4.0 NEEDS ASSESSMENT

4.1 EXISTING CONDITIONS

The demand for road capacity continues to grow in the Region, notwithstanding the various transit initiatives.

The existing needs are demonstrated in observed traffic volumes and congestion during the a.m. and p.m. peak periods, particularly found along the north-south Regional street segments between Highway 7 and Steeles Avenue, contributed by the fact that about 47 percent of the work trips generated by York residents are destined to the City of Toronto. In addition, for all a.m. peak period trips made by York residents, 79 percent are by auto (drivers and passengers), with only 8 percent made by public transit including GO Transit and 6 percent made by walking or cycling.[1]

Figure 4-1 on page 36 illustrates the curr4ent locations of greatest congestion on the road system during peak travel times identified in the York Region Transportation Master Plan. Volume-to-capacity ratios across key screenlines show that the major corridors such as Yonge Street and Highway 7/Highway 407 are highly congested during peak periods. Traffic demands across the Toronto boundary are also close to capacity during weekday a.m. and p.m. peak periods.

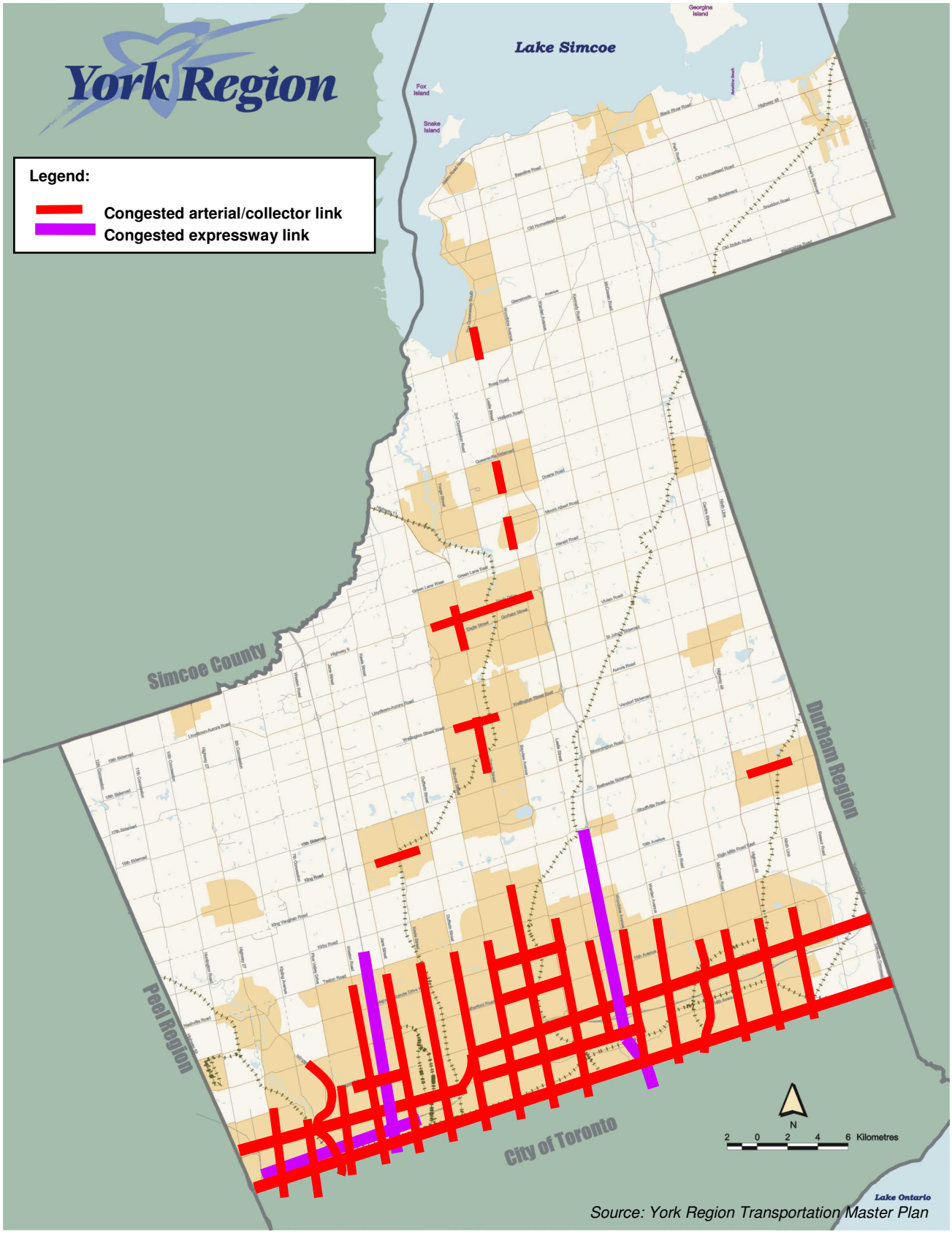
A comparison of demand to capacity has been undertaken for a number of York Region screenlines, based on 1998 data from the York Region Cordon Count program. During the a.m. peak period, the southbound demands across the York-Toronto screenline are approximately equal to capacity. The northbound demands are not as large, but are still approaching capacity. Peak demand is concentrated in the westerly and central sections (i.e. Vaughan, Richmond Hill and the westerly part of Markham).

During the p.m. peak period, the west and central segments of the York-Toronto screenline segments are operating “at capacity”. The northbound direction is more congested, however southbound demands are also close to capacity. In addition, many of the screenlines in the southern tier municipalities are operating at volume-to-capacity (v/c) ratios between 0.80 and 0.90, indicating that there is relatively little reserve capacity remaining. These include the south section of the Highway 400 screenline (westbound), eastbound and westbound demands across the south section of the Highway 404 screenline, and eastbound demands across the York-Durham screenline.

Figures 4-2 and **4-3** shown on pages 37 and 38 and extracted from the York Region Transportation Master Plan report illustrate the screenline analysis results for the a.m. and p.m. peak periods, respectively. Traffic conditions have further deteriorated since 1998.

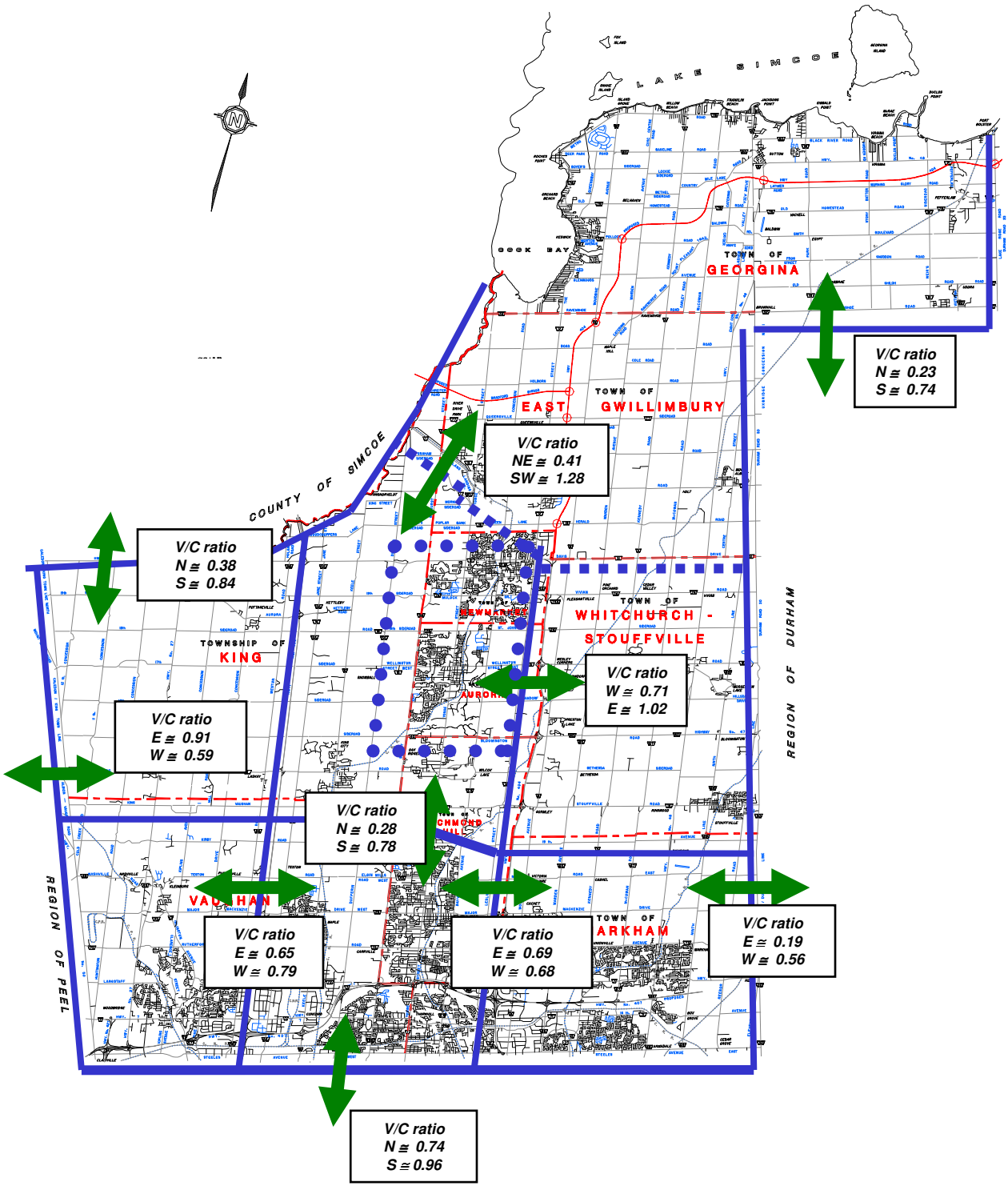
In the southern local municipalities within York Region the volumes on key roads have reached the level where delays are significant in the peak direction of travel, causing extensive queuing and delay, with many major intersections operating at capacity.

[1] 2001 Transportation Tomorrow Survey



Source: York Region Transportation Master Plan

FIGURE 4-1
EXISTING AREAS OF MAJOR TRAFFIC CONGESTION

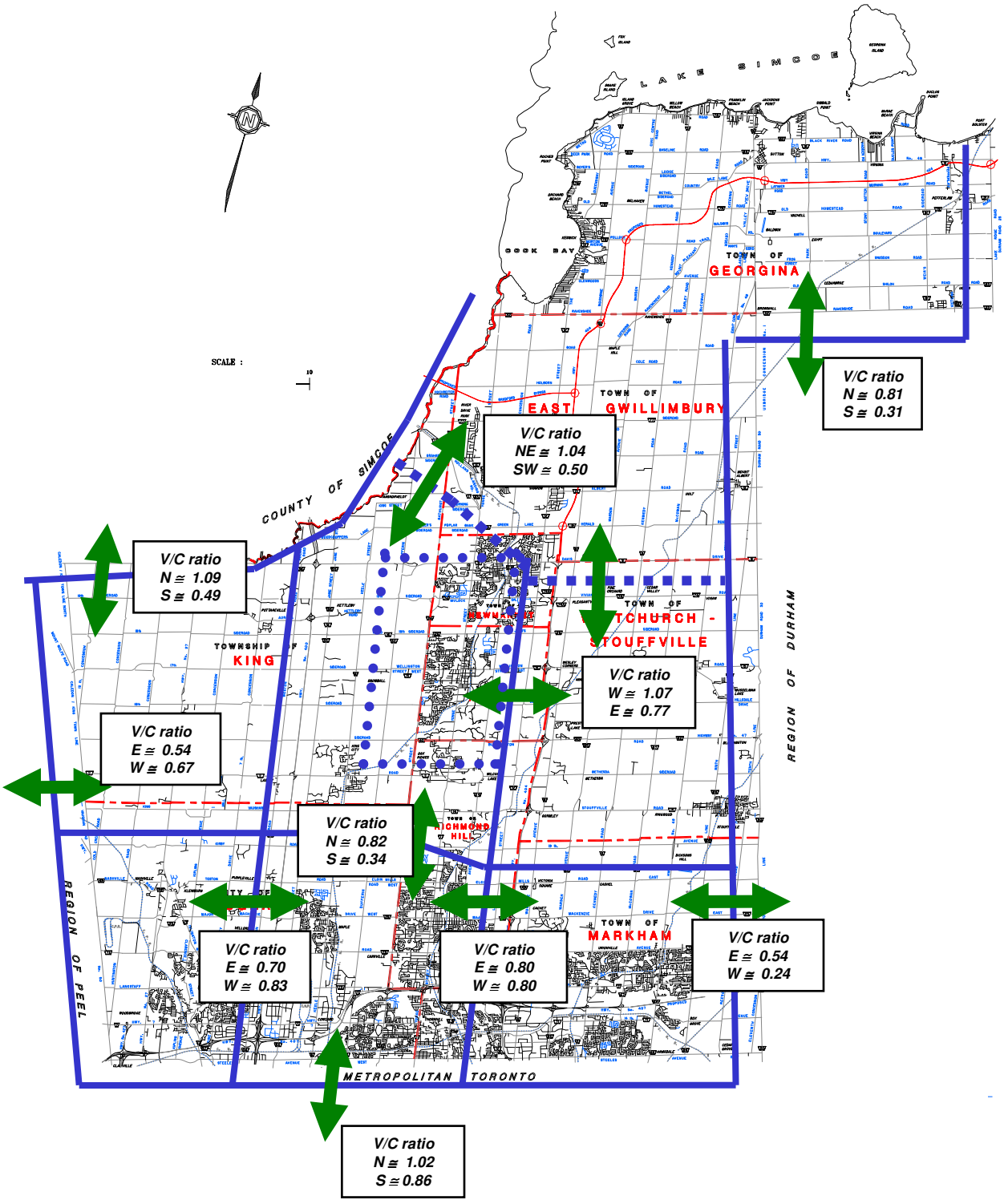


V/C: Volume-to-Capacity Ratio

Source: *York Region Transportation Master Plan*

FIGURE 4-2
1998 AM PEAK PERIOD
SCREENLINE COMPARISON OF
VOLUME-TO-CAPACITY

MMM GROUP · The MBTW Group · Texas Transportation Institute



V/C: Volume-to-Capacity Ratio

Source: *York Region Transportation Master Plan*

MMM GROUP

The MBTW Group

Texas Transportation Institute

FIGURE 4-3
1998 PM PEAK PERIOD
SCREENLINE COMPARISON OF
VOLUME-TO-CAPACITY

4.2 PROJECTED INCREASES IN TRAVEL DEMANDS

As noted, the projected volume-to-capacity ratios on the screenlines for the a.m. peak hour based on the existing road network, as presented in the Transportation Master Plan, are illustrated in **Figure 4-4** on page 40. Based on the unimproved capacities, numerous deficiencies are projected, particularly across the York/Toronto boundary, the Peel, Durham and Simcoe boundaries and across the 400 series highways.

4.3 ALTERNATIVES TO SIX LANE CROSS-SECTIONS

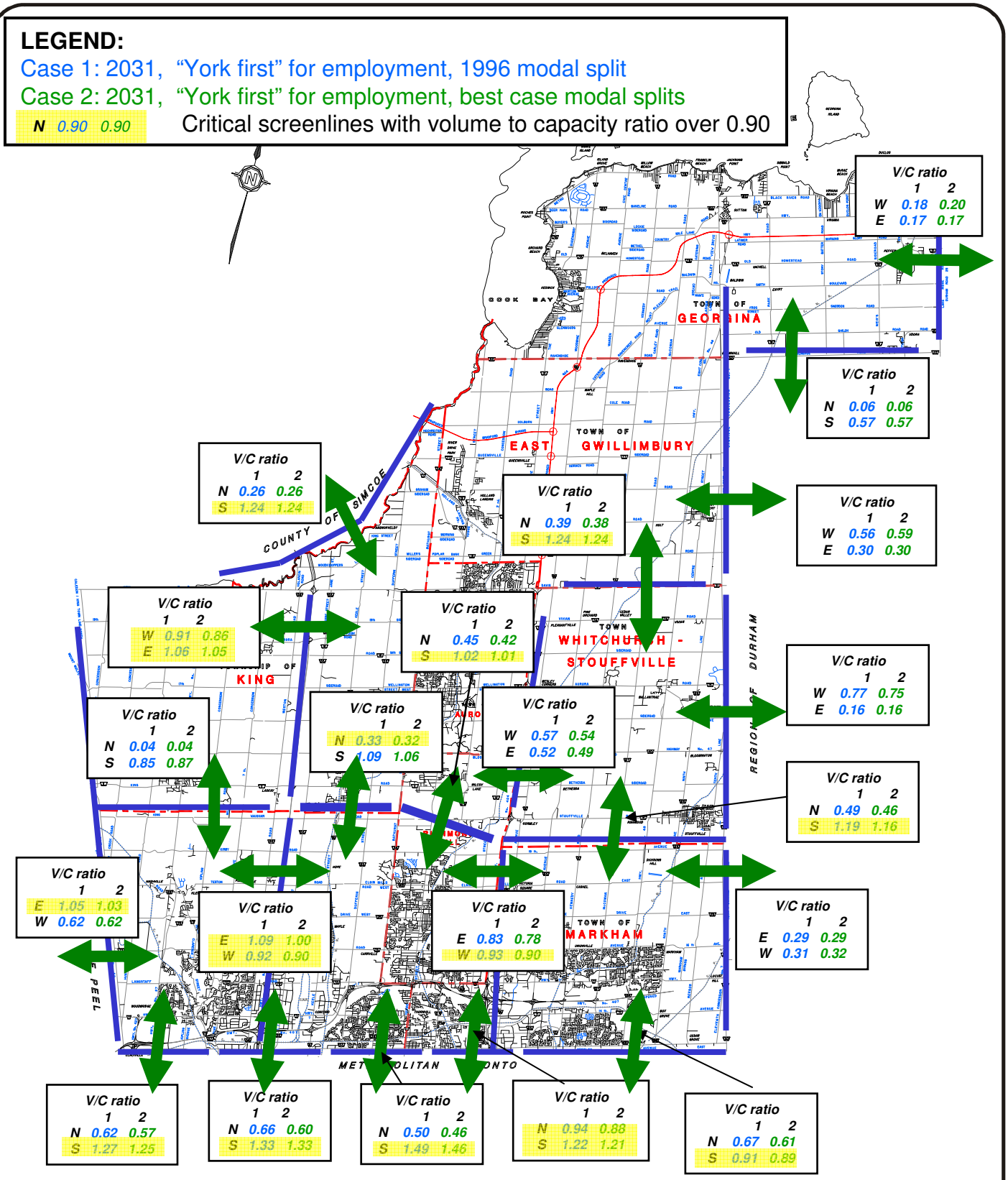
The 2006 10-Year Capital Program identifies 31 segments of existing four lane streets to be widened to six/seven lane cross-sections over the next nine years in order to help address these deficiencies.

However, the need for all of these widenings has been questioned. These are valid questions. In part, the response relates to the manner in which land use has developed in the Region of York. Generally, arterials in the Region are spaced approximately every 2 kilometres. Often, they do include mid-block collectors, but not in all cases. Also, for the most part land uses are discrete (e.g. separate residential communities, employment areas, etc.), with little mixed use, such that it is necessary to travel between residential communities and places of employment. In southern York Region, where the need for the widened Regional streets has been identified, it is no longer possible to modify the spacing of roadways to provide a closer grid, thereby avoiding widenings to six lanes. Also, over the course of time, it may be possible to introduce mixed uses along some corridors, however the expectation is that stable neighbourhoods of single family housing will remain, with these residents travelling out of their neighbourhoods for employment. Widenings of the arterials can perhaps be avoided by widening mid-block collectors instead, where they exist. However, this would in all likelihood be unacceptable where these collectors have abutting uses such as single family dwellings and elementary schools. Also, there may not be sufficient right-of-way available, even if there was support for widening mid-block collectors.

4.3.1 Alternative 1 – More Closely Spaced Arterials

From a planning perspective, consideration should be given to introducing a closer spacing of arterials (e.g. at a one kilometre spacing) in newly developing parts of the Region, coupled with more mixed use to allow residents to both live and work within the same communities. This would allow Regional streets to be limited to a maximum of four through lanes in these areas.

However, as noted, this option is no longer available in the established southerly parts of the Region, where the traffic pressures are more immense.



Source: *York Region Transportation Master Plan*

FIGURE 4-4
2031 HORIZON – AM PEAK HOUR SCREENLINE COMPARISON OF VOLUME-TO-CAPACITY

4.3.2 Alternative 2 – Conversion of Existing Curb Lanes to HOV

As has been suggested, another alternative to widening to six lanes would be to simply take an existing lane of traffic in each direction and to convert it for high occupancy vehicle (HOV), or for exclusive transit usage. The argument in support of this alternative would be to "force" people to change their mode of travel from driving alone to transit or carpooling, given the increasing congestion and delay. This would force all other traffic, including single occupant vehicles (SOVs) as well as trucks, into the one remaining lane in each direction. This could have serious implications on the economy in terms of goods movement. In addition, some commuters have no choice but to drive. They too would be penalized, with substantial delay and frustration, as well as with non-compliance with the HOV lane usage.

In order to test the implications of various options, a number of scenarios have been developed and tested, as described below.

4.4 TESTING OF DIFFERENT MOBILITY SCENARIOS

As noted, analyses have been undertaken to assess the degree of mobility of a segment of urban street based on 2 versus 3 lanes per direction, and based on different traffic allocations in the case of a through lane approach.

The street configurations tested include:

- Scenario 0 – 2 lanes per direction for mixed traffic (Status quo)
- Scenario A – 3 lanes per direction for mixed traffic (Base Case)
- Scenarios B1 and B2 – 3 lanes per direction inclusive of an exclusive transit lane
- Scenarios C1 and C2 – 3 lanes per direction inclusive of an HOV lane.

The number of persons being carried through the roadway is assumed to be 3,300 per direction per hour, for all cases. This number is kept constant for all scenarios in order to assess the average travel speeds for different alternatives with the same level of throughput (3,300 persons).

With the provision of an exclusive transit lane (Scenarios B1 and B2), transit services are thus more convenient, reliable and faster. Therefore, more people are expected to switch from auto to buses. Accordingly, a higher transit modal split is assumed for Scenario B2. Existing transit modal split is assumed for Scenario B1 for comparative purposes.

Similarly, with the provision of an HOV lane (Scenarios C1 and C2), transit service on the HOV lane is expected to be faster and more reliable, and therefore can potentially attract more people to travel by bus. In addition, the reduced travel time is expected to attract some people to carpool instead of driving alone, in order to make use of the less-congested HOV lanes. This would result in a higher percentage of HOV users and therefore higher average vehicle occupancy for the corridor with the HOV lanes. Existing transit modal split and percentage of HOVs are assumed for Scenario C1 for comparative purposes.

With the different street configurations, traffic mixes by mode, and vehicle occupancy, traffic volumes using the various lane types would vary.

The scenarios tested are summarized in **Table 4-1**.

Table 4-1
Scenarios

Scenario	Street Configuration	Traffic Volumes (pcus per hour per direction) [1]	Traffic Mix
0	2 lanes per direction for mixed traffic	2,700	Present [2]
A	3 lanes per direction for mixed traffic	2,700	Present [2]
B1	3 lanes per direction inclusive of an exclusive transit lane	2,700	Present [2]
B2	3 lanes per direction inclusive of an exclusive transit lane	2,440	Future [3]
C1	3 lanes per direction inclusive of an HOV lane	2,700	Present [2]
C2	3 lanes per direction inclusive of an HOV lane	2,452	Future [4]

[1] *Higher transit modal split and/or more people travelling in HOVs reduce the total number of vehicles required to carry the same number of people per hour.*
Pcu: passenger car unit (assuming 1 truck or 1 bus = 2 pcus)
[2] *10% Transit modal split and 21 % of passenger vehicles are for HOV use.*
[3] *20% Transit modal split and 21 % of passenger vehicles are for HOV use.*
[4] *15% Transit modal split and 28 % of passenger vehicles are for HOV use.*

As noted, the analysis tested and compared the mobility of a one kilometre segment of corridor with the same basic parameters, such as the total number of persons who need to be carried, capacity, cycle length, etc. With varying lane allocations/numbers, the traffic allocation between the lane types (general purpose lanes, versus HOV/Transit lanes) varies, thus resulting in different levels of service as defined by average travel speed. The overall average travel speed for all lane groups is also calculated by weighing the average travel speed for each lane group against the number of persons carried through each lane group.

Table 4-2 summarizes the findings of the assessment.

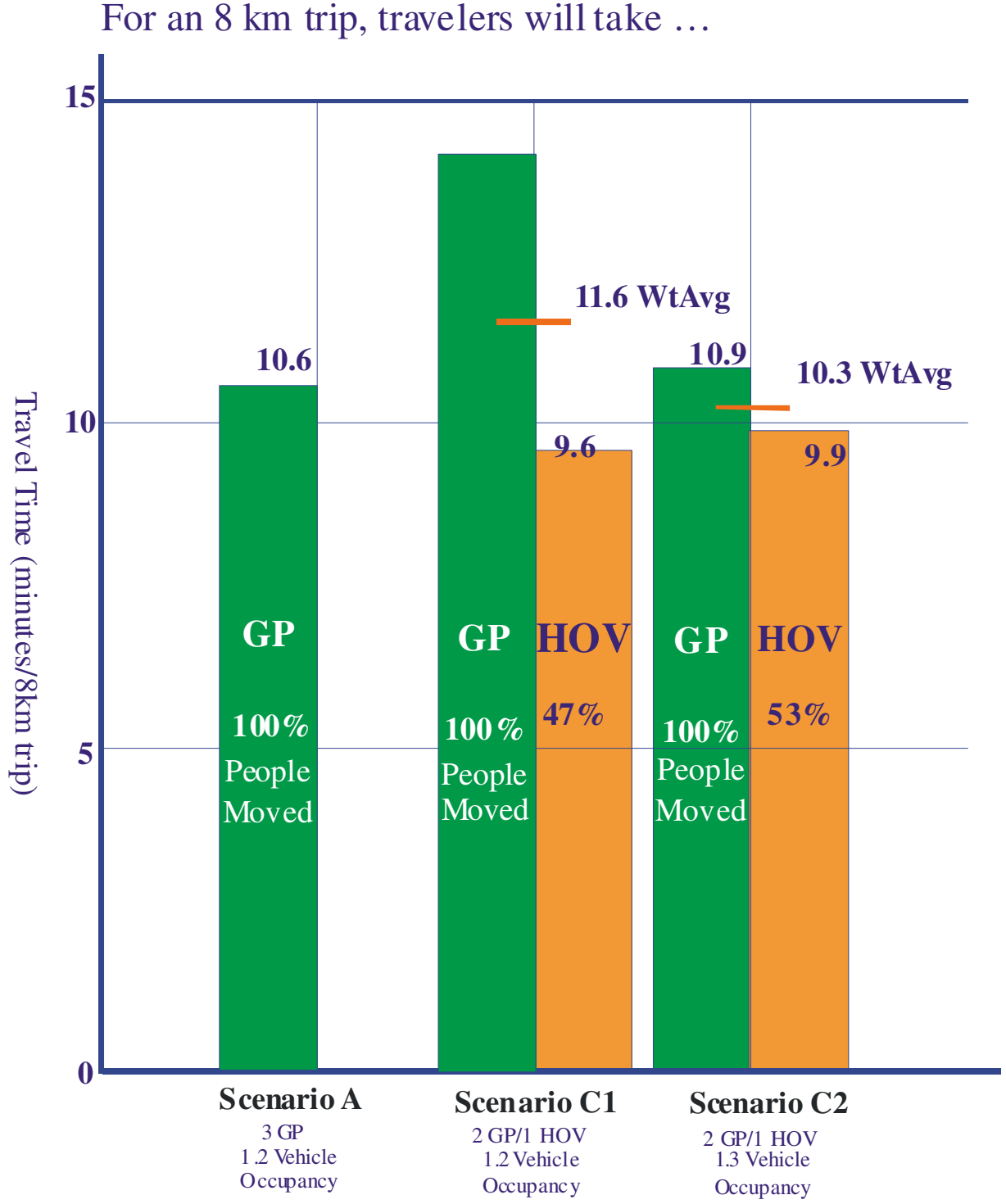
Table 4-2
Resulting Average Travel Speed

Scenario	Street Configuration	General Purpose Lanes	HOV Lane/ Transit Lane	Weighted Average
0	2 lanes per direction for mixed traffic	5 km/h	N/A	5 km/h
A	3 lanes per direction for mixed traffic	40 km/h	N/A	40 km/h
B1	3 lanes per direction inclusive of an exclusive transit lane	5 km/h	50 km/h	9 km/h
B2	3 lanes per direction inclusive of an exclusive transit lane	8 km/h	50 km/h	16 km/h
C1	3 lanes per direction inclusive of an HOV lane	14 km/h	45 km/h	27 km/h
C2	3 lanes per direction inclusive of an HOV lane	38 km/h	44 km/h	41 km/h

Table 4-2 indicates that the forecast traffic volumes simply cannot be accommodated within four lanes of mixed traffic (Scenario 0) and still result in reasonable travel speed. An average travel speed of 5 km/h is far from acceptable either for the general public or for goods movement. It is also forecast that three travel lanes per direction, with the dedication of one lane in each direction to transit exclusively, will cause substantial delay on the two general purpose lanes in each direction (Scenarios B1 and B2). Again, an average travel speed of 5 to 8 km/h in the general purpose lanes would not be acceptable. A much higher transit modal split would need to be achieved to significantly reduce the number of passenger vehicles, which would provide for a reasonable level of service to be maintained in the general purpose lanes.

The option that provides three travel lanes per direction, inclusive of an HOV lane, is expected to result in the most desirable travel speeds of the alternatives considered. Those travelling in the HOV lane either in buses or high occupancy automobiles would achieve shorter travel times than those travelling in the mixed vehicle lanes, however trucks and single occupant vehicles in the other two lanes would not be unduly delayed.

Figure 4-5 on page 44 illustrates the travel time comparison for an 8 km trip for Scenarios A, C1 and C2.



GP – General Purpose Lanes
HOV – High Occupancy Vehicle Lanes

FIGURE 4-5
TRAVEL TIME COMPARISON

As shown in Figure 4-5, for an 8 kilometre trip and three general purpose lanes in each direction (i.e. no HOV lanes), the average travel time is forecast to be 10.6 minutes. If the outside lanes were allocated to HOV, with the same vehicle occupancy, the average travel time would increase marginally to 11.6 minutes, although for those using the HOV lane the travel time would be reduced to 9.6 minutes. If the average vehicle occupancy could be increased even marginally to 1.3 people per vehicle on average, the average travel time could be reduced to 10.3 minutes, with those using the HOV lane making the trip in 9.9 minutes.

4.5 SUMMARY

The Region of York's transportation system is under considerable strain, particularly in the five urban municipalities, experiencing substantial growth in both population and employment. Regional streets are increasingly pressured to meet and balance various competing needs including those related to goods movement to sustain the economy, transit riders, cyclists, pedestrians, as well as auto drivers and their passengers. The Regional streets must balance transportation network needs including efficiency, viability and capacity, with community focused goals of pedestrian friendliness and transit focused design, in order to fulfil their role in the Region's planned growth.

The existing needs are demonstrated in observed traffic volumes and congestion during the a.m. and p.m. peak periods. In the southern municipalities in York Region, volumes on key Regional streets have reached the level where delays are significant in the peak direction of travel, causing extensive queuing and delay, with many major intersections operating at capacity. The demand for road capacity will continue to grow in the Region, notwithstanding the various transit initiatives. On the basis of the 2031 traffic forecasts from the York Region Transportation Master Plan, numerous deficiencies are expected, based on the unimproved capacities, particularly across the York/Toronto boundary, the Peel, Durham and Simcoe boundaries and across the 400 series.

Some existing four lane roads are proposed to be widened in specific links to six lane cross-sections over the next ten years according to the Capital Works Program, in order to help address these deficiencies. An alternative option to the widening of existing four lane streets to six lanes would be to construct continuous mid-block collectors at an approximately one kilometre spacing between existing arterials. However, in southern York Region where the need for the widened Regional streets has been identified, it is no longer possible to modify the spacing of streets to provide a closer grid, given that developments are already in place in these areas. Another option would be to widen mid-block collectors where they exist. In all likelihood, this would be unacceptable where these collectors have abutting uses such as single family dwellings and elementary schools. Also, there may not be sufficient right-of-way available to allow for widening.

Yet another alternative would be to simply convert an existing lane of traffic in each direction to an HOV lane, or exclusive transit lane. This would force all other traffic, including Single Occupancy Vehicles (SOVs) and trucks, into the one remaining lane in each direction. This could have very serious implications on the economy in terms of goods movement. It would also impact those commuters who simply have no choice but to drive alone.

Various alternative street configurations have been considered and tested from a travel time perspective, including two lanes of mixed traffic per direction, three lanes of mixed

traffic per direction, three travel lanes per direction inclusive of an exclusive transit lane in each direction, and three lanes per direction inclusive of an HOV lane in each direction. The average travel speeds for different alternatives to achieve the same level of throughput (same number of persons per direction) have been calculated.

The findings indicate that the forecast traffic volumes simply cannot be accommodated within four lanes of mixed traffic, resulting in substantial delay. It has also been forecast that three travel lanes per direction, with the dedication of one lane in each direction to transit exclusively, will result in substantial delays on the two general purpose lanes in each direction. However, the exclusive transit lanes are expected to operate satisfactorily. Much higher transit modal splits would need to be achieved in order to significantly reduce the number of passenger vehicles and maintain a reasonable level of service in the general purpose lanes.

On the other hand, the option that provides three travel lanes per direction, inclusive of an HOV lane, is expected to result in the most desirable travel speeds of the alternatives considered. Those traveling in the HOV lane either in buses or high occupancy automobiles would achieve better travel times than those travelling in the general purpose lanes, without causing unreasonable levels of delay to trucks and SOVs. This also provides incentives such as travel time savings and a more reliable and predictable trip for HOV lane users. It is recognized, however, that widenings for HOVs cannot be implemented as isolated segments. Rather, they need to be considered within the context of a comprehensive strategy for the implementation of HOVs, including public education and an enforcement strategy.

4.6 SYNOPSIS

The following summarizes the need for widening Regional streets from four lanes to six lanes and the context in which the widening should occur. The requirement to widen Regional streets from an existing four lane cross-section to a six lane cross-section should be critically reviewed on a link-by-link basis, as the needs are identified. In some cases, there may be other viable alternative solutions available, for example to widen a parallel collector street where sufficient right-of-way is available to do so, and where the abutting land uses would not be unduly impacted. However, in many cases, other viable alternatives may not exist. In these cases, the Regional street may need to be widened. Without these widenings, extreme levels of congestion could have serious repercussions on the movement of goods and therefore the economy. Other requirements such as quick emergency response (police, fire, ambulance), would also be jeopardized.

As a principle, the widening to six lanes should not be undertaken for mixed traffic (i.e. continuation of the status quo), but rather to accommodate HOV lanes, for the following reasons:

- To help encourage ridesharing
- To be supportive of transit initiatives

However, it is recognized that it may be necessary to operate some newly widened six lane sections for general traffic for a period of time, with the understanding that the outside lanes will be converted to HOV in the future. In newly developing parts of the Region, consideration should be given to a more closely spaced grid network of arterials

situated at approximately one kilometre apart, in order to spread the traffic load and to potentially defer or eliminate the need to construct six lane streets in the future.

In both existing and newly developing corridors of the Region, consideration should also be given to mixed-use development, thus providing more opportunities for residents to both live and work in a more localized area, thereby reducing the demand for travel by automobile.

Effectively, this represents a more balanced approach to the functioning of Regional streets.

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