Church Line to E.C. Row Expressway

This area would see the construction of an interchange at Todd Lane/Cabana Road with Practical Alternatives 2A and 2B. This interchange location does not facilitate access between Huron Church Line and the mainline. Northbound Huron Church Line traffic would be required to turn left from Huron Church Line to Highway 3, then left again at Todd Lane to access the mainline on-ramps. Similarly, mainline traffic destined for southbound Huron Church Line would exit at the interchange, turn onto Todd Lane, right onto the eastbound service road, then right again to Huron Church Line.

This interchange location will result in poor levels of service for some movements at the intersection of the service road with Todd Lane/Cabana Road. In particular, the westbound left turn from the service road will be heavily impacted, as vehicles turn left to access the westbound on-ramp to the mainline. Local traffic destined for the west/south will find that it must compete with regional and international traffic at this intersection, reducing mobility for all. Likewise, interchange traffic will affect local traffic attempting to access the service road from Todd Lane, or continuing straight to Cabana Road. If local traffic has difficulty accessing the service road at this intersection, the likely result will be increased neighbourhood infiltration in areas near adjacent access points such as Grand Marais Road/Lambton Street and Howard Avenue.

This sub-area sees a variety of configuration differences across the various practical alternatives. For example, Alternative 1B provides a partial interchange between Todd Lane/Cabana Road and Pulford Street. These ramps allow westbound traffic to access the mainline, and allow eastbound traffic to leave the mainline. This partial interchange is particularly effective to move traffic between the mainline and Huron Church Line, and would serve to provide the greatest level of access and accommodation of future growth along Huron Church Line to the south of the Area of Continued Analysis.

Alternative 1B is also the only alternative that retains the eastbound connection at Pulford Street. Pulford Street and surrounding neighbourhood traffic will be able to access the eastbound service road directly, and eastbound service road traffic will be able to access Pulford Street directly. Practical Alternatives 1A, 2A, 2B and 3 do not provide this connection, and thus require some manner of backtracking, either along California Avenue to Grand Marais Road or Labelle Street, or on Askin Avenue to Cabana Road.

Practical Alternatives 1A and 2A provide a grade-separated intersection between the service road(s) and Grand Marais Road / Lambton Street. The grade-separation results in a positive impact on the service road itself, as it eliminates the need for a traffic signal at the intersection. However, it will result in increased neighbourhood infiltration under Alternative 1A, as traffic would be required to use Fazio Drive for access to and from the eastbound service road. The connection on the west side does not traverse any residential neighbourhoods.

Finally, Practical Alternatives 1B, 2A, 2B and 3 maintain access across the new facility at

or near Labelle Street, providing a more direct route from one side to the other than is offered in Alternative 1A. Alternative 1A would require Labelle Street traffic to access the eastbound service road via Northway Avenue, increasing neighbourhood infiltration.

A comparison of the practical alternatives against the 2035 Base Case indicates that most intersections within this sub-area are expected to operate at or better than 2035 Base Case levels of service, with minor degradation at the south E.C. Row Expressway ramp under Practical Alternatives 2A and 2B. The intersection of Huron Church Road with Cabana Road/Todd Lane is expected to operate at LOS F, or failure, during the AM peak hour under Practical Alternatives 2A and 2B. The poor level of service is due to the interchange location of these practical alternatives. Similar degradation is seen when comparing the 2035 practical alternatives to existing conditions.

4.6.3. Huron Church Road from E.C. Row Expressway to College Avenue

None of the practical alternatives propose infrastructure or configuration changes to Huron Church Road north of the E.C. Row Expressway. All existing access points will remain in the future. As a result, there will be no configuration impacts to this sub-area. In general, relative to the 2035 Base Case, the following traffic impacts will occur:

- Reduced international traffic, as much of the existing international traffic will use the new crossing;
- A return of the domestic and international traffic that would spill over/be distributed to other adjacent routes under the Base Case, resulting in reduced neighbourhood infiltration and decreased travel times, delays and queues. Motorists will have less reason to "jump the queue" than they do today;
- Improved access to and from cross streets, as well as to the University of Windsor, Windsor Western Hospital and various shopping and employment facilities along this section of Huron Church Road; and
- Increased ability to accommodate future growth demands.

Overall intersection levels of service are equal to or better than the 2035 Base Case for all practical alternatives at all intersections, with the exception of the intersection of Huron Church Road and Prince Road/Totten Street, which degrades slightly from an excellent LOS A to a very good LOS B during the AM peak hour. In light of the reduction in international traffic and its associated benefits, as well as the "backfill" of local traffic that is able to return to Huron Church Road and away from the diversion routes it is currently using, this LOS degradation should not be seen as significant.

During the PM peak hour, which continues to represent the worst-case condition, all practical alternatives either retain or improve the LOS at each intersection within this sub-area, a reflection of the increased access and mobility throughout the corridor.

When compared to existing conditions, several intersections have a lower level of service under various practical alternatives; however, only the intersection of Huron Church Road

and College Avenue operates at LOS D. All other intersections operate at LOS C or better.

4.6.4. E.C. Row Expressway from Huron Church Road to Ojibway Parkway

There are no differences between the various alternative alignments within this sub-area. However, as discussed in the following section, the plaza alternatives present significant differences both in their location and access points.

With any plaza alternative, the primary impact is the severing of some existing roadways. Plaza Alternative A would sever the existing Matchette Road and provide a bypass running parallel to Ojibway Parkway and the E.C. Row Expressway. Both Plaza alternatives provide a partial interchange at Malden Road. Plaza Alternative A locates the plaza south of the E.C. Row Expressway, east of its intersection with Ojibway Parkway. This alternative provide local access via connections to Malden Road, resulting in increased traffic and decreased mobility on Malden Road to the south of E.C. Row Expressway.

Plaza Alternatives B, B1 and C are located to the south/west of Ojibway Parkway, closer to the Detroit River, placing them further from residential neighbourhoods. International traffic would gain access to/from the plaza and E.C. Row Expressway via direct connections. These alternatives do not require that Matchette Road be severed south of the E.C. Row Expressway..

4.7. Crossing Plaza Layouts

4.7.1. Plaza A

Plaza A is bounded by Ojibway Parkway, E.C. Row Expressway, Malden Road and Armanda Road/Broadway Avenue. Matchette Road is realigned between E.C. Row and Broadway Street due to the Plaza location, however access from and to E.C. Row Expressway would remain. Local access from the Plaza to Ojibway Parkway would be provided via the interchange at Malden Road. Access from Ojibway and E.C. Row Expressway west to the Plaza is provided via a loop ramp in the vicinity of the E.C. Row Expressway and Huron Church Road interchange, resulting in minor “back-tracking”. Access to Highway 401 southbound is not provided from Ojibway Parkway and E.C. Row Expressway. Access to E.C. Row Expressway eastbound and Huron Church Road is provided via direct ramps.

4.7.2. Plaza B

Approaches to Plazas B and B1 are virtually the same with the only difference being in the actual layout of the Plazas. Plaza B1 is located adjacent to Broadway Street between

Ojibway Parkway on the east and Water Street on the west, while Plaza B is north-south oriented, and is located immediately west of Brighton Beach Industrial Area. From the traffic operations standpoint, and plaza accessibility from/to the surrounding road network, both plaza layouts are deemed to be comparable. Local access to and from the Plaza is provided via the E.C. Row Expressway/Ojibway Parkway/Highway 401 interchange. There is no "back-tracking" to local traffic destined to Ojibway Parkway. Access from and to Malden Road is also provided. Overall, Plazas B and B1 accessibility/road network connectivity is similar to those of Plaza A with minor back-tracking required for Ojibway Parkway traffic in the latter scenario, and with access to Highway 401 eastbound from Ojibway Parkway and E.C. Row Expressway provided in Plaza B, B1 and C layouts only.

4.7.3. Plaza C

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 Windsor Power Plant; and to the south is Chappus Street and the Brighton Beach industrial area. From the traffic operations viewpoint (access to/from local network), Plaza C layout is similar to Plaza B where an interchange at Ojibway Parkway is provided. Local access to and from the Plaza is provided via the E.C. Row/Ojibway Parkway/Highway 401 interchange. There is no "back-tracking" to local traffic destined to Ojibway Parkway. Access from and to Malden Road is also provided. Exhibit 34 summarizes the three plaza layouts in terms of provided connections to and from the local road network from and to Highway 401 in the vicinity of the plaza.

EXHIBIT 34. PLAZA LAYOUTS COMPARISON – LOCAL ROAD NETWORK CONNECTIONS

Plaza Layout	From Highway 401 To			To Highway 401 From		
	Ojibway	EC Row	Malden	Ojibway	EC Row	Malden
Plaza A		✓	✓		✓	✓
Plaza B and B1	✓ ✓	✓ ✓	✓	✓ ✓	✓	✓
Plaza C	✓ ✓	✓ ✓	✓	✓ ✓	✓	✓

✓ Highway 401 Westbound
✓ Highway 401 Eastbound

4.8. Impacts on Transit Services

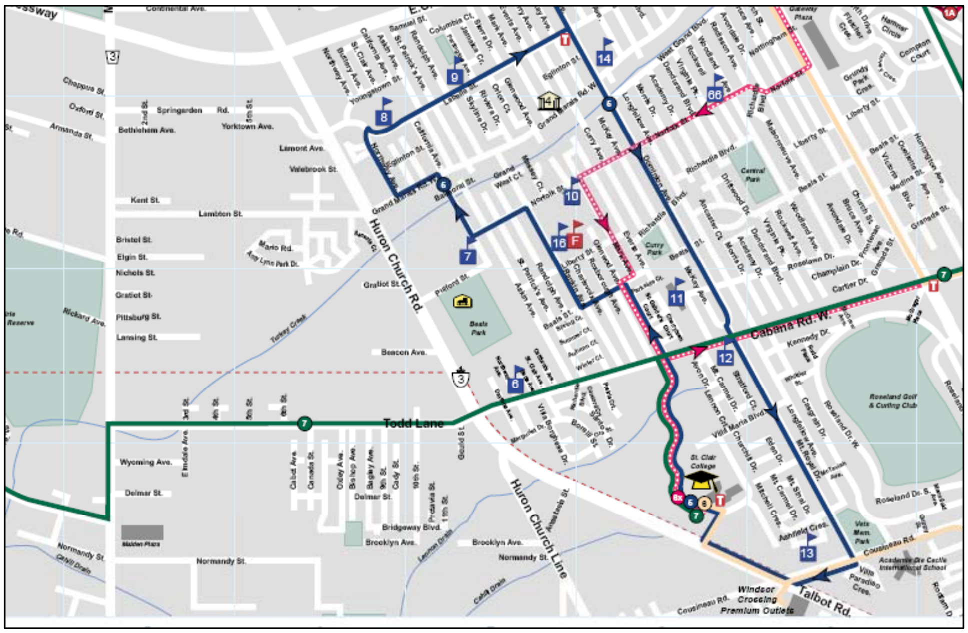
The following describes how each of the Practical Alternatives will impact Transit Windsor services and proposes some potential solutions.

4.8.1. Existing and Planned Transit Services

Transit Windsor does not currently provide continuous service along the Huron Church Road/Highway 3 corridor between Ambassador Bridge and Highway 401. The only transit service on Huron Church Road/Highway 3 is provided by Routes 5 and 6 on a portion of Highway 3 between Cousineau Road and St. Clair College with stops at Cousineau Road/Highway 3, Windsor Crossing and the main entrance to the College. Route 7 –

South Windsor crosses the corridor along Todd Lane/Cabana Road with stops at the intersection of Huron Church. Further east, St. Clair College, located north of Highway 3 between Cousineau Road and Todd Lane/Cabana Road West, is the major transfer point connecting several routes including Routes 5 – Dominion, 6 – Dougall, 6X – Dougall Express and 7 – South Windsor. Exhibit 35 illustrates the transit services currently operated in and adjacent to the Area of Continued Analysis.

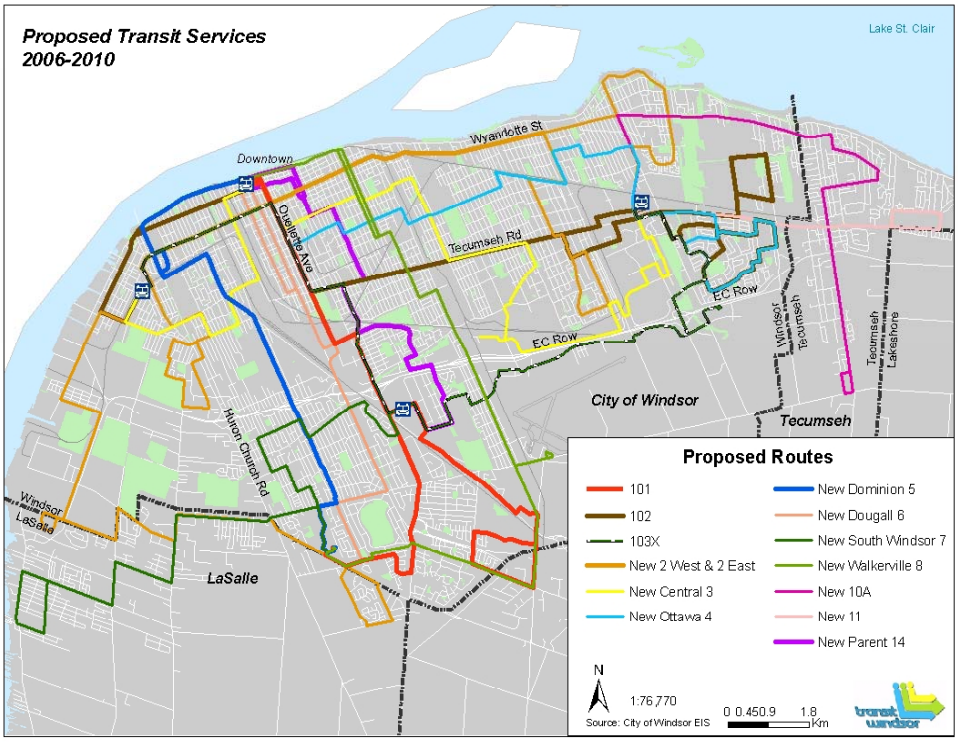
EXHIBIT 35. EXISTING TRANSIT SERVICE IN THE AREA OF CONTINUED ANALYSIS



Source: Transit Windsor

The recently completed City of Windsor/Transit Windsor Transit Master Plan, prepared by IBI Group, includes a five-year transit service plan (2006 to 2010) for Transit Windsor as shown in Exhibit 36. Under the proposed plan, additional transit service in the corridor will be provided by a new Route, 2 – West, on Highway 3 between Cousineau Road and Montgomery Drive with a one-way loop operating into the neighbourhood south of Highway 3. A revised Route 6 will continue to serve St. Clair College via Cousineau Road and Highway 3 while Route 7 will continue to operate along its existing routing in the Area of Continued Analysis. Service on Highway 3, now provided by Route 5, will be removed since this route will be re-directed to other streets. Revised Route 8 – Walkerville as well as Route 101 will connect downtown Windsor to the college via Cousineau Road and Highway 3 in the Area of Continued Analysis.

EXHIBIT 36. PROPOSED TRANSIT SERVICES (2006 TO 2010)



Source: City of Windsor Transit Master Plan

4.8.2. Impacts and Possible Solutions

The Alternative 1 configurations would not require any change to the proposed transit route structure in the Area of Continued Analysis. However, the service road design would provide limited pedestrian access to bus stops along service roads on both sides of the proposed freeway to passengers to/from the areas along existing Highway 3 between Huron Church Line and Howard Avenue. A possible solution to this would be to provide structures for pedestrian crossings along this section (refer to Table 32).

The existing road system will be maintained under Alternative 2 options since the proposed highway will follow an alignment parallel to Highway 3. However, access to Highway 3 from areas south of the highway will be limited due to the limited number of road crossings over the proposed highway.

Alternative 2 would negatively impact both Transit Windsor services by limiting pedestrian access to bus stops on Highway 3 for passengers south of Highway 3 between Huron Church Line and Howard Avenue.

The routing of the proposed new Route 2 – West would have to be changed due to the elimination of access from Highway 3 to Montgomery Drive in order to continue to serve

the neighbourhood south of Highway 3. A possible routing would be to continue on Highway 3 instead of turning right at Montgomery Drive, left on Howard Avenue, right on 6th Concession Road and then back on Highway 3 via Heritage Drive and Sandwich Parkway. This change would result in a longer route distance and a possible tight schedule, which may require more running time and therefore added cost, as well as longer walking distance and / or longer on-board travel time for some passengers to/from the area south of Highway 3 between Howard Avenue and Sandwich Parkway.

Alternative 3 would not have any impact on the current and proposed transit route structure or users.

The impacts on proposed future transit services and possible solutions are summarized in Table 32.

TABLE 32. IMPACTS ON TRANSIT SERVICES BY ALTERNATIVE

Evaluation Criteria		Alternative		
		Alternative 1	Alternative 2	Alternative 3
Transit Routes	Impacts	• New Route 2 West, new Route 6, Route 101 and new Route 8 will be operated on Highway 3 • No known impact on new Route 6, Route 101 and new Route 8 • No change is required for the proposed route structure	• New Route 2 West, new Route 6, Route 101 and new Route 8 will be operated on Highway 3 • No known impact on new Route 6, Route 101 and new Route 8 • Portion of new Route 2 West on Highway 3 needs to be changed due to the eliminated access from Highway 3 to Montgomery Dr.	• New Route 2 West, new Route 6, Route 101 and new Route 8 will be operated on Highway 3 • No known impact on new Route 6, Route 101 and new Route 8 • No change is required for the proposed route structure
	Possible Solutions	• N/A	• Route 2 would continue on Highway 3, left on Howard Ave., right on 6th Concession Rd. and then back on Highway 3 via Heritage Dr. and Sandwich Pkwy. This will result in longer route distance and possible tight schedule	• N/A
Transit Users	Impacts	• Limited pedestrian accesses to bus stops along Highway 3 for passengers south and north of Highway 3 between Huron Church Line and Howard Ave. due to the extension of Hwy 401	• Longer walking distance and / or longer onboard traveling time for passengers south of Highway 3 between Howard Ave. and Sandwich Pkwy due to changes on Route 2 • Limited pedestrian accesses to bus stops on Highway 3 between Huron Church Line and Howard Ave.	• None
	Possible Solutions	• Provide structures for pedestrian crossings	• Provide structures for pedestrian crossings	• N/A

4.9. Summary

Table 33 summarizes the above sections to present the strengths and weaknesses of the various alternatives and sub-areas.

TABLE 33. SUMMARY OF PRACTICAL ALTERNATIVE STRENGTHS AND WEAKNESSES

Sub-Area	Alternative	Strengths	Weaknesses
Overall	All Alternatives	• Increased local and regional mobility over Base Case operations • International (i.e. truck) traffic shifted away from Huron Church Road and Highway 3	• Fewer access points to Huron Church Road and Highway 3 compared to Base Case
	1A	• No opposing traffic for left turns from service roads	• Cross streets require additional green time to accommodate left turns from the service road (become through movements at adjacent intersection)
	1B	• No opposing traffic for left turns from service roads	• Cross streets require additional green time to accommodate left turns from the service road (become through movements at adjacent intersection)
	2A	• More green time can be devoted to major through movements	• Opposing traffic for left turns from service road
	2B	• More green time can be devoted to major through movements	• Opposing traffic for left turns from service road
	3	• Closest alignment to existing Huron Church Road / Highway 3 corridor	• No specific weaknesses in this sub-area
1. Highway 3 from Howard Avenue to Huron Church Line	1A	• Direct connection from eastbound service road to Howard Avenue • Interchange location at St. Clair College diverts traffic away from Todd Lane / Cabana Road /Huron Church Line area	• No connection between Howard Avenue and Cousineau Road; traffic infiltration • Most Huron Church Line traffic will use Todd Lane; traffic infiltration • No connection between Howard Avenue and Cousineau Road; increased infiltration • No direct access from mainline to Howard Avenue
	1B	• No opposing traffic for left turns from service roads • Connection at Montgomery Drive; less infiltration • Direct connection from south service road to Howard Avenue • Direct access from Huron Church Line to the service road • Interchange location at St. Clair College diverts traffic away from Todd Lane /Cabana Road / Huron Church Line area	• No direct access from mainline to Howard Avenue

Sub-Area	Alternative	Strengths	Weaknesses
	2A	• Direct access from Huron Church Line to the service road • Eastbound off-ramp from mainline to Howard	• No direct access to service road from neighbourhood to the south (i.e. no connection at Montgomery Drive); traffic infiltration • No direct access from eastbound service road to existing Highway 401 or Highway 3
	2B	• Direct access from Huron Church Line to the service road • Connection at Montgomery Drive; less infiltration	• No direct access from eastbound service road to existing Highway 401 or Highway 3
	3	• Direct connection from eastbound service road to Howard Avenue • Direct access from Huron Church Line to the service road	• No direct access from mainline to Howard Avenue
2. Huron Church Road from Huron Church Line to E.C. Row Expressway	1A	• No opposing traffic for left turns from service roads • Grade separation at Grand Marais Road / Lambton Street eliminates need for traffic signal	• No mainline connection north of interchange at St. Clair College • No crossing north of Grand Marais Road / Lambton Street • Backtracking required to reach Pulford Street • Grade separation at Grand Marais Road / Lambton Street likely to increase infiltration on Fazio Drive • No access across new facility north of Grand Marais Road; resulting backtracking likely to increase infiltration on Northway Avenue between Grand Marais Road and Labelle Street
	1B	• No opposing traffic for left turns from service roads • Partial interchange between Todd Lane /Cabana Road and Pulford Street; accommodation of growth along Huron Church Line and to the south • Connection retained at Pulford Street • Access across mainline at Stpring Garden Road / Labelle Street	• No specific weaknesses in this sub-area

Sub-Area	Alternative	Strengths	Weaknesses
	2A	• Access across mainline north of Spring Garden Road / Labelle Street • Grade separation at Grand Marais Road / Lambton Street likely to increase mobility	• Opposing traffic for left turns from service road • Inconvenient access between Huron Church Line and interchange at Todd Lane / Cabana Road • Backtracking required to reach Pulford Street • Interchange location concentrates traffic around Todd Lane / Cabana Road / Huron Church Line
	2B	• Access across mainline north of Spring Garden Road / Labelle Street	• Opposing traffic for left turns from service road • Inconvenient access between Huron Church Line and interchange at Todd Lane /Cabana Road • Backtracking required to reach Pulford Street • Interchange location concentrates traffic around Todd Lane / Cabana Road / Huron Church Line
	3	• Partial interchange between Todd Lane /Cabana Road and Pulford Street; accommodation of growth along Huron Church Line and to the south	• None
3. Huron Church Road from E.C. Row Expressway to College Street	All Alternatives	• Reduced international traffic • Reduced neighbourhood infiltration • Return of local traffic currently diverted to other routes • Improved access to and from cross streets and local facilities • Increased ability to accommodate future growth demands	• None
4. E.C. Row Expressway from Huron Church Road to Ojibway Parkway	Plaza Alternative A	• New access to Malden Road	• Severing of some existing roadways • Decreased mobility on Malden road due to increased plaza traffic use
	Plaza Alternative B	• New access to Malden Road • Matchette Road not severed	• Severing of some existing roadways

5. Conclusions

The following conclusions can be drawn from this Level 2 analysis:

- Currently, the Huron Church Road/Highway 3 corridor is generally operating with some congestion and acceptable levels of service during the peak hours. This is substantially improved over the past few years, due mostly to the addition of U.S.-bound border processing capacity, prior to which significant vehicle queues existed. Westbound/northbound (Canada to U.S.) traffic is the peak direction during the AM peak hour, while southbound/eastbound (U.S. to Canada) traffic is the peak direction during the PM peak hour and the heaviest overall daily movement;
- There is a relatively high proportion of truck traffic on the corridor, comprised of approximately 15% to 20% international during the peak hours;
- Between 2004 and 2035, international truck traffic is expected to grow significantly, increasing in the PM peak hour by about 85% on the corridor and about 130% across the corridor and the set of arterials and highways that provide secondary access to the Ambassador Bridge. International car traffic will also show strong growth at about 35% on the corridor but about 90% across the corridor and secondary access facilities;
- Due to capacity limitations, domestic traffic on the corridor is actually expected to decrease from 2004 levels due to the strong growth in international traffic, particularly trucks. This is despite strong growth in population and future employment within LaSalle, which will increase demand for use of the corridor;
- Due to the projected growth on the corridor, particularly in international trucks, traffic operations are expected to deteriorate significantly by 2015, particularly for southbound/eastbound traffic during the PM peak hour. The primary effect of the traffic congestion is reduced mobility and access to businesses, schools and other local interests;
- The significant growth in local, regional and international traffic and associated levels of congestion on the corridor will force cross-border Ambassador Bridge traffic to spill into adjacent roadways rather than use Huron Church Road;
- The reduced mobility on the corridor and associated traffic diversion will adversely affect the quality of life for local residents and business owners. These impacts will be felt by major land uses such as the University of Windsor, St. Clair College, Windsor Crossing outlet, Windsor Raceway, Windsor Western Hospital and Tecumseh Mall/Ambassador Plaza;
- For residents of adjacent neighbourhoods, the primary impacts are increased traffic infiltration onto adjacent arterials;
- Several intersections throughout the entire corridor are expected to operate at or near full capacity for peak direction through movements by 2015, particularly during the PM peak hour. For a corridor such as Huron Church Road/Highway 3, even one poorly

performing intersection has the capability to significantly reduce throughput to and from the Ambassador Bridge, and the effects of one intersection can quickly spill upstream to adjacent intersections. When multiple intersections are at or near the point of failure, as indicated by the 2015 analysis, it indicates that isolated improvements at select intersections will not be sufficient to address the traffic problems of the entire corridor and overall traffic breakdown will occur;

- All of the Practical Alternatives serve to significantly improve overall traffic operations over Base Case conditions and meet overall road transportation system needs. The alternatives also serve to improve or maintain existing levels of service at most Study Area intersections. All users of the roadway will be able to move more efficiently and effectively through the corridor. The majority of international traffic will use the new mainline facility, either to the new crossing or rejoining Huron Church Road in the vicinity of the E.C. Row Expressway. The new crossing will provide commercial operators with another route to and from the United States, reducing the proportion of international truck traffic on the corridor by almost 30 percentage points north of the E.C. Row Expressway, resulting in significant congestion and delay reductions without the need for local infrastructure improvements;
- All Practical Alternatives demonstrated travel time savings of at least six minutes when compared to the future Base Case. Practical Alternatives 1A and 1B revealed the best travel time savings amongst all the alternatives;
- Diamond interchange at Cabana Road/Todd Lane in Practical Alternatives 2A and 2B is expected to be heavily utilized during peak periods with some critical movements at the Cabana Road/Highway 3 intersection (westbound left turn, northbound left turn and northbound right turn). Average traffic queues on the eastbound approach at the Cabana Road/Huron Church Road are expected to extend to the E-N/S ramp terminal during peak periods.
- The Highway 401 E-N/S ramp terminal intersection at Ojibway Parkway is expected to operate at LOS E during the PM peak hour for every Practical Alternative. The LOS E operations are mostly due to heavy traffic volumes on EC Row Expressway in the southbound direction;
- Practical Alternatives 2A and 2B propose realignment of the EC Row Expressway ramps to accommodate the Highway 401 westbound off ramp terminus at Huron Church Road. The distance between the two ramp terminals (at EC Row and at Highway 401) is significantly shorter in Practical Alternatives 2A and 2B (approximately 250 metres) than in any other Practical Alternatives (approximately 400 metres). Having a shorter distance between the two signalized intersections increases the potential for traffic queues at one ramp terminal impacting operations at the other. It is preferred to have consecutive signalized intersections spaced at least 350 metres;
- Traffic weaving is anticipated in Practical Alternatives 1A, 1B and 3 in the vicinity of the St Clair College between through traffic on Highway 3 and traffic destined to St Clair College (between traffic coming off Highway 401 and Highway 3 traffic). Practical Alternatives 1A and 1B are expected to have fewer weaving vehicles at this location than Practical Alternative 3, considering that the majority of St Clair College destined

traffic is local traffic on Highway 3 rather than on Highway 401;

- From quantitative and qualitative analyses of the Practical Alternatives, and the traffic operations standpoint, Practical Alternatives 1B, 3 and 1A have demonstrated best performance in terms of measures of effectiveness such as levels of service, volume to capacity ratios, delays and travel times, as well as urban impacts, including access needs, land uses and other social-economic factors.