

# **Warden Corridor and Victoria Park Station Land Use Planning Studies**

Transportation Review

**McCormick Rankin Corporation**

**November 2004**



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## APPENDICES

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# **1. INTRODUCTION**

## **1.1 Background**

In response to development interest, both by the City and Toronto Transit Commission (TTC) with respect to the Warden and Victoria Park subway station sites, and by prospective developers of other sites in the Warden Avenue corridor, the City of Toronto has initiated the current planning studies to ensure that redevelopment in these areas is coordinated and responds to the City's Official Plan. To this end, the City retained planningAlliance (pA), in conjunction with the McCormick Rankin Corporation (MRC) to undertake the current land-use and transportation planning studies of potential redevelopment in the study areas.

This report documents the transportation review component of the study. It is noted that a parallel transportation impact study has been undertaken by MRC for the TTC with respect to the Warden and Victoria Park subway station sites.

## **1.2 Objectives**

The objectives of the transportation review are as follows:

- To identify and assess the transportation implications of potential redevelopment of the Warden and Victoria Park subway station sites, along with other redevelopment sites in the Warden Avenue corridor;
- To provide a context for the planning of connections between the redevelopment sites and the road system, and identify site planning considerations oriented to the facilitation of a high level of transit use by future occupants and users of the development sites.

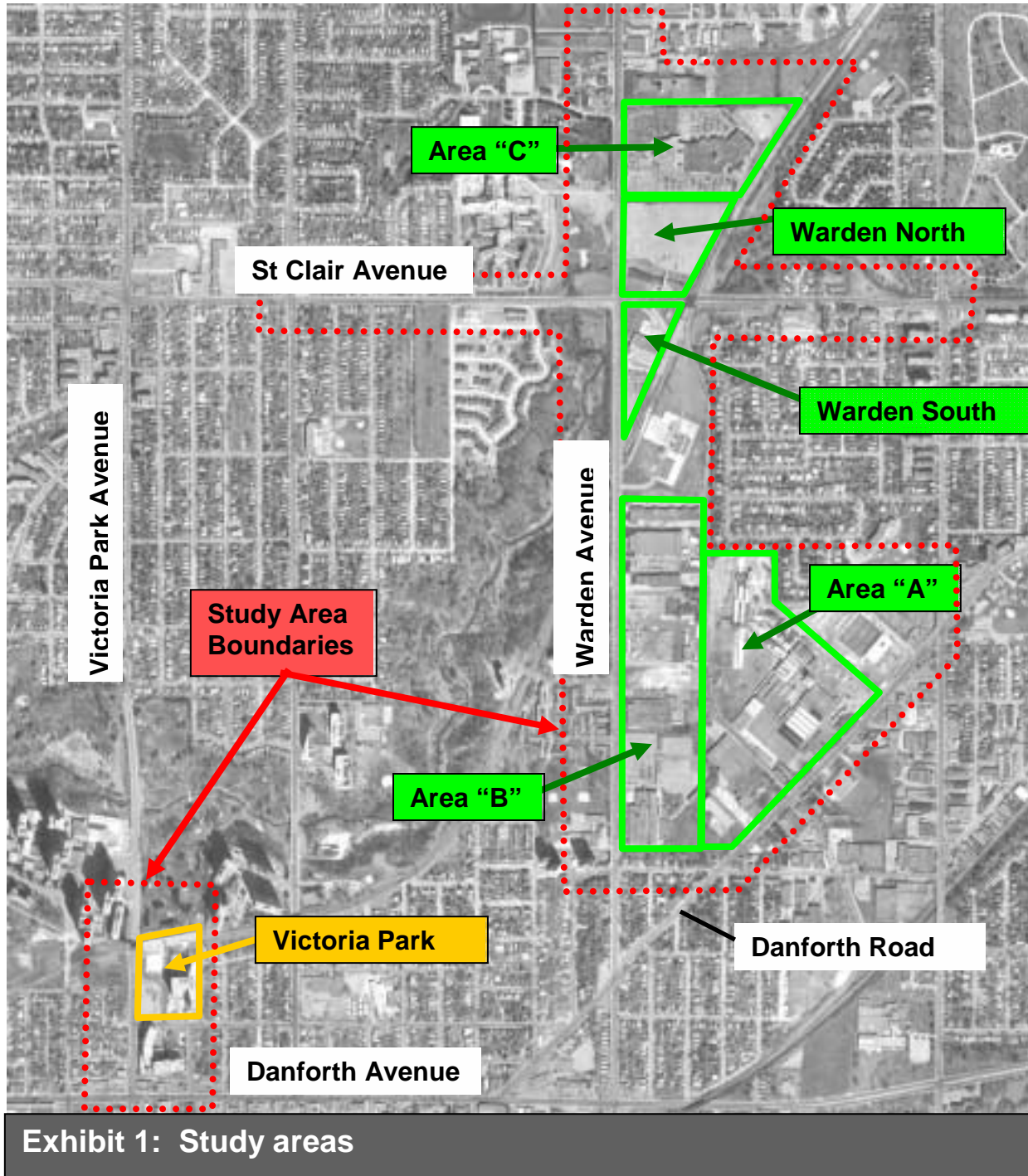
## **1.3 Scope of the Review**

### **1.3.1 Space**

The review addresses two distinct geographic locations although the study areas for these locations overlap in terms of the technical analysis requirements. The extent of the study area was defined in each case to include road network elements that one would reasonably expect to be noticeably affected by traffic associated with corridor redevelopment.

In the case of the Warden Avenue study area, the transportation assessment generally covers the Warden Avenue corridor between Eglinton Avenue and Danforth Avenue and the St. Clair Avenue corridor between Pharmacy Avenue and Birchmount Road. In the case of the Victoria Park study area, the assessment focuses on Victoria Park Avenue from the station south to Danforth Avenue.

Exhibit 1 shows the study areas and the various future redevelopment sites considered in this review.



### 1.3.2 Time

A ten-year planning horizon is used in this review, the assessment being focused on 2004 and 2014 conditions. It is assumed that the potential redevelopment assessed in this review would be in place and operational by 2014.

### 1.3.3 Scenarios

In accordance with the City's normal requirements, three scenarios have been identified and evaluated:

- 2004 (existing) land-use and transportation conditions;
- 2014 conditions including background traffic growth resulting from development *beyond* the study areas;
- 2014 conditions including both background traffic and traffic resulting from potential redevelopment *within* the study areas.

## 2. BASELINE TRANSPORTATION SYSTEM

### 2.1 Road System serving the Study Areas

The key elements of the road system serving the Warden and Victoria Park study areas are described briefly below. The schematic diagram in Appendix 1-A shows these roads in context as well as the location of signalized intersections in the study areas and the designated rights-of-way.

- *Warden Avenue* is a major arterial road north of St. Clair Avenue and a minor arterial road south of this point. It is continuous from south of Kingston Road to north of Steeles Avenue. Warden Avenue has a four-lane basic cross-section throughout the study area and a posted speed limit of 60 km/h.
- *St. Clair Avenue East* is a major arterial road that extends from Kingston Road to Jane Street, but is discontinuous through the Don Valley. St. Clair Avenue has a five-lane basic cross-section between Warden Avenue and Birchmount Road, including a continuous centre left-turn lane, but a four-lane basic cross-section outside this segment. The posted speed limit throughout the study area is 60 km/h.
- *Eglinton Avenue* provides access westerly from Kingston Road to west of the City. Within the study area, Eglinton Avenue has a seven-lane basic cross section, including a continuous centre left-turn lane. The posted speed limit is 60 km/h.
- *Danforth Avenue* is a minor arterial road extending from Kingston Road to the Don Valley where it connects with Bloor Street. Danforth Avenue has a four-lane basic cross-section and a posted speed limit of 60 km/h.
- *Birchmount Road* is a minor arterial road providing a connection from south of Kingston Road to north of Steeles Avenue. It has a four-lane basic cross-section and a posted speed limit of 50 km/h.
- *Danforth Road* is a minor arterial road that extends northeast from Danforth Avenue to McCowan Road. Danforth Road has a four-lane basic cross-section and a posted speed limit of 60 km/h.
- *Victoria Park Avenue* is an arterial road that extends from Kingston Road to Steeles Avenue. It has a four-lane basic cross-section northerly to the north side of Denton Avenue (opposite the Victoria Park subway station), where the cross-section narrows

to two lanes across the Don Valley. The posted speed within the study area is 50 km/h.

## **2.2 Existing Traffic Flows**

The traffic flow summary in Appendix B shows assumed existing traffic levels based on:

- the most recent counts available from the City, typically undertaken between 2001 and 2003; and,
- the traffic impact study undertaken in 2003 by the B.A. Group for the 350 Danforth Road site.

## **2.3 Transit System serving the Study Areas**

Appendix A-2 documents the transit routes and facilities serving the study areas and indicates the service frequencies.

Many of the bus routes serving this area are oriented to feeding the Warden and Victoria Park subway stations.

## **3. LAND-USE AND TRAVEL DEMAND**

This section documents the land-uses assumed, the analysis of travel characteristics associated with development near subway stations, and the estimation of future travel demand associated with assumed redevelopment within and beyond the two study areas.

### **3.1 Background Traffic Growth**

To reflect the impact of growth outside the study area on traffic within the study area, it is normal practice to assume a certain percentage growth over time. In this case, as suggested by City staff, it was assumed that factors beyond the study areas would result in an across-the-board 5% increase in traffic within the study areas over the 10-year planning horizon (2004 to 2014).

In conjunction with an assumed increase in the number of commuters parking at the Warden Subway station, an increase of 5% in peak hour traffic to and from this parking lot was accounted for. This is despite an overall reduction in the number of parking spaces.

### **3.2 Land-Use Assumptions for the Redevelopment Sites**

The proposed nature and scale of potential future land uses for the study areas was provisionally identified by pA as part of the land-use planning component of this study. Upon review of these assumptions from a transportation perspective, modifications were suggested to reflect space limitations for parking and the unsuitability of the subway station sites for destination (rather than community/ancillary) retail facilities. These modifications were rationalized with the land-use planning process, giving the final assumptions summarized in Table 1 below.

<b>Table 1: Assumed Future Increases in Land Use in the Study Areas</b>							
	<b>Warden Station North</b>	<b>Warden Station South</b>	<b>Area "A"</b>	<b>Area "B"</b>	<b>Area "C"</b>	<b>Total Warden Corridor</b>	<b>Victoria Park</b>
Total residential (units)	433	460	698	1,046	425	3,062	230
Detached homes (units)			143			143	
Semi-detached homes (units)			48			48	
Conventional townhomes (units)	28		317	488	285	1,118	
Stacked townhomes (units)	60		108	248	140	556	
Condominium apartments (units)	345	460	82	310		1,197	230
Retail commercial (sq. m.)	2,000	2,000	2,324	6,400	2,000	14,724	2,000
Institutional (sq. m.)	2,000			6,400		8,400	2,000
Service/Medical Office (sq.m.)		1,500				1,500	

### 3.3 Travel Characteristics of Development in the Vicinity of Subway Stations

It is commonly accepted that a higher proportion of individuals living and/or working close to a subway station (ie. 400 metres or within easy walking distance) show different travel habits than those who live and/or work further away.

A review of travel characteristics based on the Transportation Tomorrow Survey data for those with a home or work destination within 400 metres of ten subway stations in the City indicated the following:

- Approximately 35% of households within this radius do not have an automobile available for use. The percentage varies from 20% for detached houses to 40% for apartment-type structures. The average number of automobiles varies from 1.15 per household for detached houses down to 0.69 for apartment-type residences.
- The transit modal share for morning peak-hour trips originating from residences within this radius is 50%, ranging from 40% for detached houses to 53% for apartment-type dwellings. After accounting for auto passenger and walking trips, less than 30% are auto driver trips, 33% for detached houses and 27% for apartment-type dwellings. During the afternoon peak hour, 53% of trips inbound to residences

are transit trips, compared to 34% by auto drivers, meaning a smaller percentage of auto passenger trips.

- By contrast with the above, 36% of trips outbound from workplaces within 400 metres of a subway station are on transit while 51% are auto driver trips.

Based on the information presented above, the trip generation rates assumed for development at the Warden North and South sites and the Victoria Park station site are shown in Table 2. Most of these dwellings will be higher-density condominium or apartment units. Also shown are rates for institutional uses (blending of library, recreation centre, and daycare centre rates), medical/dental office uses, and retail uses, based on shopping centre characteristics. In the case of retail uses, these rates assume that 50% of trips are generated by residents, workers, or transit patrons already on-site and a further 25% are associated with “pass-by” traffic. This reflects the community, rather than destination, nature of the assumed retail space.

	Morning peak hour		Afternoon peak hour	
	Inbound	Outbound	Inbound	Outbound
Residential Trips/100 units	1	14	10	2
Institutional Trips/1,000 sq.m.	13	8	20	25
Medical/dental Trips/1,000 sq.m.	19	5	10	27
Retail/commercial Trips/1,000 sq.m.	10	6	27	29

### 3.4 Travel Characteristics of Development Elsewhere in the Study Areas

Analysis of travel associated with residences outside the 400 metre radius, also based on the Transportation Tomorrow Survey, indicates that peak hour trips from these residences show an auto-driver modal share of 42%. Using this fact, standard Institute of Transportation Engineers (ITE) trip generation rates were adjusted (ITE trips contain an unknown percentage of transit trips, usually taken to be 10% or less) to produce the auto driver trip generation rates shown in Table 3. These rates were used for Areas “A”, “B”, and “C”.

Travel to and from retail commercial developments was assumed to be adequately represented by standard ITE rates for shopping centres with a 25% reduction being applied to account for “pass-by” traffic.

	Morning peak hour		Afternoon peak hour	
	Inbound	Outbound	Inbound	Outbound
Detached/semi-detached dwellings Auto driver trips/100 units	19	56	65	36
Condominium/townhome dwellings Auto driver trips/100 units	7	37	36	18
Institutional Auto driver trips/1000 sq.m.	26	14	14	22
Retail commercial Auto driver trips/1000 sq.m.	19	12	54	59

### 3.5 Travel Demand Estimates

#### 3.5.1 Trip Generation and Modal Split

Table 4 provides a complete summary of automobile traffic generated by all assumed development within the study areas for the 2014 planning horizon. Table 5 summarizes the transit trips generated by study area development. These totals do not include the relatively minor transit passenger demands associated with community retail and institutional uses.

	Morning peak hour		Afternoon peak hour	
	Inbound	Outbound	Inbound	Outbound
Warden Station North	50	89	139	119
Warden Station South	49	82	113	100
Area "A".	91	217	320	235
Area "B"	147	308	492	391
Area "C"	60	126	209	167
Total - Warden Corridor	397	822	1,273	1,012
Victoria Park Station*	49	70	126	116

\* Trip generation for the Victoria Park station site is based on 300 residential units

	Morning peak hour		Afternoon peak hour	
	Inbound	Outbound	Inbound	Outbound
Warden Station North	< 10	108	69	< 10
Warden Station South	< 10	115	74	< 10
Area "A".	40	158	165	86
Area "B"	42	206	204	100
Area "C"	17	84	83	41
Total - Warden Corridor	119	671	595	247
Victoria Park Station	< 10	75	48	< 10

#### 3.5.2 Trip Distribution

The trip distribution used for this review, in terms of destinations for trips originating in the study areas and origins for trips destined to the study areas, was based on travel

patterns recorded during the 2001 Transportation Tomorrow Survey as modelled in the GTA Travel Demand (EMME2) model. Directional splits observed for the Warden Power Centre were considered and the splits reported in the analysis of the 350 Danforth site were incorporated directly. Also taken into account was the more localized and less directional trip distribution that would be associated with community-based retail and institutional uses.

Table 6 summarizes the overall trip distribution for the various uses and areas.

Table 6: Trip Distribution Summary by Area		To/from the North	To/from the South	To/from the East	To/from the West	Internal
Warden Station	Residential	36%	5%	20%	39%	
	Non-residential	10%	25%	35%	30%	
Area "A".	Residential	19%	8%	35%	38%	
	Non-residential	10%	40%	20%	25%	5%
Area "B"	Residential	36%	5%	20%	39%	
	Non-residential	20%	5%	45%	25%	5%
Area "C"	Residential	36%	5%	20%	39%	
	Non-residential	25%	5%	30%	35%	5%
Victoria Park Station	Residential	35%	31%	16%	18%	
	Non-residential	30%	20%	30%	20%	

### 3.5.3 Trip Routing

Based on the pattern of trip origins and destinations described in the previous section, trips were assigned to appropriate routes on the road system. Trips in a given direction were assigned to available routes, the allocation between routes being based on convenience and likely congestion and resulting trip times. The assignment of trips oriented to the north of the study area recognized that the intersection of Warden Avenue and Eglinton Avenue is congested today, and that the collector road system to the south of Eglinton Avenue has been improved (eg. the construction of Lebovic Avenue) to provide alternative routes through this area.

The adjustment of existing trip routings to reflect "pass-by" access to the new development in the study areas was accounted for at this point. This included trip re-routing as a result of the pending closure of the Warden Power Centre. We note that there was no need to make adjustments to reflect the replacement of other land uses in the study area with new development as there is little current activity on these sites and the net effect on future traffic flows would be minimal and, if anything, would result in a reduction in future traffic demand.

A parallel evaluation of access options for the TTC sites (as part of the transportation impact assessment of proposed redevelopment of the Warden and Victoria Park subway station sites) resulted in some routing adjustments to existing traffic to reflect revisions to the existing access schemes and the proposed relocation of the commuter parking spaces.

### 3.5.4 Estimated Future Traffic Flows

In addition to a summary of existing traffic flows, Appendix B contains summaries of traffic flows associated with the two future scenarios identified at the outset:

- Existing traffic plus “background” growth associated with development *beyond* the study areas; and,
- Existing traffic plus “background” growth plus growth resulting specifically from the proposed redevelopment of the study areas.

It is also worthwhile comparing the relative contributions of existing traffic demand, growth in “background” traffic, and growth resulting from future redevelopment on the TTC sites and the other redevelopment sites. The graphs in Exhibit 2 depict these relative contributions at the two key intersections most affected by development in the study areas, Warden Avenue/St. Clair Avenue and Victoria Park Avenue/Denton Avenue. From these graphs, it is seen that only between 5% and 16% of traffic in 2014 result from redevelopment within the study areas.

## 4. EVALUATION OF ROAD SYSTEM LEVEL-OF-SERVICE

The level-of-service of the road system is primarily defined by the level-of-service at key signalized intersections. For the current review, these were assessed using the *Highway Capacity Manual (HCM)* procedures as implemented within the *Synchro 5* software suite.

The analysis reflects the existing physical configurations of the intersections involved. Signal phasings and timings were optimized based on the traffic demand. This is an appropriate procedure for a planning analysis of future conditions since it reflects the level-of-service that could be provided, given the potential to adjust the traffic signal controllers. The use of existing phasing and timings would place an unnecessary constraint on the capacity of the intersections and would impart a bias to the evaluation.

Table 7 summarizes the levels-of-service for the key intersections in the study areas for existing conditions and for the two 2014 scenarios under morning and afternoon peak-hour conditions.

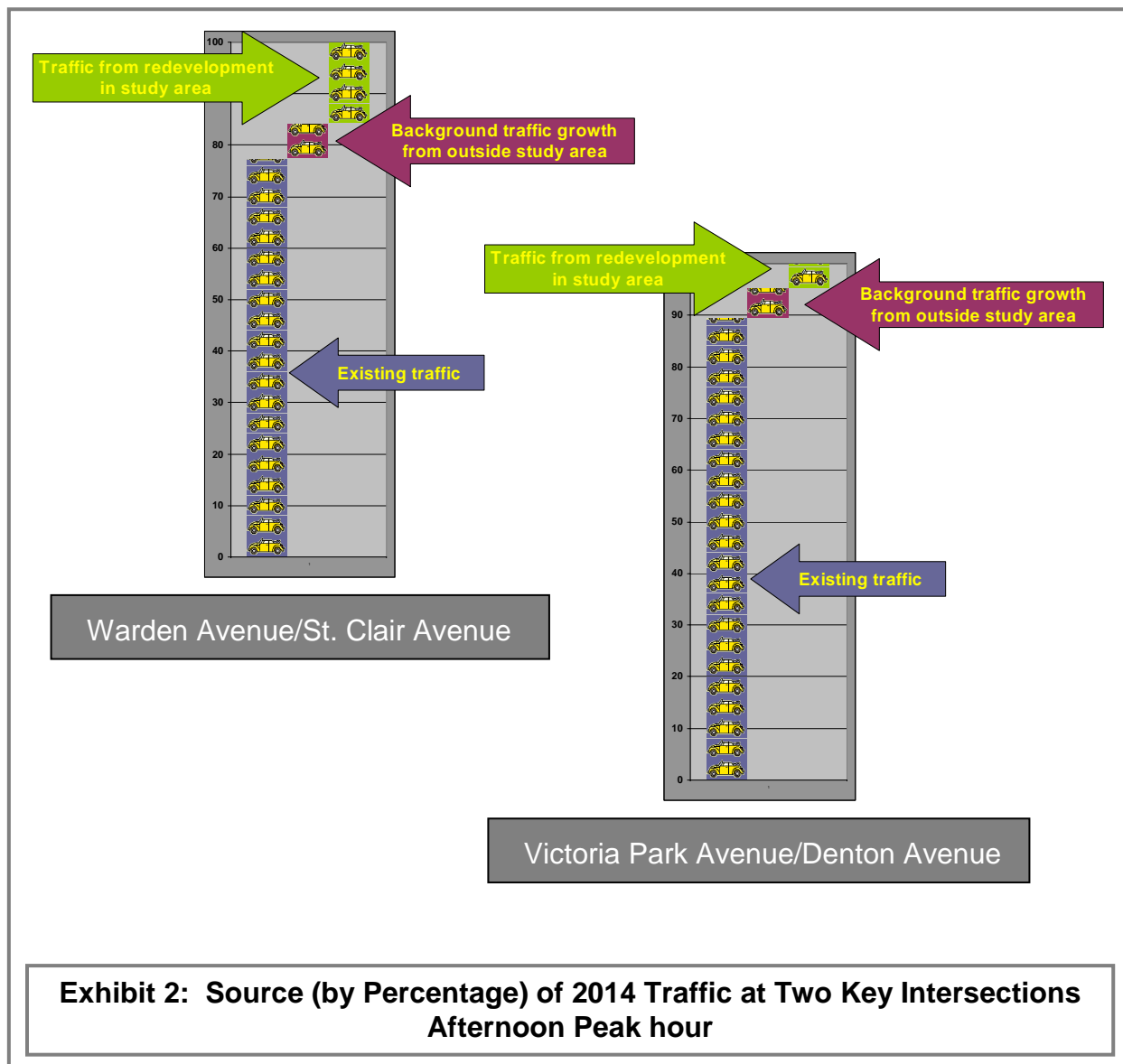
Using delay-based level-of-service as the performance criterion (standard approach using the Highway Capacity Manual Methodology), all intersections will be operating at level-of-service “D” or better except for one intersection, Eglinton Avenue/Warden Avenue, which will likely be operating at level-of-service “E” in the morning peak hour. However, the addition of traffic associated with redevelopment in the study areas does not cause any noticeable worsening of this level-of-service. Using the per cent utilization criterion, it is noted that the capacity utilization at this intersection in 2014 will likely be between 85% and 100% during peak hours.

A review of the levels-of-service based on the per cent capacity utilization criterion confirms that no intersections in the study areas will exceed capacity for the three scenarios considered. Changes in capacity utilization at individual intersections resulting from proposed redevelopment in the study areas are typically less than 2% and in only one case does the change exceed 4% (St Clair/Herron which is operating at less than 75% utilization in any event).

Overall, the proposed redevelopment is not expected to noticeably worsen the level-of-service at key intersections in the study areas. No significant road improvements are required or recommended although traffic in the area should be monitored on a periodic basis to make sure that any emerging local operational issues can be addressed in a timely fashion.

## 5. EVALUATION OF TRANSIT IMPACTS

Redevelopment of the study areas is expected to add 600 to 675 person trips to transit services in the peak direction during peak hours and 120 to 250 person trips in the off-peak direction during peak hours. While a significant percentage of these trips will likely use the subway system, there may be a need for additional buses on routes serving the study areas. This will depend on the distribution of transit riders to directions and routes and the extent to which existing buses are utilized. However, this need will develop over time and will be monitored and addressed through the Toronto Transit Commission’s Service Standards review process.



**Table 7: Signalized Intersection Level-of-service Summary**

		Level-of-Service			Average Delay			Overall Utilization		
		Existing	2014 (+ background)	2014 (+ background + study area)	Existing	2014 (+ background)	2014 (+ background + study area)	Existing	2014 (+ background)	2014 (+ background + study area)
Warden/Eglinton	AM PK HR	D	E	E	41	59	62	90%	100%	100%
	PM PK HR	D	D	D	38	46	46	91%	97%	97%
Warden/Comstock	AM PK HR	B	B	B	15	15	15	55%	64%	66%
	PM PK HR	B	C	C	16	27	27	51%	72%	72%
Warden/Fairfax	AM PK HR	B	C	C	19	25	25	50%	60%	64%
	PM PK HR	B	B	B	18	18	18	54%	66%	69%
Warden/St Clair	AM PK HR	C	D	D	28	43	43	73%	88%	90%
	PM PK HR	C	D	D	29	50	52	69%	87%	90%
Warden/Danforth (Rd)	AM PK HR	C	B	B	23	18	18	53%	56%	57%
	PM PK HR	B	C	C	17	22	22	32%	45%	47%
Warden/Danforth (Ave)	AM PK HR	C	D	D	27	35	37	88%	95%	96%
	PM PK HR	B	C	C	20	27	27	65%	82%	82%
St Clair/Pharmacy	AM PK HR	B	B	B	17	14	13	47%	53%	54%
	PM PK HR	B	B	B	19	17	17	52%	60%	61%
St Clair/Herron	AM PK HR	B	B	B	16	16	19	65%	65%	72%
	PM PK HR	B	C	B	17	21	20	67%	72%	69%
St Clair/Birchmount	AM PK HR	C	D	D	31	46	46	88%	94%	94%
	PM PK HR	C	D	D	28	38	39	78%	85%	86%
Danforth (Ave)/Mack	AM PK HR	B	B	B	16	20	20	62%	77%	77%
	PM PK HR	B	B	B	19	20	20	53%	65%	65%
Danforth (Ave)/Birchmount	AM PK HR	B	C	C	17	23	23	50%	64%	64%
	PM PK HR	B	B	B	17	19	19	46%	55%	55%
Victoria Park/Danforth (Ave)	AM PK HR	B	B	B	15	17	18	59%	63%	64%
	PM PK HR	B	B	B	16	18	18	51%	54%	55%
Victoria Park/Denton	AM PK HR	B	B	B	18	17	16	43%	47%	48%
	PM PK HR	B	B	B	16	17	17	46%	54%	55%

## 6. ROADWAY CONNECTIONS AND SITE PLANNING CONSIDERATIONS

### 6.1 Providing Access to the Road System

Wherever possible, access to the arterial road system should be provided via collector or local streets intersecting the arterial roads at *planned* signalized intersections. Exhibit 3 shows existing signalized intersections along Warden Avenue and three potential new signalized intersections. The potential new locations have been provisionally located to provide rational and reasonably consistent spacing with respect to existing locations, thus facilitating coordination of signal phasing and timing between adjacent traffic signals. These potential locations have not been reviewed in detail by City staff and would have to be assessed from a signal warrant perspective and subjected to more detailed operational analysis prior to approval for implementation.

One of the suggested potential traffic signal locations does provide access indirectly to the TTC's Warden South site. This site cannot easily be served by local or collector roads without unacceptable (to local residents) impacts on the residential streets to the east. The site does extend far enough to the south to provide reasonable distance between the suggested potential traffic signal and the adjacent traffic signal at St. Clair Avenue. It is likely that an additional access to Warden Avenue will be required in conjunction with redevelopment of this site. This additional access may be signalized, subject to confirmation of acceptable traffic operations. Alternatively, it will need to be restricted to right-turns in and out.

With respect to Danforth Road, the analysis by BA Group of the 350 Danforth site concluded that additional traffic signals would not be required to provide adequate access to this site.

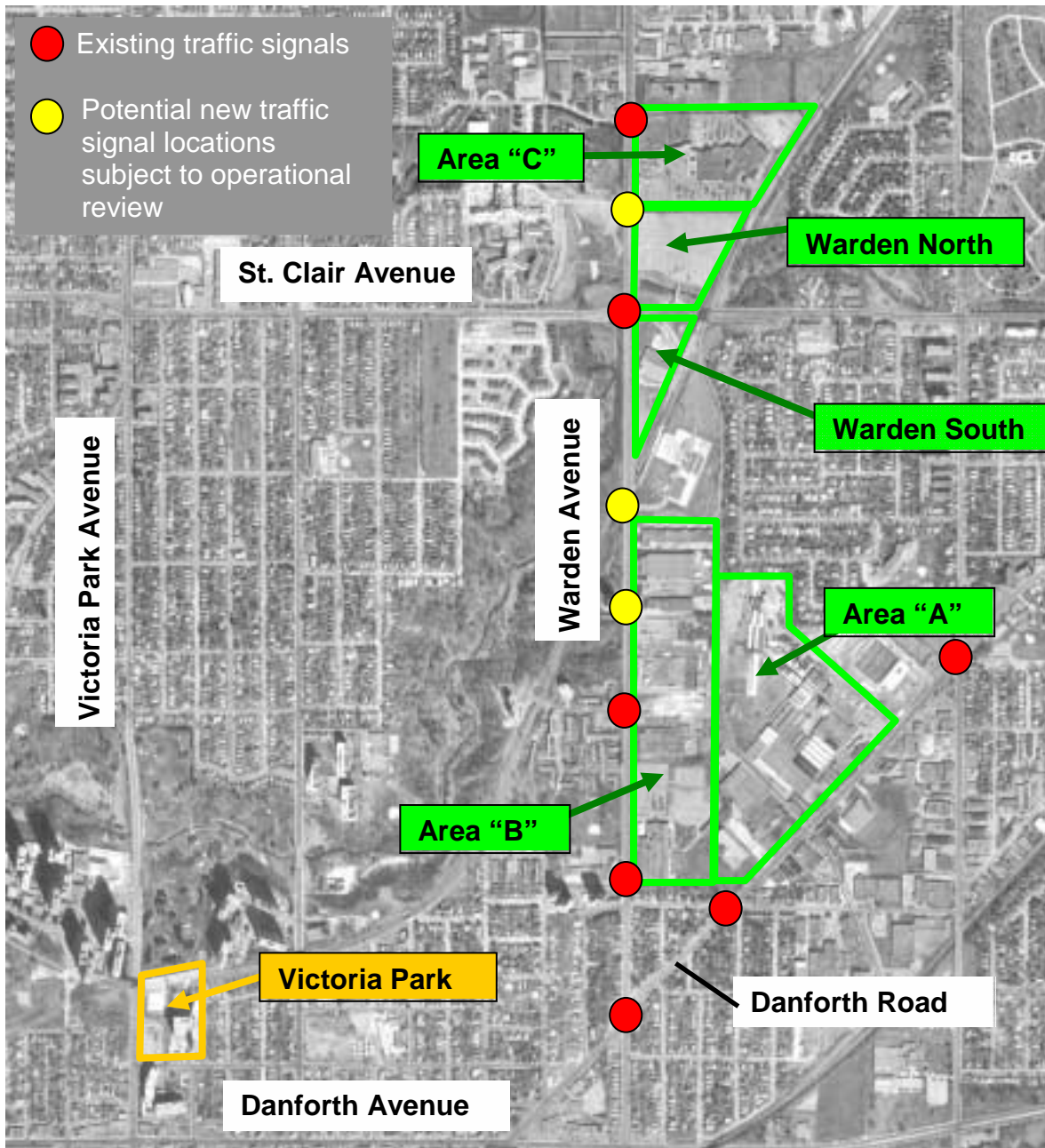
As redevelopment proceeds, it is recommended that, where feasible, particularly for larger sites, that access to Warden Avenue be consolidated as local or collector road connections at the existing or planned signalized intersections. Where this is not practical, as may be the case with smaller sites, access provisions should be evaluated on a case-by-case basis to assess the quality of operation. Subject to confirmation by such assessments, it may be desirable, particularly from a safety perspective, to arrange for shared access between sites to minimize the number of access points along Warden Avenue.

It is likely that the level-of-service provided at unsignalized driveways or local streets will be poor (subject to delay) upon implementation or in the short-term future after implementation, possibly leading to pressure for additional traffic signals. If direct, unsignalized access to Warden Avenue (either driveway access or local/collector road connections) is found to be necessary, this may need to be restricted by design to right-turn-in, right-turn-out movements from the outset or, alternatively, the developers should be advised that such a restriction is possible in the future.

A proposal has been put forward for a shared road access to Warden Avenue at the north boundary of the existing Warden North commuter parking lot. This access should be

located opposite the new residential road access on the west side of Warden Avenue and may be signalized consistent with the discussion above.

A previous proposal to extend Sinnott Road south to provide an additional road connection south to the vicinity of the Warden North site and Area "C" is not necessary in conjunction with the redevelopment of the study areas. In fact, this connection is not seen as desirable, as the lands north of Area "C" are designated as employment lands and may generate commercial-vehicle traffic which should not be provided with access to the residential streets proposed for Area "C" and the Warden North site.



**Exhibit 3: Potential Signalized Connections to Warden Avenue and Danforth Road**

## 6.2 Site Planning to Facilitate Transit Use

The planning of the TTC sites at the Warden and Victoria Park subway stations should reflect their proximity to the subway system and should be consistent with the objective of maximizing transit use by residents and employees housed on these sites. Direct, weather-protected connections should be provided between site buildings and the subway and bus stations.

The sizing of parking facilities should reflect auto ownership patterns as discussed in Section 3.3 and Appendix C. Between 20% and 40% of households, depending upon the type of residential unit occupied, do not have access to an automobile. The TTS survey addresses the question of availability rather than ownership since, for instance, there may be automobiles that are owned but not driveable or otherwise available. Allowing for some exceptions, the TTS information should still provide an estimate of auto availability that is quite close to the actual auto ownership. Examples of possible adjustments to standard parking requirements for residential or commercial buildings in close proximity to the subway stations are as follows:

- Fewer than one parking space per residential unit, in conjunction with a pool of shared visitor parking spaces;
- Residential units may be offered without parking spaces (not included in the purchase price or rental rate), which may be paid for separately as needed;
- Commercial office parking ratios of less than one space per 25 sq.m. The North York City Centre employs such a strategy, for example.
- Available parking space may be shared. For example, commuter parking spaces may be available in the evenings or on weekends to accommodate residential visitor overflow parking or parking associated with ancillary retail development.

## 7. CONCLUSIONS

- The redevelopment of the Warden corridor and Victoria Park study areas as assumed and assessed in this analysis will not result in road capacity or transit capacity deficiencies.
- Access to Warden Avenue should be restricted, where possible, to the existing and potential signalized locations identified in this report. An exception to this will be the Warden South site, which is constrained with respect to access possibilities. Where additional access is necessary with respect to individual redevelopment proposals, case-by-case assessments of road operations and safety will be necessary.
- Site planning and the sizing of parking facilities should be consistent with maximization of transit use, particularly with respect to development in close proximity to the Warden and Victoria Park subway stations.
- The analysis and conclusions contained in this review should *not* be considered as a substitute for the transportation impact studies that may be required by the City in conjunction with individual development and redevelopment proposals.