

# 6<sup>th</sup> Line Municipal Class Environmental Assessment

County Road 27 to St John's Road  
*Town of Innisfil, ON*

September 6, 2016

**APPENDIX L:  
TRAVEL DEMAND  
FORECASTING MEMORANDUM**



# Technical Memorandum

Date: Tuesday, January 27, 2015

Project: 6th Line Municipal Class Environmental Assessment

To: Scott MacKenzie, Town of Innisfil

From: Tyrone Gan - HDR

Subject: Needs Analysis: Travel Demand Forecasting

As part of the 6th Line Municipal Class Environmental Assessment, it is necessary to determine the required number of lanes for 6<sup>th</sup> Line so that future growth can be sufficiently served. This technical memorandum summarizes the forecasting efforts that ultimately justify the widening of 6<sup>th</sup> Line Road to support forecast 2031 travel demand.

Utilizing a detailed travel demand forecasting model, and incorporating the Town of Innisfil's ("the Town's") latest population and employment forecasts to the 2031 horizon year (including the development of the Sleeping Lion lands and the Alcona North and South Secondary Plan areas), the need for infrastructure improvements on 6<sup>th</sup> Line between County Road 27 and St. John's Road were assessed.

A summary of the recommendations detailed in this memorandum are as follows

- Without construction of the 6th Line / Highway 400 interchange:
  - County Road 27 to Sideroad 20 - reconstruction to 2 lanes
  - Sideroad 20 to St. John's Road- reconstruction and widening to 4 lanes
- With construction of the 6th Line / Highway 400 interchange:
  - County Road 27 to Sideroad 20 - widening to 4 lanes
  - Sideroad 20 to St. John's Road- reconstruction and widening to 4 lanes

The following memorandum documents the travel demand model forecasting procedure, assumptions and analysis which led to the recommendations for infrastructure improvements. The memo structure includes the following sections:

- Model Background
- Land Use Assumptions
- Transportation (Road) Network Assumptions
- Results Analysis for 3 scenarios tested



## Model Background

To assess future traffic conditions, a travel demand forecasting model was utilized. The Simcoe County TransCAD model used for the 2008 Simcoe TMP was obtained and modified for use for the 2013 Innisfil Transportation Master Plan (TMP) study. The model forecasts daily traffic and is meant to be used as a tool to guide decisions on the future needs of the Town.

The Simcoe model covers the entire Greater Toronto Area plus Simcoe County, and is comprised of 150 traffic zones, 6 of which are within Innisfil. For the TMP, traffic zone disaggregation was undertaken, and 26 new zones were added within Innisfil. Within the Alcona Urban Growth node, 8 new zones were added including two expansion areas (Alcona North and Alcona South).

The model was modified for the purposes of the 6<sup>th</sup> Line Road Needs Analysis. Key inputs and modifications to the model are discussed later in this document and include population and employment forecasts and transportation network assumptions.

## Land Use Assumptions

The model's land use assumptions were updated to account for new developments in Alcona South and Alcona North, specifically the Sleeping Lion settlement proposed in Alcona South. **Exhibit 1** illustrates the Town's settlement areas which were used as a basis to develop a traffic zone system for the Town of Innisfil. Zones 5 and 6 in Alcona were further disaggregated to produce more robust trip patterns within Alcona. **Exhibit 2** illustrates the disaggregated zone system employed for Zones 5 and 6. Zones A, B and C in **Exhibit 1** are the lands annexed by the City of Barrie which are accounted for in the model. Further discussion on these zones is provided below.

**Table 1** presents the population and forecast assumptions by traffic zone with a comparison with the forecasts assumed for the 2013 TMP. The population forecast used for the EA increases by nearly 17,000 residents compared to the TMP, while employment forecasts increase by about 3,350. This is all due to growth in Alcona, specifically Alcona South and the Sleeping Lion development.

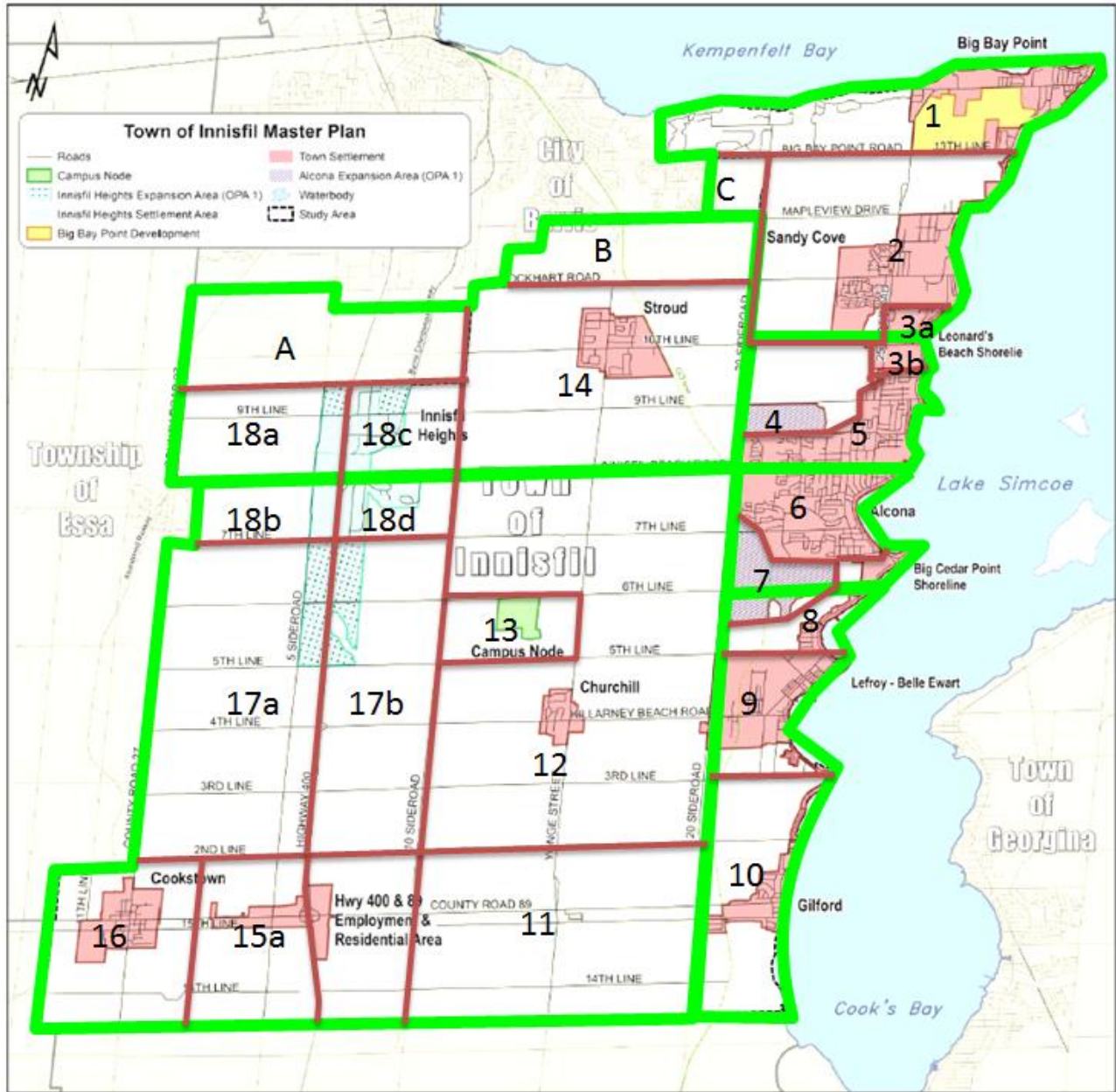


Exhibit 1: Town of Innisfil Settlement Areas

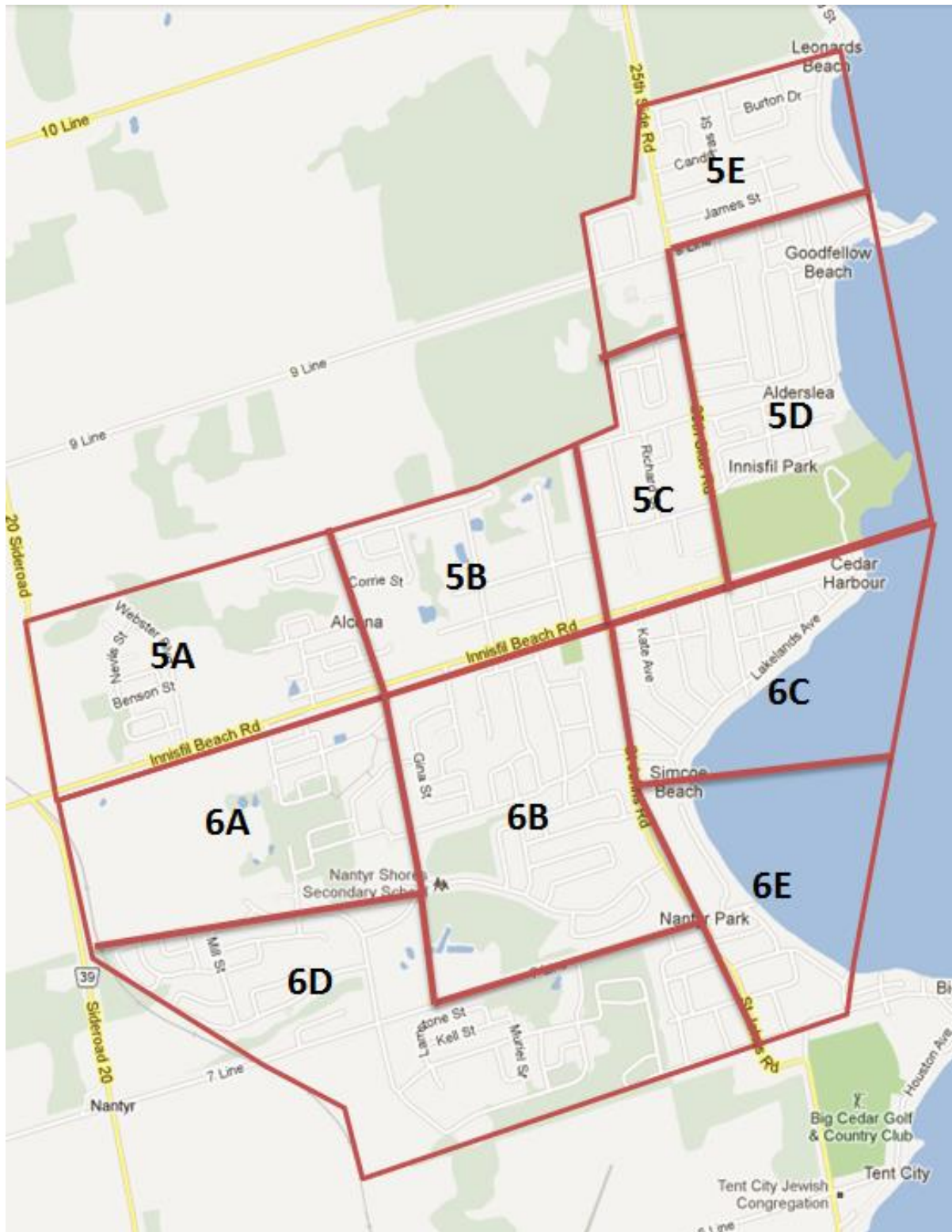


Exhibit 2: Alcona Traffic Zone Disaggregation



**Table 1: Town of Innisfil 2031 Land Use Projections**

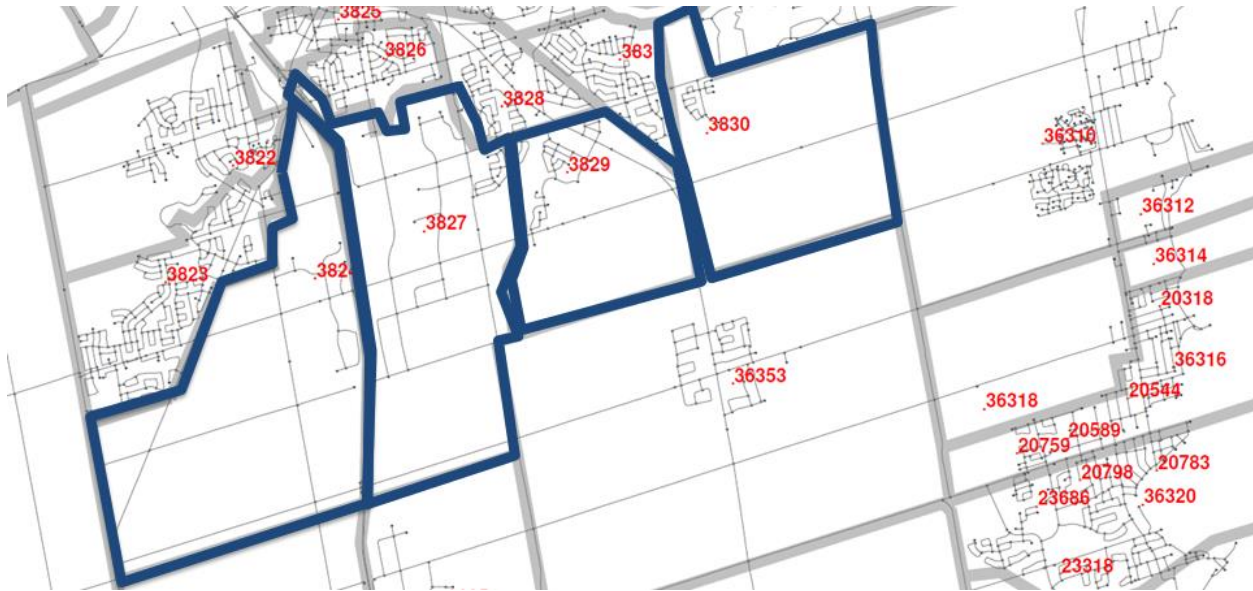
Traffic Zone	Settlement Area	Population		Employment	
		2031 TMP Forecast	2031 New Forecast	2031 TMP Forecast	2031 New Forecast
1	Big Bay Cove	7,356	7,356	1,233	1,233
2	Sandy Cove	9,551	9,551	303	303
3a	Leonard's Beach , north	619	619	0	0
3b	Leonard's Beach , south	619	619	0	0
4	Alcona North Expansion Area	0	5,460	0	850
5a	Alcona North Existing Settlement, west	2,385	2,385	173	173
5b	Alcona North Existing Settlement, central	1,908	1,908	138	138
5c	Alcona North Existing Settlement, east	1,431	1,431	104	104
5d	Alcona North Existing Settlement, Alderslea	1,908	1,908	138	138
5e	Alcona North Existing Settlement, northeast	1,908	1,908	138	138
6a	Alcona South Existing Settlement, west	2,385	2,385	173	173
6b	Alcona South Existing Settlement, central	4,055	4,055	294	294
6c	Alcona South Existing Settlement, east	2,147	2,147	156	156
6d	Alcona South Existing Settlement, south	4,532	4,532	329	329
6e	Alcona South Existing Settlement, Nantyr Park	1,193	1,193	86	86
7	Alcona South Expansion Area	5,000	16,500	0	2,500
8	Big Cedar Point	819	819	0	0
9	Lefroy – Belle Ewart	8,218	8,218	534	534
10	Gilford – Degrassi Point	2,141	2,141	139	139
11	Fennel's Corners	196	196	0	0
12	Churchill	760	760	155	155
13	Campus Node	0	0	0	0
14	Stroud	2,494	2,494	509	509
15a	Hwy 400 & 89 Employment Area, west	0	0	0	0
15b	Hwy 400 & 89 Employment Area, east	0	0	0	0
16	Cookstown	3,477	3,477	709	709
17a	Innisfil Heights Expansion Area, west	0	0	1,200	1,200
17b	Innisfil Heights Expansion Area , east	0	0	1,200	1,200
18a	Innisfil Heights, northwest	48	48	808	808
18b	Innisfil Heights, southwest	48	48	808	808
18c	Innisfil Heights, northeast	112	112	1,886	1,886
18d	Innisfil Heights, southeast	112	112	1,886	1,886
<b>Total</b>		<b>65,420</b>	<b>82,380</b>	<b>13,100</b>	<b>16,450</b>

It should be noted that a planned institutional centre (identified as either community college or healthcare) located at 6<sup>th</sup> Line and Yonge Street is in its planning stages; however, the number of jobs and students projected at this facility was not available prior to the forecasting work. Therefore the Campus was not included in these forecasts. However, if the analysis of the forecast results determines that widening is required without the facility, then it can be surmised that the need for widening would be strengthened with the introduction of the campus.

### Barrie Annexed Lands

Traffic zones A, B and C presented in **Exhibit 1** represent lands annexed by the City of Barrie and slated for future development. During the TMP model build process, these lands were removed from the Innisfil Traffic Zone system and reallocated to adjacent Simcoe TMP traffic

zones located in Barrie as illustrated in **Exhibit 3**. The updated land use projections for these zones are provided in **Table 2**.



**Exhibit 3: Annexed Barrie Lands Traffic Zone System**

**Table 2: Annexed Barrie Lands Land Use Projections**

Traffic Zone	Area	2031 Population	2031 Employment
3824	Barrie Annexed Lands, west	14,856	5,186
3827	Barrie Annexed Lands, west-central	0	0
3829	Barrie Annexed Lands, east-central	12,802	1,709
3830	Barrie Annexed Lands, east	13,129	506

## Transportation (Road) Network Assumptions

The assumed road network used to produce the demand forecasts for 6<sup>th</sup> Line is the preferred road network as identified in the Town’s TMP.

**Exhibits Exhibit 4 to Exhibit 6** illustrate the assumed number of lanes, daily link capacities and free flow speeds respectively for the road network. Links shaded in grey denote centroid connectors. These plots are also provided separately, and are attached to this memorandum. It is noted that the speeds coded into the model do not represent actual posted speed limits. Free flow speeds have been adjusted in the transportation model for calibration against observed traffic volume data.

In order to determine the need for improvements to 6<sup>th</sup> Line, a “Do Nothing” future horizon scenario was tested first. In this scenario, the model forecasted traffic on 6<sup>th</sup> Line with one lane in each direction with an assumed daily capacity of 5,000 vpdpl (vehicles per day per lane) with a free-flow speed of 40 km/h between Highway 27 and 20 Sideroad. Although the actual free flow speed today is 80 km/h, as noted above the Simcoe county model is calibrated to 40 km/h speeds on all of Innisfil’s local roads / lines.



Innisfil Beach Road is currently the main east-west arterial road connecting the Alcona Community to Highway 400. It was assumed that Innisfil Beach Road will operate with two lanes in each direction with a daily capacity of 10,000 vpdpl east of Highway 400 and a free-flow speed of 80 km/h west of 20 Sideroad and 60 km/h east of 20 Sideroad.

In total, seven scenarios were tested for 6<sup>th</sup> Line, and are summarized in **Table 3**.

**Table 3: Analysis Scenarios**

Scenario #	Scenario	Speed (west of 20 Sdrd / east of 20 Sdrd)	Lanes (per direction)	Capacity - vpdpl (west of 20 Sdrd / east of 20 Sdrd)	Highway 400 IC?
1A	Do Nothing	40 km/h / 40 km/h	1	5,000 / 5,000	No
1B	Reconstruction	40 km/h / 40 km/h	1	6,500 / 5,000	No
1C	Base Case / Currently Planned	60 km/h / 40 km/h	1	6,500 / 5,000	No
2	Higher Speed and Capacity	80 km/h / 60 km/h	1	10,000 / 6,500	No
3	Base case plus Highway 400 IC	60 km/h / 40 km/h	1	6,500 / 5,000	Yes
4	Higher Speed and Capacity plus Highway 400 IC	80 km/h / 60 km/h	1	10,000 / 6,500	Yes
5	Widening, Higher Speed and Capacity, and Highway 400 IC	80 km/h / 60 km/h	2	10,000 / 6,500	Yes



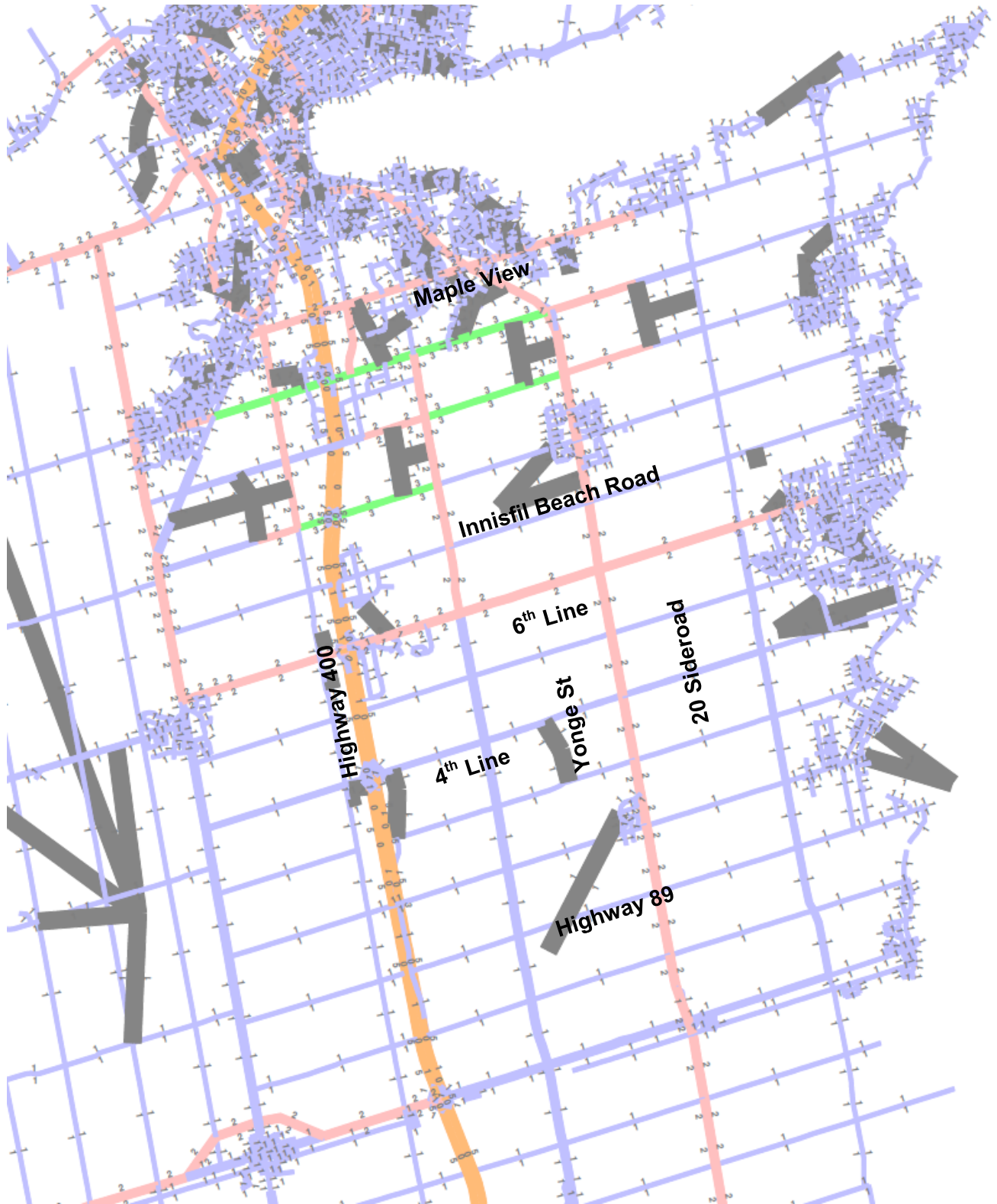


Exhibit 4: Number of Lanes - Base Case Scenario

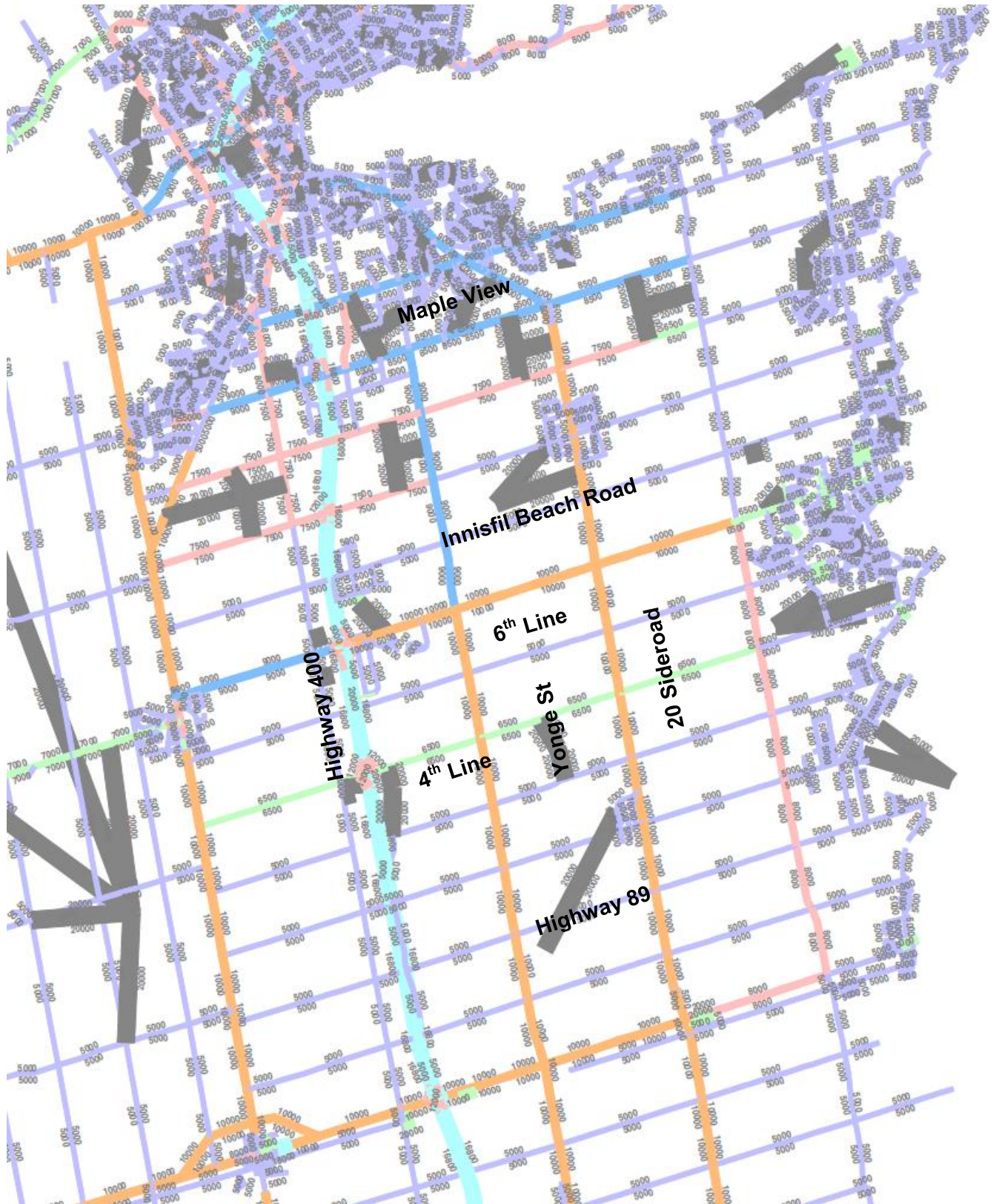


Exhibit 5: Daily Lane Capacities - Base Case Scenario (Vehicles per Lane per Day)



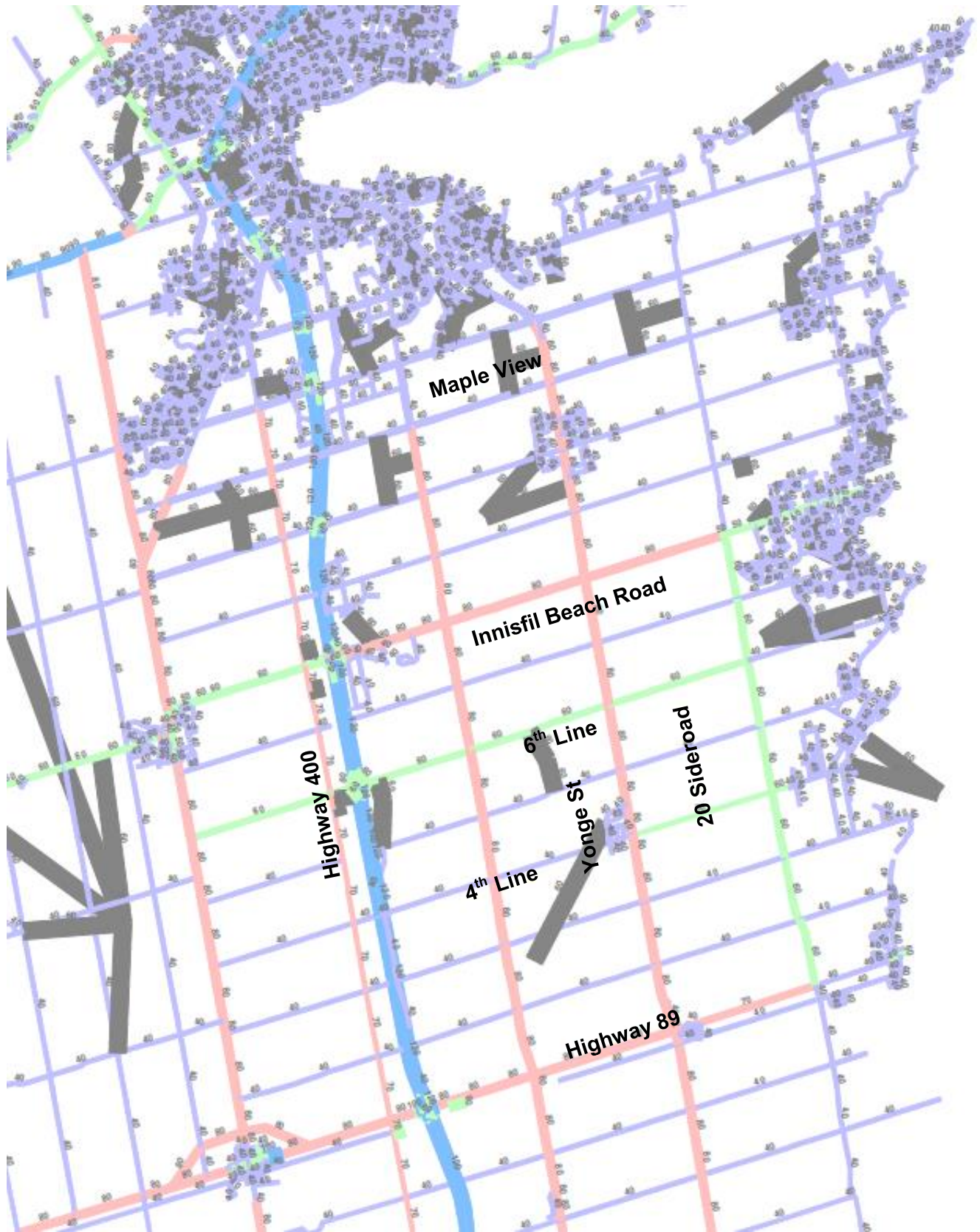


Exhibit 6: Free-flow Speeds - Base or Do Nothing Scenario (Kilometres per Hour)



## Results Analysis

Results for the seven scenarios are provided in the following sections.

### **Scenario 1A: Do Nothing**

**Exhibit 7** is a plot containing the results for Scenario 1A, which is the Do Nothing scenario. The links are coloured to illustrate their projected volume / capacity ratio in 2031 while the text indicates the forecast daily auto volume. With no change to the roadway, traffic from the Sleeping Lion development and other Alcona South development areas adjacent to 6<sup>th</sup> Line will increase traffic on 6<sup>th</sup> Line beyond capacity east of Yonge Street. Innisfil Beach Road volumes exceed capacity for the entire length between Highway 400 and Webster Blvd.

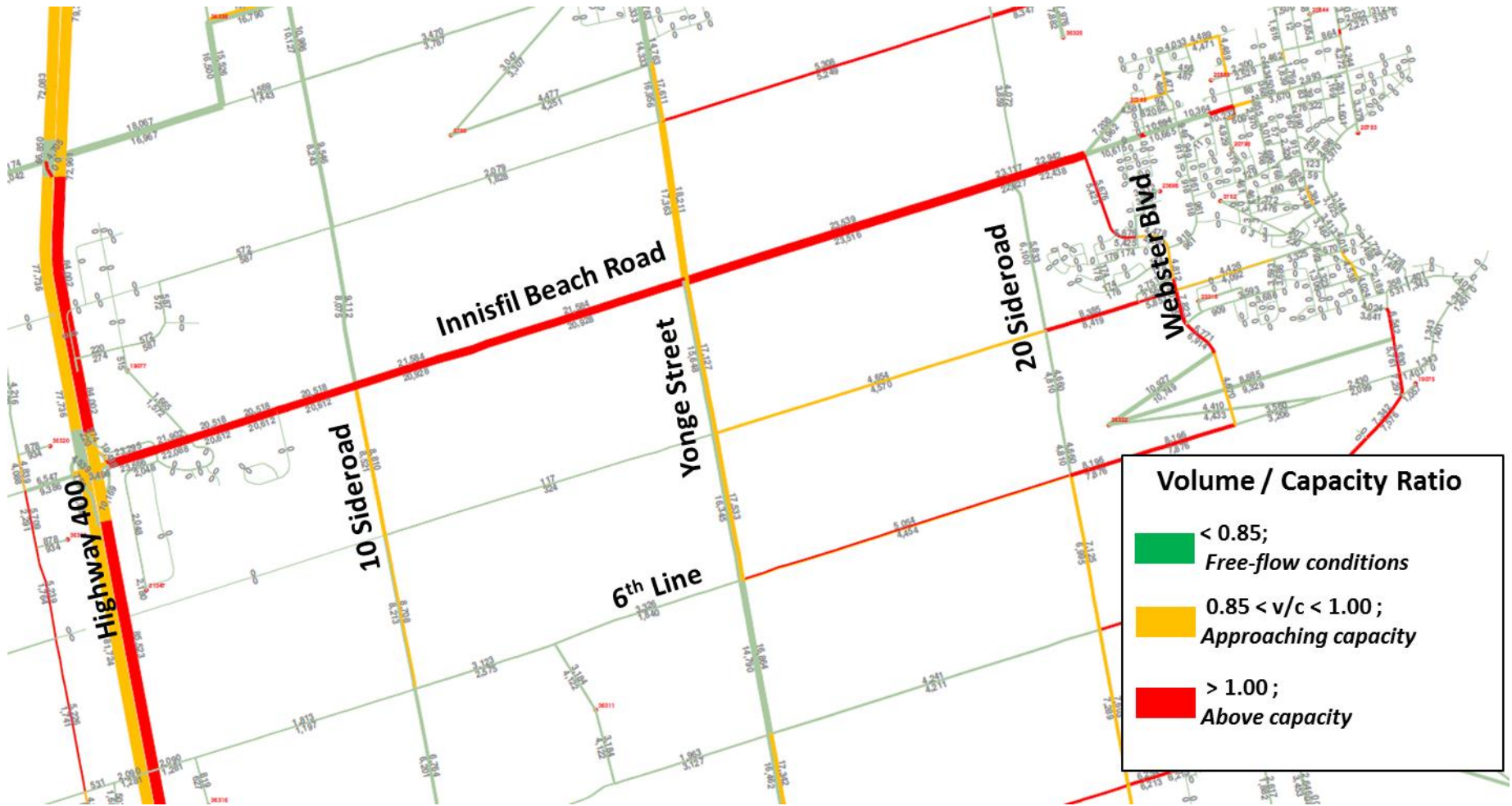


Exhibit 7: Scenario 1A – Do Nothing Auto Volume and Volume / Capacity Results

**Scenario 1B: Reconstruction**

Exhibit 8 is a plot containing the results for Scenario 1B, which proposes to reconstruct 6<sup>th</sup> Line through the Study Area. The reconstruction could increase capacity by providing wider lanes and paved shoulders. With this improved capacity, 6<sup>th</sup> Line is still



approaching capacity east of Yonge Street, but operations are improved over Scenario 1A on 6<sup>th</sup> Line, while Innisfil Beach Road remains above capacity.

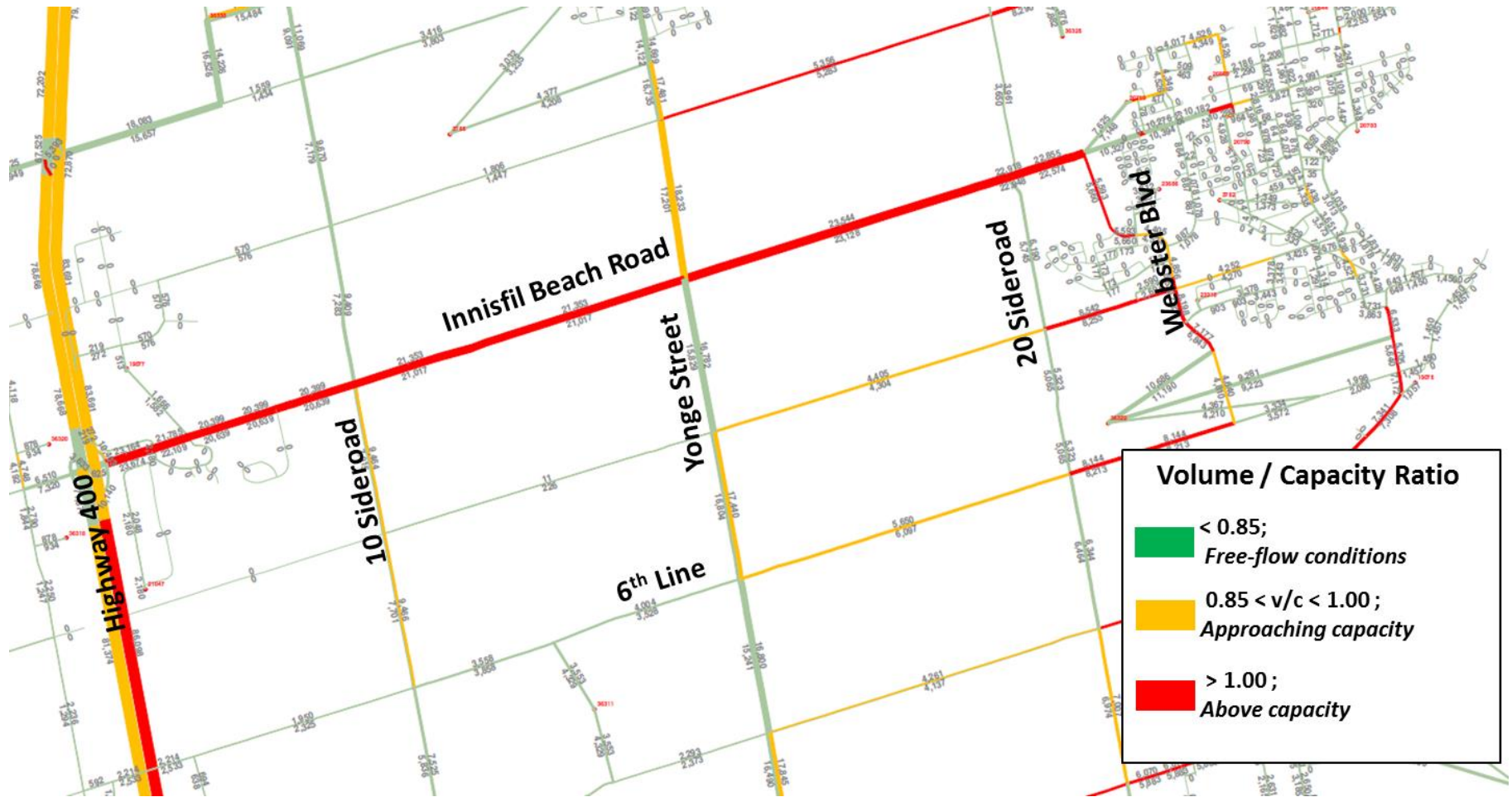
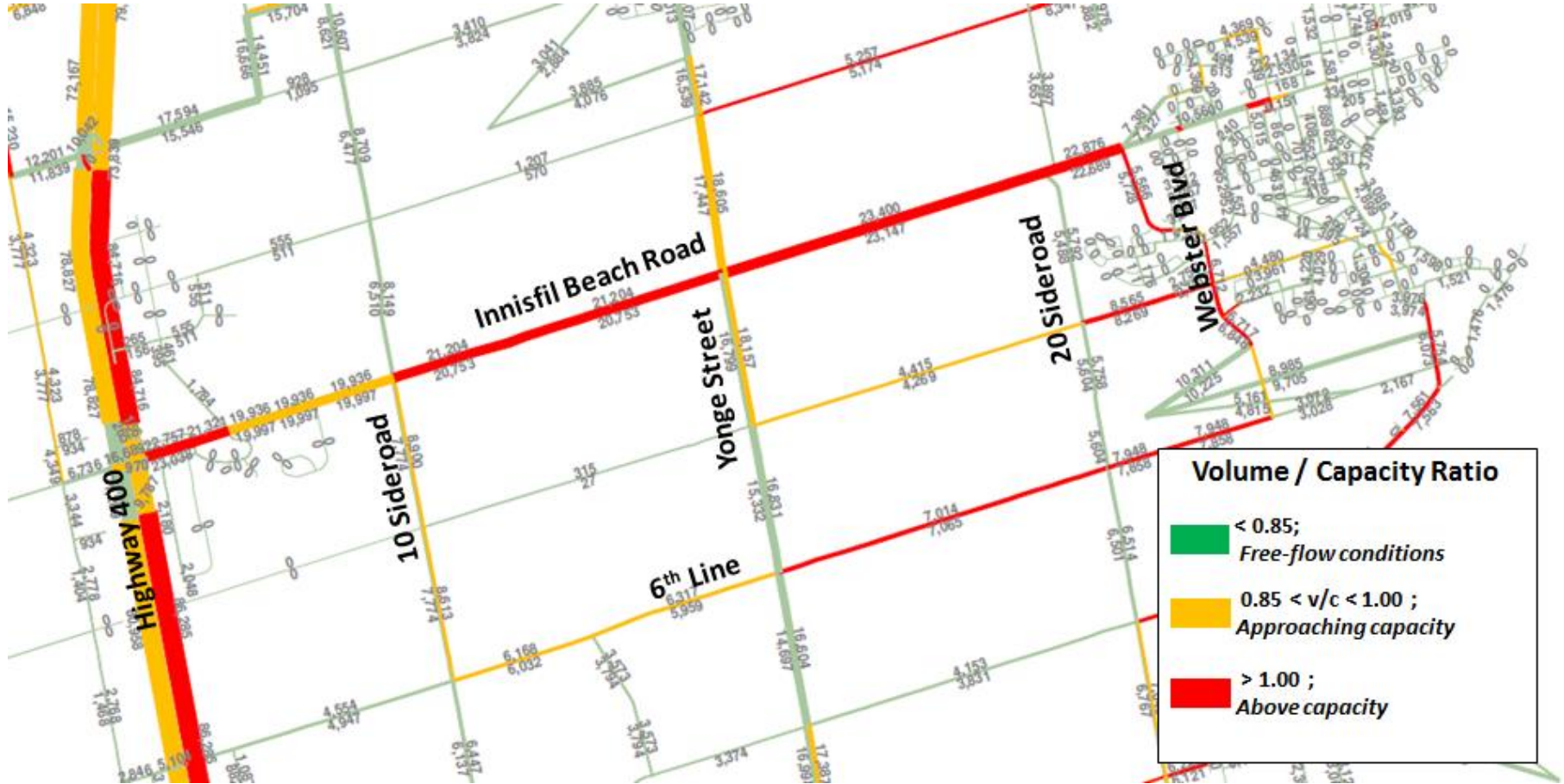


Exhibit 8: Scenario 1B – Reconstruction Auto Volume and Volume / Capacity Results

**Scenario 1C: Base Case / Currently Planned**

**Exhibit 9** is a plot containing the results for Scenario 1C, and as per TMP recommendations, the assumed travel speed on 6<sup>th</sup> Line is increased to 60km/h which results in demand exceeding capacity east of Yonge Street and approaching capacity between Yonge Street and 10 Sideroad. Innisfil Beach Road also remains above capacity for nearly the entire length between Highway 400 and Webster Blvd.



**Exhibit 9: Scenario 1C – Base Case / Currently Planned Auto Volume and Volume / Capacity Results**



### **Scenario 2: Capacity and Speed Improvements**

The plot for Scenario 2, which assumed improved lane capacity and free-flow speed on 6<sup>th</sup> Line, is presented in **Exhibit 10**. 6<sup>th</sup> Line becomes a more attractive travel route between Alcona and Highway 400 due to the travel time savings that arise with a higher free-flow speed. However due to the increase in demand, 6<sup>th</sup> Line is projected to operate above the assumed two-way daily capacity between 10 Side Road and 20 Side Road. Meanwhile Innisfil Beach Road will also continue to operate above its capacity; however, there is some diverted traffic forecasted from Innisfil Beach Road to 6<sup>th</sup> Line.

In summary, the results of Scenarios 1 and 2 reveal that even if the interchange at Highway 400 is not constructed, 6<sup>th</sup> Line will continue to be congested if not widened to 4 lanes with even worse congestion occurring on Innisfil Beach Road.

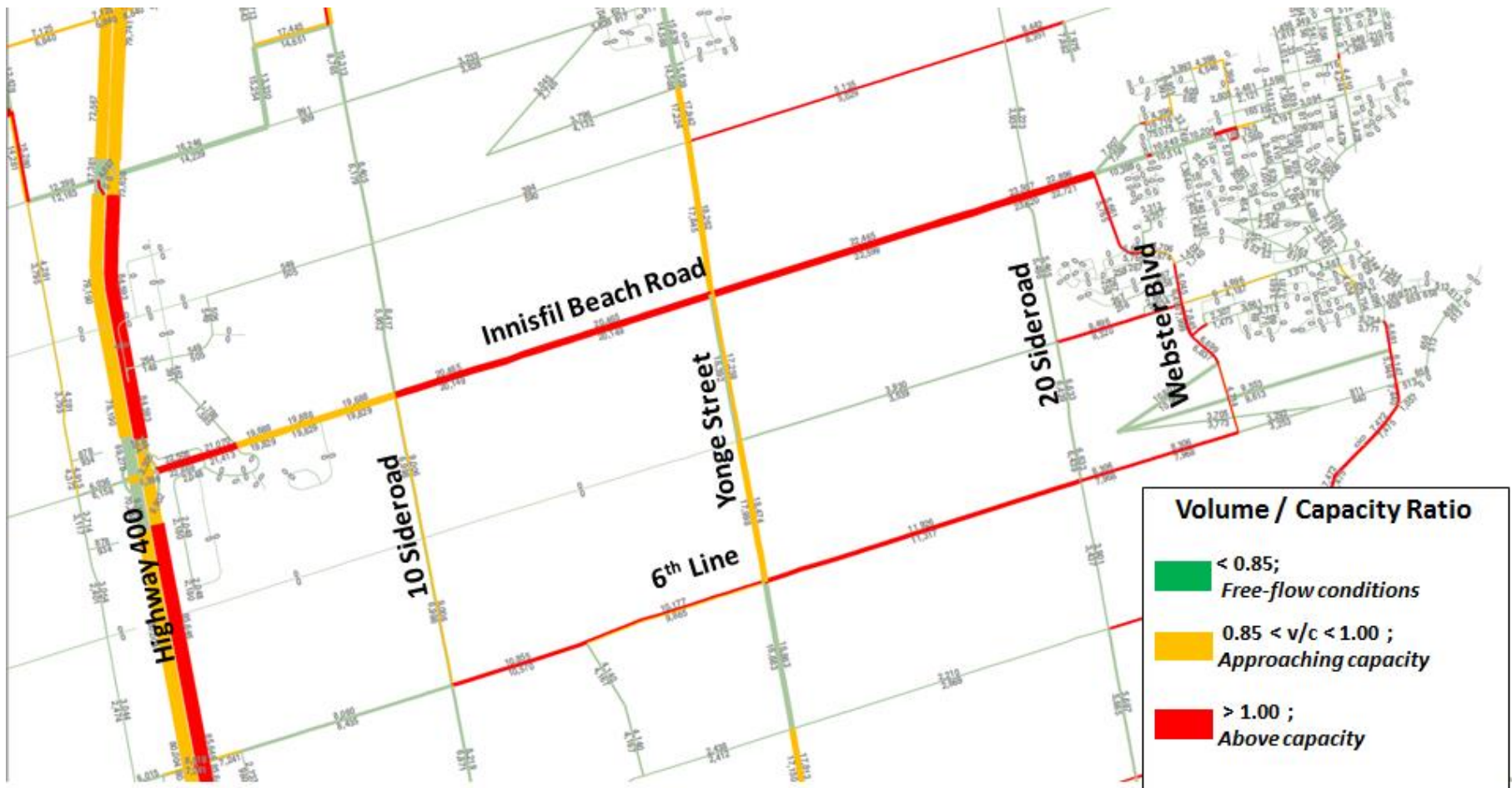


Exhibit 10: Scenario 2 – Capacity and Speed Improvements - Auto Volume and Volume / Capacity Results

**Scenario 3: Base Case plus Highway 400 IC**

Exhibit 11 is a plot containing the results for Scenario 3, which is the base case where 6<sup>th</sup> Line Road has an interchange to connect to Highway 400. From Yonge Street to Webster Blvd, 6<sup>th</sup> Line is projected to carry demand above its capacity, while west of Yonge Street it is projected to be at or near capacity all the way to Highway 400. Meanwhile Innisfil Beach Road is projected to be above its capacity for nearly the entire length between Highway 400 and Webster Blvd.



The benefit of the interchange at Highway 400 and 6<sup>th</sup> Line can be observed in that traffic volumes are projected to significantly decrease on 10 Side Road and Yonge Street. Traffic will not need to use these north/south roads in order to access Highway 400 at Innisfil Beach Road.

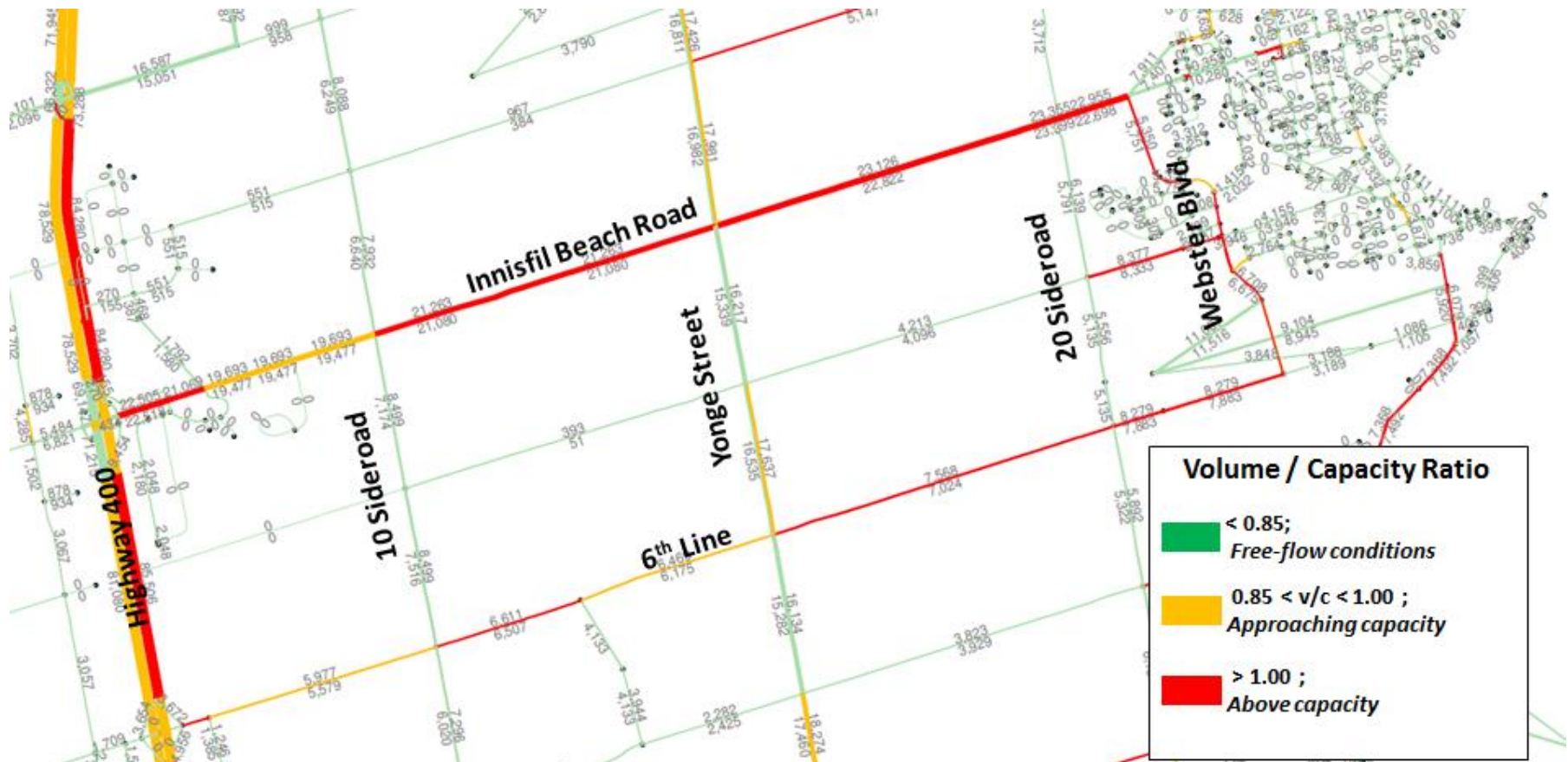


Exhibit 11: Scenario 3 - Base/Do Nothing plus Highway 400 IC Auto Volume and Volume / Capacity Results

#### Scenario 4: Capacity and Speed Improvements plus Highway 400 IC

The results for Scenario 4, which assumed increased lane capacity and free-flow speed on 6<sup>th</sup> Line are illustrated in **Exhibit 12**. Due to the increased free-flow speed as a result of cross-sectional improvements, nearly the entire length of 6<sup>th</sup> Line is at or above its



practical daily capacity, even if the capacity per lane is also increased. The travel time savings that arise due to improved free-flow speeds make 6<sup>th</sup> Line an attractive route compared to parallel rural roads. There is also some reduction in traffic projected along Innisfil Beach Road.

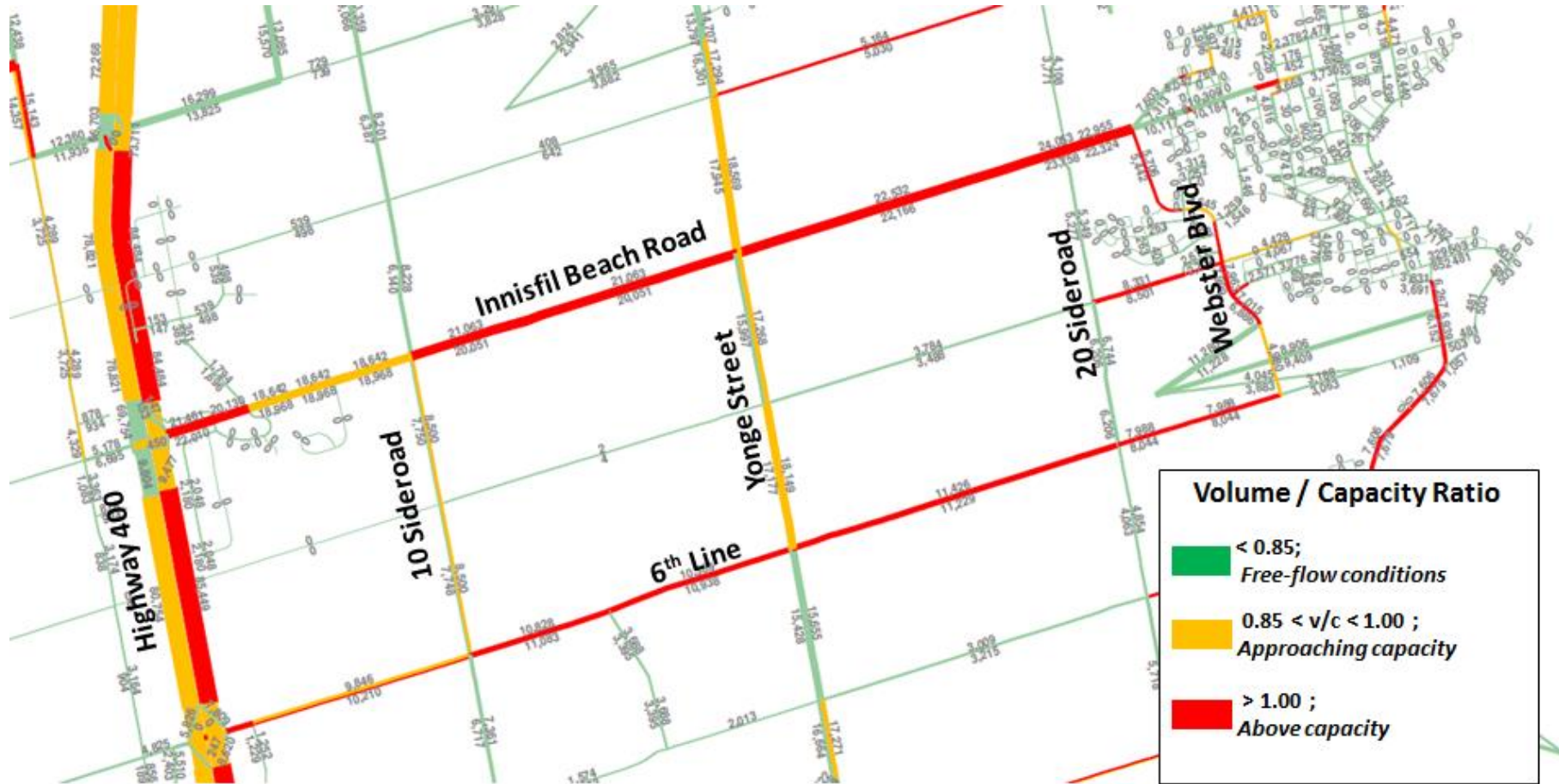


Exhibit 12: Scenario 4 - Capacity and Speed Improvements with Highway 400 IC Auto Volume and Volume / Capacity Results



### **Scenario 5: Widening with Capacity and Speed Improvements and Highway 400 IC**

Scenario 5, which assumes two lanes per direction on 6<sup>th</sup> Line, capacity and speed improvements on 6<sup>th</sup> Line and the Highway 400 interchange, performs the best from both a corridor and network perspective as shown in **Exhibit 13**. 6<sup>th</sup> Line is projected to carry about 18,000 vehicles per day per direction by 2031, which is below its capacity of 20,000 vehicles per day between Highway 400 and 20 Sideroad. However the portion east of 20 Sideroad will be above its capacity.

Meanwhile Innisfil Beach Road from east of Highway 400 to Yonge Street will also be relieved such that it will operate below its practical capacity as it is likely vehicles will be diverting to the widened 6<sup>th</sup> Line Road.

Therefore, not only does a 4-lane 6<sup>th</sup> Line improve operations along 6<sup>th</sup> Line, it will also provide a network benefit.

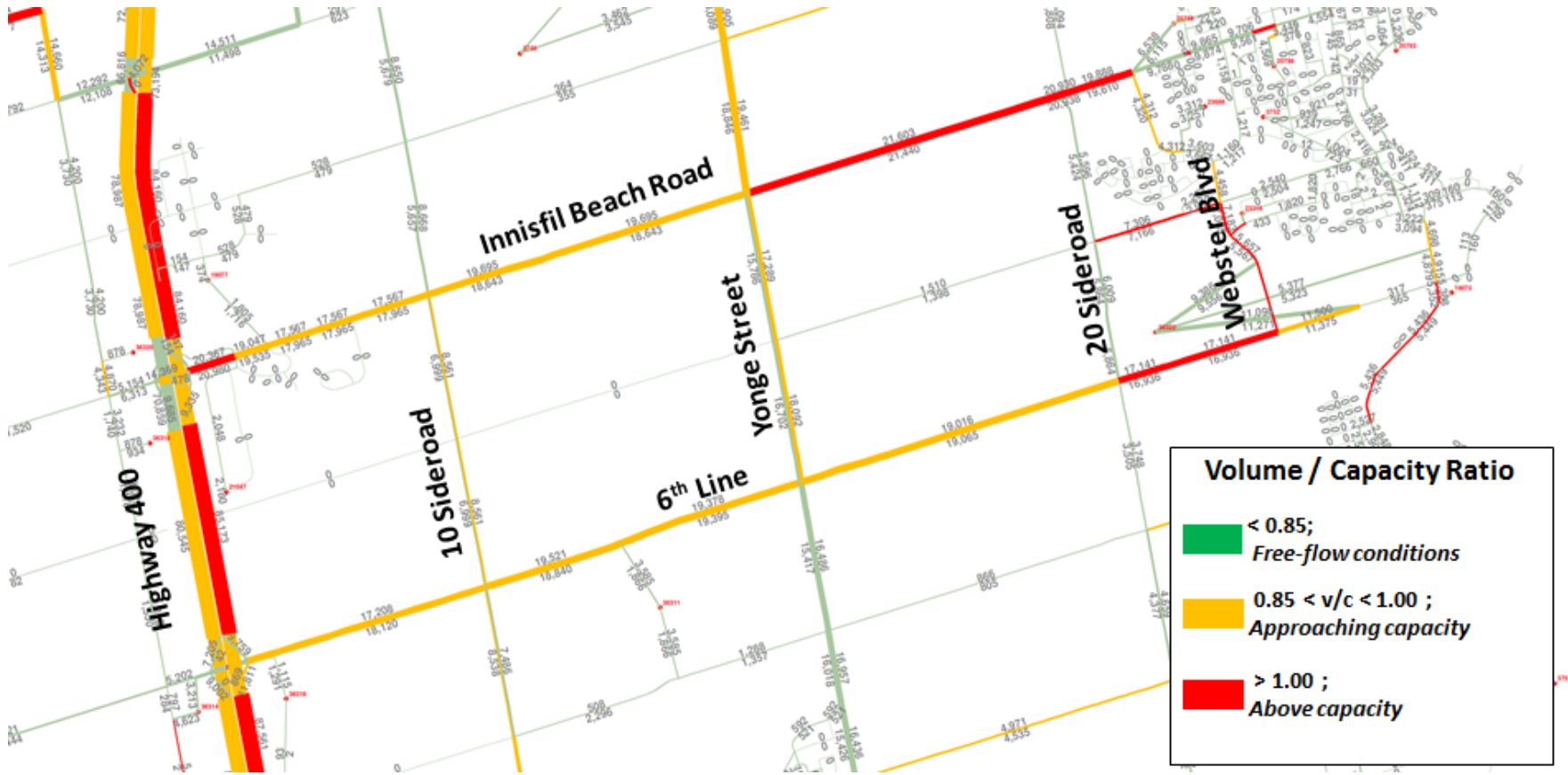


Exhibit 13: Scenario 5 – Widening with Capacity and Speed Improvements Auto Volume and Volume / Capacity Results



### Summary Tables

**Table 4, Table 5** and **Table 6** summarize the results discussed above in tabular screenline format for eastbound traffic. Westbound traffic tables are similar as the model represents daily traffic which is typically similar for different directions. It is noted in all 6<sup>th</sup> Line improvement scenarios, Innisfil Beach Road will likely be very congested in the future if all planned developments in the Town of Innisfil are built. The widening of 6<sup>th</sup> Line to 4 lanes plus a Highway 400 interchange (Scenario 5) provides the greatest amount of relief to Innisfil Beach Road while improving 6<sup>th</sup> Line to carry a high volume of traffic.

Should the Highway 400 interchange not be built, traffic volumes will still increase on 6<sup>th</sup> Line, particularly between Yonge Street and 20 Sideroad, but given the number of alternative routes to access Yonge Street, there isn't a strong need to widen 6<sup>th</sup> Line west of 20 Sideroad until a major piece of infrastructure such as a Highway 400 Interchange is built on 6<sup>th</sup> Line.

East of 20 Sideroad it is clear that an improvement such as road widening of 6<sup>th</sup> Line is needed to support development.

It is noted that in the West of Yonge Screenline, 7<sup>th</sup> Line is projected to have very little demand since it does not cross Highway 400. Even though the roadway capacity is there in the screenline, very little traffic will use this Road west of Yonge Street to divert away from congestion on Innisfil Beach Road and 6<sup>th</sup> Line.



**Table 4: Screenline Capacity Summary Table**

Eastbound	Total Capacity (vehicles per day)						
	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 2	Scenario 3	Scenario 4	Scenario 5
<b>Link / Screenline East of 400</b>							
Innisfil Beach Road	20,000	20,000	20,000	20,000	20,000	20,000	20,000
6th Line	5,000	6,500	6,500	10,000	6,500	10,000	20,000
<b>TOTAL</b>	<b>25,000</b>	<b>26,500</b>	<b>26,500</b>	<b>30,000</b>	<b>26,500</b>	<b>30,000</b>	<b>40,000</b>
<b>Link / Screenline West of Yonge</b>							
Innisfil Beach Road	20,000	20,000	20,000	20,000	20,000	20,000	20,000
7th Line	5,000	5,000	5,000	5,000	5,000	5,000	5,000
6th Line	5,000	6,500	6,500	10,000	6,500	10,000	20,000
<b>TOTAL</b>	<b>30,000</b>	<b>31,500</b>	<b>31,500</b>	<b>35,000</b>	<b>31,500</b>	<b>35,000</b>	<b>45,000</b>
<b>Link / Screenline East of Yonge</b>							
Innisfil Beach Road	20,000	20,000	20,000	20,000	20,000	20,000	20,000
7th Line	5,000	5,000	5,000	5,000	5,000	5,000	5,000
6th Line	5,000	6,500	6,500	10,000	6,500	10,000	20,000
<b>TOTAL</b>	<b>30,000</b>	<b>31,500</b>	<b>31,500</b>	<b>35,000</b>	<b>31,500</b>	<b>35,000</b>	<b>45,000</b>
<b>Link / Screenline East of 20 Sideroad</b>							
Innisfil Beach Road	13,000	13,000	13,000	13,000	13,000	13,000	13,000
7th Line	5,000	5,000	5,000	5,000	5,000	5,000	5,000
6th Line	5,000	6,500	6,500	6,500	5,000	6,500	13,000
<b>TOTAL</b>	<b>23,000</b>	<b>24,500</b>	<b>24,500</b>	<b>24,500</b>	<b>23,000</b>	<b>24,500</b>	<b>31,000</b>



**Table 5: Screenline Auto Volume Summary Table**

Eastbound	Auto Volume						
	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 2	Scenario 3	Scenario 4	Scenario 5
<b>East of 400</b>							
Innisfil Beach Road	23,666	23,674	23,038	22,869	22,518	22,010	20,960
6th Line	1,281	2,325	5,292	7,241	6,618	11,008	18,902
<b>TOTAL</b>	<b>24,947</b>	<b>25,999</b>	<b>28,330</b>	<b>30,110</b>	<b>29,136</b>	<b>33,018</b>	<b>39,862</b>
<b>Link / Screenline West of Yonge</b>							
Innisfil Beach Road	20,928	21,017	20,753	20,149	21,080	20,051	18,843
7th Line	324	226	27	0	51	4	0
6th Line	1,840	3,528	5,959	9,865	6,175	10,938	19,395
<b>TOTAL</b>	<b>23,092</b>	<b>24,771</b>	<b>26,739</b>	<b>30,014</b>	<b>27,306</b>	<b>30,993</b>	<b>38,238</b>
<b>East of Yonge</b>							
Innisfil Beach Road	23,516	23,128	23,147	22,599	22,822	22,166	21,440
7th Line	4,570	4,304	4,269	3,539	4,096	3,488	1,398
6th Line	4,454	6,097	7,065	11,317	7,024	11,229	19,065
<b>TOTAL</b>	<b>32,540</b>	<b>33,529</b>	<b>34,481</b>	<b>37,455</b>	<b>33,942</b>	<b>36,883</b>	<b>41,903</b>
<b>Link / Screenline East of 20 Sideroad</b>							
Innisfil Beach Road	22,438	22,574	22,875	22,896	22,955	22,955	19,888
7th Line	8,419	8,255	8,269	8,320	8,333	8,501	7,166
6th Line	7,876	8,213	7,858	7,968	7,883	8,044	17,141
<b>TOTAL</b>	<b>38,733</b>	<b>39,042</b>	<b>39,002</b>	<b>39,184</b>	<b>39,171</b>	<b>39,500</b>	<b>44,195</b>

**Table 6: Screenline Volume to Capacity Ratio Summary Table**

Eastbound	Volume / Capacity Ratio						
	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 2	Scenario 3	Scenario 4	Scenario 5
<b>East of 400</b>							
Innisfil Beach Road	1.18	1.18	1.15	1.14	1.13	1.10	1.05
6th Line	0.20	0.36	0.81	0.72	1.02	1.10	0.95
<b>TOTAL</b>	<b>1.00</b>	<b>0.98</b>	<b>1.07</b>	<b>1.00</b>	<b>1.10</b>	<b>1.10</b>	<b>1.00</b>
<b>Link / Screenline West of Yonge</b>							
Innisfil Beach Road	1.05	1.05	1.04	1.01	1.05	1.00	0.94
7th Line	0.06	0.05	0.01	0.00	0.01	0.00	0.00
6th Line	0.28	0.54	0.92	0.99	0.95	1.09	0.97
<b>TOTAL</b>	<b>0.73</b>	<b>0.79</b>	<b>0.85</b>	<b>0.86</b>	<b>0.87</b>	<b>0.89</b>	<b>0.85</b>
<b>Link / Screenline East of Yonge</b>							
Innisfil Beach Road	1.18	1.16	1.16	1.13	1.14	1.11	1.07
7th Line	0.91	0.86	0.85	0.71	0.82	0.70	0.28
6th Line	0.89	0.94	1.09	1.13	1.08	1.12	0.95
<b>TOTAL</b>	<b>1.03</b>	<b>1.06</b>	<b>1.09</b>	<b>1.07</b>	<b>1.08</b>	<b>1.05</b>	<b>0.93</b>
<b>Link / Screenline East of 20 Sideroad</b>							
Innisfil Beach Road	1.73	1.74	1.76	1.76	1.77	1.77	1.53
7th Line	1.68	1.65	1.65	1.66	1.67	1.70	1.43
6th Line	1.58	1.26	1.21	1.23	1.58	1.24	1.32
<b>TOTAL</b>	<b>1.68</b>	<b>1.59</b>	<b>1.59</b>	<b>1.60</b>	<b>1.70</b>	<b>1.61</b>	<b>1.43</b>

## Conclusion and Recommendations

Based on the 2031 horizon year analysis conducted for the 6<sup>th</sup> Line Environmental Assessment the following recommendations are made for improving 6<sup>th</sup> Line:

- Without the construction of the 6th Line / Highway 400 interchange:
  - County Road 27 to Sideroad 20 - reconstruction to 2 lanes
  - Sideroad 20 to St. John's - reconstruction and widening to 4 lanes
- With construction of the 6th Line / Highway 400 interchange:
  - County Road 27 to Sideroad 20 - widening to 4 lanes
  - Sideroad 20 to St. John's - reconstruction and widening to 4 lanes