Chapter 3

The Land Use & Transportation Connection

TABLE OF CONTENTS

TABLE OF FIGURES

3.1 THE LAND USE & TRANSPORTATION LINK

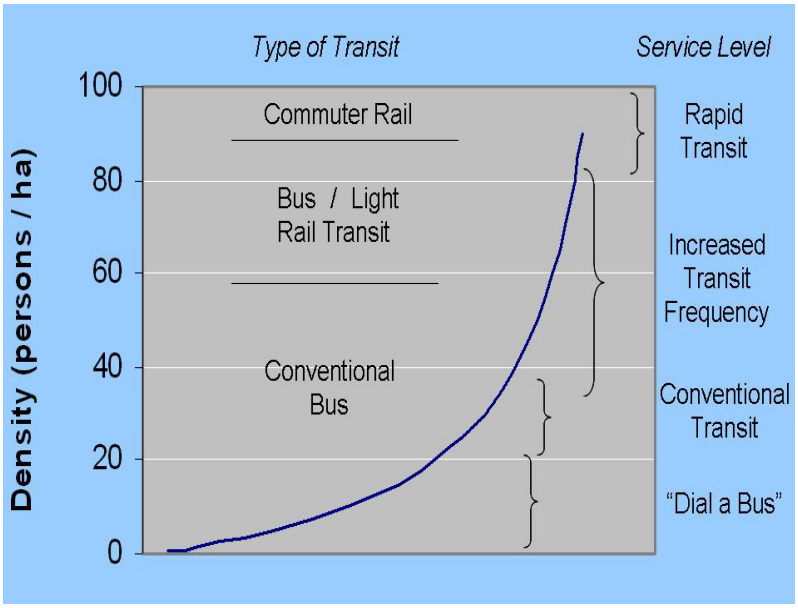
One of the key areas of integration between these two studies is the association between land use, built form and transportation. As a community grows, the location and form of growth will play a large role in defining the future transportation needs of the community.

Growth in a community can affect transportation needs in a number of ways. The location of new residential, employment, and commercial growth areas will define where the demand for travel will be in the future. Similarly, the manner in which these growth areas develop, will affect the decisions residents make with respect to how and how often they travel.

Lower density development patterns are difficult to efficiently serve by transit and tend to encourage increased auto ownership and auto usage. Residents feel that they need a car to facilitate daily travel needs (i.e. to work, school, or shopping) due to longer travel distances. The grouping of similar land uses within areas of a city can encourage more cross town travel to access designated employment or commercial areas.

More compact forms of development, on the other hand, tend to be more supportive and easier to serve by transit. Auto ownership levels and auto usage can be lower, in communities where infrastructure to support alternative transportation modes exists. Combining a mix of land uses within an area can significantly reduce average trip lengths as a wider range of goods, services, and employment opportunities are located within or near residential areas.

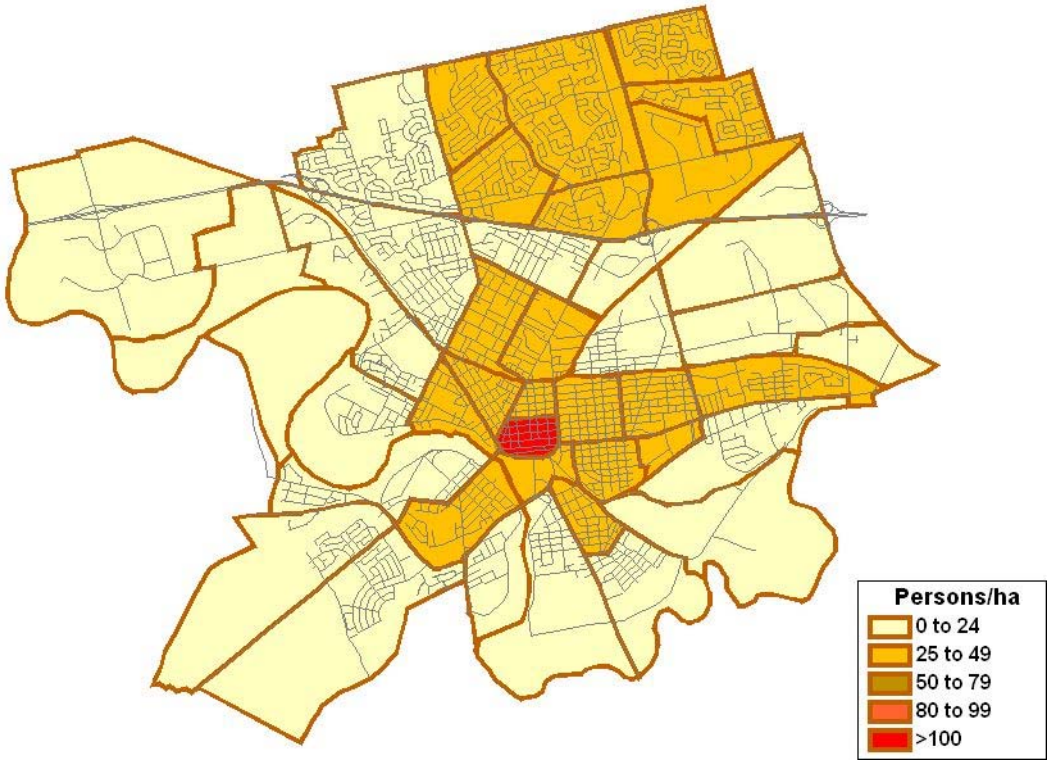
Figure 3.1 – Land Use Density to Support Transit Service



The link between higher densities and transportation sustainability has been widely recognized in the transportation planning research over the past decade, and figures prominently in the new "Places to Grow" Plan for the Greater Golden Horseshoe. The density of people or jobs within a community or area is one of the key determinants in assessing the feasibility or viability of transit service, as illustrated in **Figure 3.1**.

The density of the current land use pattern in the City of Brantford is illustrated in Figure 3.2, below, in terms of population and jobs per hectare. With the exception of the downtown area, the majority of the City is less dense than the guidelines for new growth areas outlined in the "Places to Grow" Plan, which specifies a target of 50 people or jobs per hectare for new development or "greenfield" areas.

Figure 3.2 – Current Population / Employment Density



The transportation implications of a relatively sparse development pattern can be observed in the relatively high reliance Brantford residents currently have with the automobile. Approximately 90% of peak hour work trips in the City are made by auto, followed by walking/cycling at 6% and transit at 3%.

Table 3.1 - Current Mode of Travel in Brantford - PM Peak Hour

Mode of Travel	Share of Work Trips
Auto - Driver	81%
Auto - Passenger	9%
Transit	3%
Walk / Cycle	6%
Other	1%

3.2 POPULATION & EMPLOYMENT GROWTH FORECASTS

3.2.1 Proposed Places to Grow Plan Forecasts TO 2031

The Greater Golden Horseshoe (GGH) is one of the fastest growing regions in North America, covering an area that includes Peterborough, Barrie, Toronto, Kitchener-Waterloo, and south to Niagara. Over the next 25 years, the population forecast for the GGH area will see it grow to approximately 11.5 million people. The proposed "Places to Grow Plan" for the Greater Golden Horseshoe, has been developed by the provincial government, in an effort to control and plan this future growth in a sustainable manner. The City of Brantford is located within the Greater Golden Horseshoe, and is designated as one of only nine designated Urban Growth Centres within the "Outer Ring" municipalities that surround the Greater Toronto Area. This 'outer ring' is expected to accommodate an additional 900,000 people by 2031.

3.2.2 Population and Employment Forecasts for Brantford

In 2001, the City of Brantford was home to 86,000 residents, and provided approximately 37,200 jobs for the city and surrounding communities[1]. Brantford has experienced steady growth over the past 5 years and the estimated base population in 2006 has grown to approximately 93,000. Total employment in the City is currently estimated at 42,800.

The City of Brantford has completed population, household, and employment projections to the years 2031 and 2046. These projections are based on the work carried out by CN Watson & Associates as part of the Development Charges Background Study that was completed in 2004. A further description of this study is outlined in the Phase 1 Background Report for the Official Plan Review.

The population of the City of Brantford is projected to increase from 93,000 in 2006 to 132,000 in 2031; a growth of 39,000 people. The number of jobs in the City of Brantford is projected to increase from 42,800 in 2006 to 70,000 in 2031. Employment growth is forecast to be comprised of the following four employment sectors.

Population and Employment Forecast for 2031
Population 132,000
Employment 70,000

Table 3.2 – Growth in Employment by Job Sector[2]

Job Sector	Employment Growth
Industrial - Includes manufacturing, construction and resource based industries	10,100
Population-related - Includes finance, real estate, retail/commercial employment and any other services to serve the population	8,500
Institutional - Includes employment in health and education services	6,500
Work At Home - Includes work at home jobs, such as home offices/self-employment	2,100
Total Employment Growth to 2031	27,200

[1] Statistics Canada
[2] Draft - Phase 1 Background Report – Official Plan Review, MHBC Planning, Feb 2006

Between toady and 2031, growth in population and employment is expected to develop in a relatively uniform fashion. Forecasts developed as part of the Official Plan Review have estimated the total forecast population and employment for the City, for the 2011 planning horizon at 100,557 and 45,453 respectively. For the 2016 planning horizon, the total forecast population and employment for the City is estimated at 108,493 and 50,557 respectively. For the 2021 planning horizon, the City is forecast to grow to a population of 115,394 residents and 57,051 jobs. **Table 3.3** summarizes the population and employment forecasts for the City by horizon year. A detailed breakdown of the population and employment forecasts by traffic zone for each horizon year is included in Appendix E.

Table 3.3 – Population and Employment Forecasts by Horizon Year[3]

Horizon	Population	Employment
2006	93,000	42,800
2011	100,600	45,500
2016	108,500	50,600
2021	115,400	57,100
2031	132,000	70,000

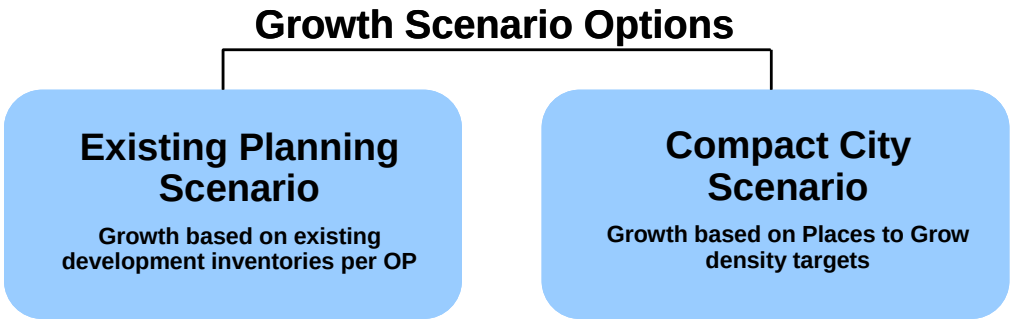
[3] Numbers have been rounded to nearest 100.

3.3 GROWTH SCENARIO OPTIONS

The Provincial Policy Statement provides that municipalities may plan to accommodate growth projected for a time horizon of up to 20 years or a time horizon consistent with a Provincial growth plan. The proposed Places to Grow Plan has a time horizon to the year 2031. This is the time horizon recommended for the Official Plan Review and the Transportation Master Plan.

Two development scenarios have been identified for build-out within existing City of Brantford municipal boundaries and are described as follows:

Figure 3.3 – Growth Scenario Options



The 'Existing Planning Scenario' is based on existing inventories of known infilling projects as well as current estimates of development in residential greenfield areas in accordance with the current Official Plan. This scenario would result in an ultimate population at total build-out to City boundaries of approximately 124,000 people. Full build out is forecast to occur by 2026. For the Existing Planning Scenario, additional population growth beyond 2026 would need to be accommodated outside of the current City boundaries, within Brant County.

The 'Compact City Scenario' is based on the intensification and density targets contained within the proposed 'Places to Grow Plan'. For example, the capacity of greenfield areas has been adjusted based on 50 people or jobs per gross hectare. Downtown density has been estimated at 150 people or jobs per hectare. A minimum of 40 percent of future residential units have been assumed to be provided through intensification within the built-up area. The Compact City Scenario can accommodate the 2031 forecasted population within existing boundaries and would result in an ultimate build out at a population of 140,600, forecast to occur by 2036.

Since the City of Brantford acts as an employment centre for the entire City-County area, the employment forecasts for each scenario are assumed to be the same.

3.3.1 Distribution of Growth

As noted previously, the transportation system is not only affected by the total growth in population and employment within a community, but is also affected by the location and form of growth that occurs. For the purpose of forecasting transportation demands,

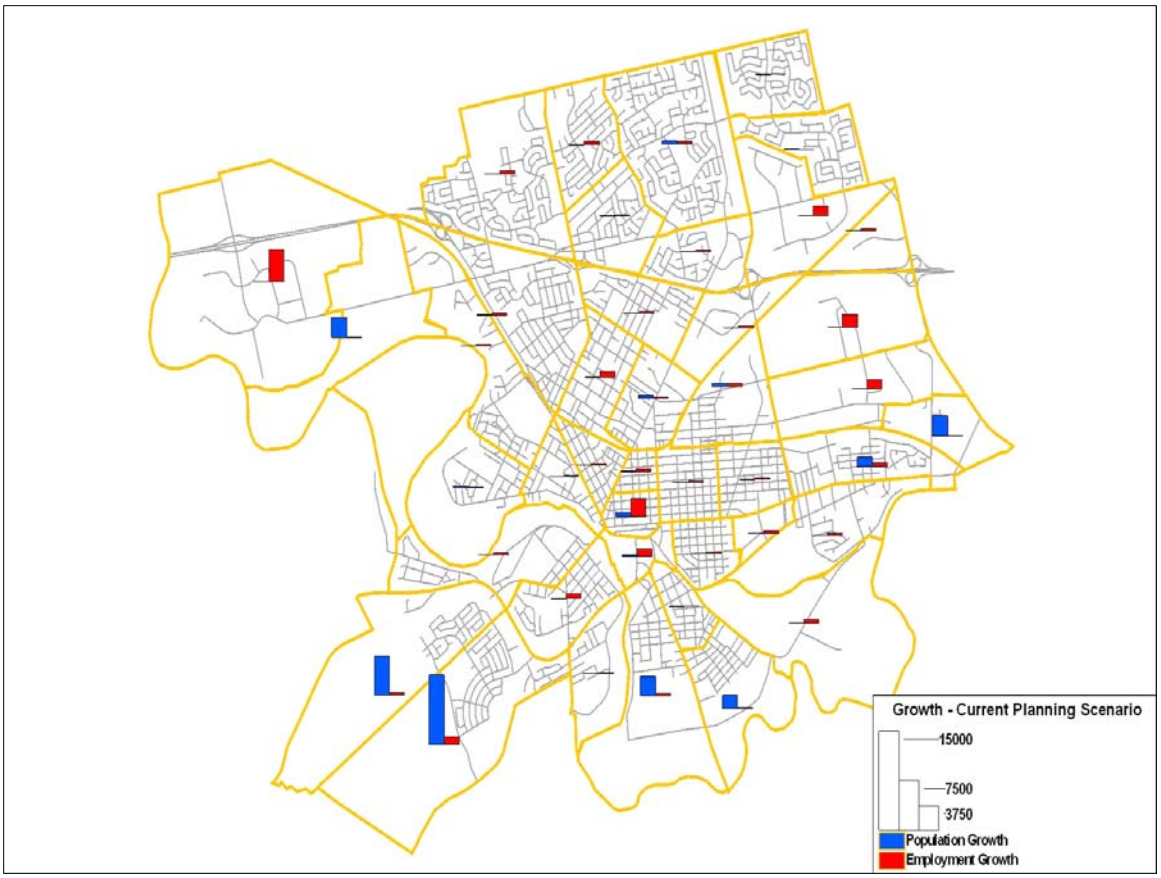
future population and employment is distributed to a series of Traffic Zones across the City, which represent areas or neighbourhoods with similar land uses and physical boundary constraints. There are 43 Traffic Zones within the City of Brantford and 6 are located in areas outside the City.

Two land use development scenarios were identified for build-out within existing City of Brantford municipal boundaries.

The ***'Existing Planning Scenario'*** represents growth in accordance with current planning policies, existing inventories of known infilling projects, and current estimates of development in residential greenfield areas. This scenario would result in an ultimate population at total build-out to City boundaries of approximately 124,000 people, which would occur by 2026. For the Existing Planning Scenario, additional population growth beyond 2026 would need to be accommodated outside of the current City boundaries, within Brant County. For the purpose of forecasting future travel demands, this growth of approximately 8,000 people was assumed to occur to north of the current City boundaries.

Future population and employment growth in the City was allocated to the various traffic zones by City staff based on the City's Residential Monitoring Map (July 1, 2005), the Vacant Industrial Land Map (September, 2005), and known development areas within the City. This growth distribution is illustrated in Figure 3.4.

Figure 3.4 – Existing Planning Growth Scenario

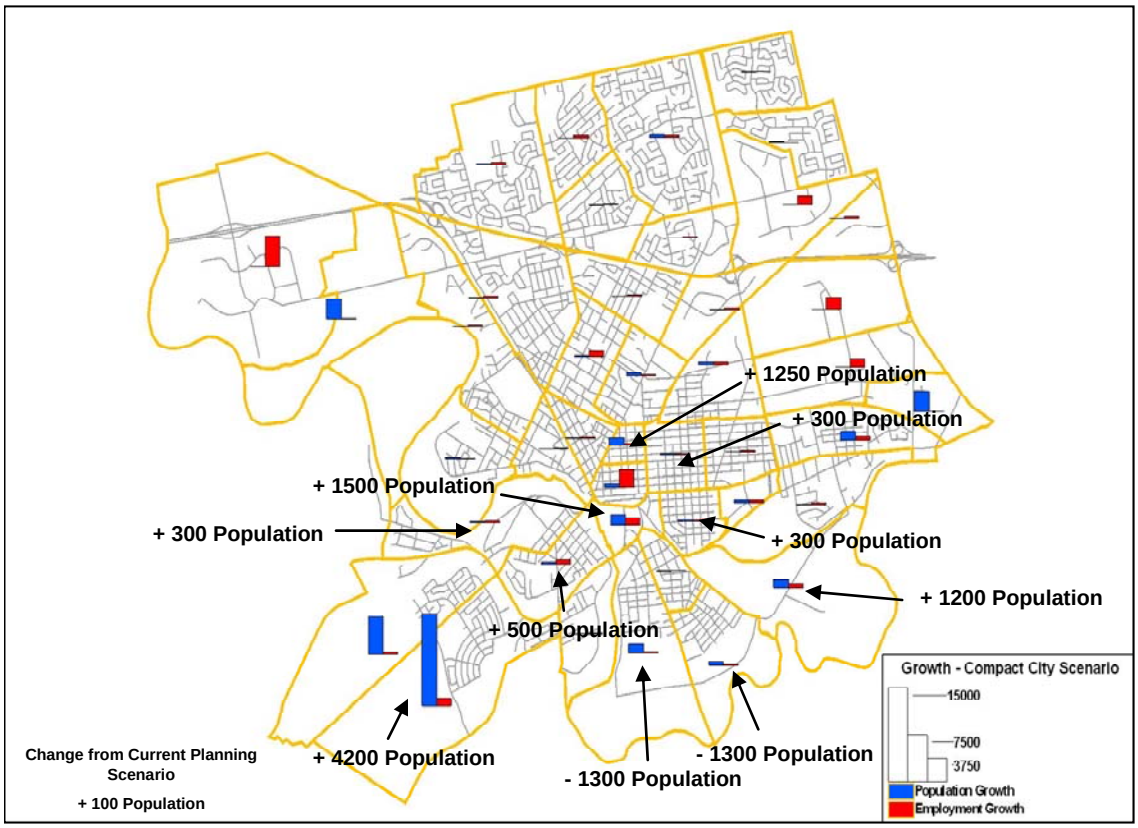


Approximately 75% of the forecasted growth in population would be accommodated through new Low Density, single family housing units. Approximately 15% of new residential units would be classified as medium density and 10% of the growth would be accommodated in high density residential units[4].

The ***'Compact City Scenario'*** is based on the intensification and density targets contained within the proposed 'Places to Grow Plan'. The Compact City Scenario can accommodate the 2031 forecasted population within existing boundaries and would result in an ultimate build out at a population of 139,200, forecast to occur by 2036.

For residential Greenfield areas, new development must achieve 50 persons and jobs per hectare. Within the existing City built up area, it is assumed that 6,600 new residents would be accommodated in areas identified for infilling based on the City's Residential Monitoring Map (July 1, 2005). Approximately 3,400 new residents would be directed into the Urban Growth Centre which includes the existing downtown area to achieve a downtown density of approximately 150 people or jobs per hectare, as outlined in the 'Places to Grow Plan'. A minimum of 40 percent of future residential units have been assumed to be provided through intensification within the built-up area, resulting in another 6,000 residents who would be allocated to various brownfield redevelopment areas and along major transportation corridors, such as King George Road, Park Road North, West Street, and Charing Cross Street. This future growth distribution and the major areas where there is a change in population compared to the Current Planning Scenario is illustrated in Figure 3.5.

Figure 3.5 – Compact City Growth Scenario



[4] Draft - Phase 1 Background Report – Official Plan Review, MHBC Planning, Feb 2006

For the Compact City Scenario, the share of growth accommodated by low density residential would drop to 47%, with 22% of the growth comprised of medium density units and 31% within high density units[5].

3.4 TRANSPORTATION ASSESSMENT

Based on the distribution of future population and employment for each growth scenario, future forecasts of travel demand were prepared using the Transportation Model, developed for use in this study. The Strategic Transportation Model forecasts travel demands for the PM Peak hour based on observed travel patterns from the 1995 Household Survey and 2001 Census Place of Residence/ Place of Work Data. An overview of the Transportation Model was provided in Section 2 of this report, and a full summary report is provided in Appendix D.

Initial forecasts of travel demands were undertaken assuming no base change to existing patterns of transit usage in the City. Existing transit use during the PM Peak hour is estimated at 3% of total trips. Since one of the main purposes behind intensification is the encouragement of more transit usage, a second assessment of the transportation demands associated with the Compact City Scenario assumed an increase in the transit mode share to 7% of Peak Hour demands. It should be noted that the increase in transit mode share was applied on a global basis for this preliminary assessment, pending the development of targeted transit strategies in Phase 3 of the Transportation Master Plan project.

Table 3.3 provides a summary of the future PM peak hour transportation demands associated with each land use scenario. For the Current Planning Scenario, the increase in demand will represent an annual growth of 2% per year in auto trips during the PM peak hour, which is similar to current observed growth patterns. Transit demand during the same period is expected to almost double, without increasing the share of trips taken by transit.

Table 3.4 – Comparison of Future PM Peak Hour Travel Demands

Scenario	2005 Base	2031 Current Planning Scenario 3% Transit	2031 Compact City Scenario 3% Transit	2031 Compact City Scenario 7% Transit
Total Auto Trips	35,568	58,392	58,793	56,442
Total Transit Trips	1,100	1,806	1,818	4,248

The Compact City Scenario offers similar growth forecast results, although the overall number of trips is slightly higher, due to slightly higher trip generation rates for traffic zones in the City, than in the outlying areas. The number of trips made by transit is also similar under this scenario, assuming no increase to the transit mode share. If the transit model share was improved to 7% of PM peak hour trips, the overall transit

[5] Draft - Phase 1 Background Report – Official Plan Review, MHBC Planning, Feb 2006

demand would increase by 285% over today's demand which would require an annual increase in peak hour ridership of 5.6% per year. The auto growth rate would lower slightly to 1.8% per year.

To compare the capacity implications of the various growth scenarios, the travel demands were assigned to the road network using the Strategic Forecasting Model. A series of screenlines were established along various key corridors in the City to assess the overall demands and available capacity of the road network.

A screenline is an imaginary line that typically bisects a city or a portion of a City and is used to represent the overall flow across a series of roadways serving the same general demand pattern. Screenlines are often established based on the location of major barriers (i.e. Grand River) or along major road corridors (i.e. Highway 403), where the number of crossing points are well defined. There were 5 major screenlines established in the City of Brantford, along Powerline Road, Highway 403, the Grand River, the CN RAILWAY LINE Rail Line, and Wayne Gretzky Parkway. Another 5 minor screenlines were established to assess localized travel demands in certain segments of the City.

Figure 3.6, illustrates the total volume to capacity ratios at each of the screenlines for the Current Planning Scenario, assuming a continuation of the current 3% transit mode split. **Figures 3.7 and 3.8** illustrated the resulting volume to capacity ratios at each of the screenlines for the Compact City Scenario (with 3% Transit and 7% Transit respectively).

Figure 3.6 – Screenline Deficiencies – Existing Planning Scenario – 3% Transit

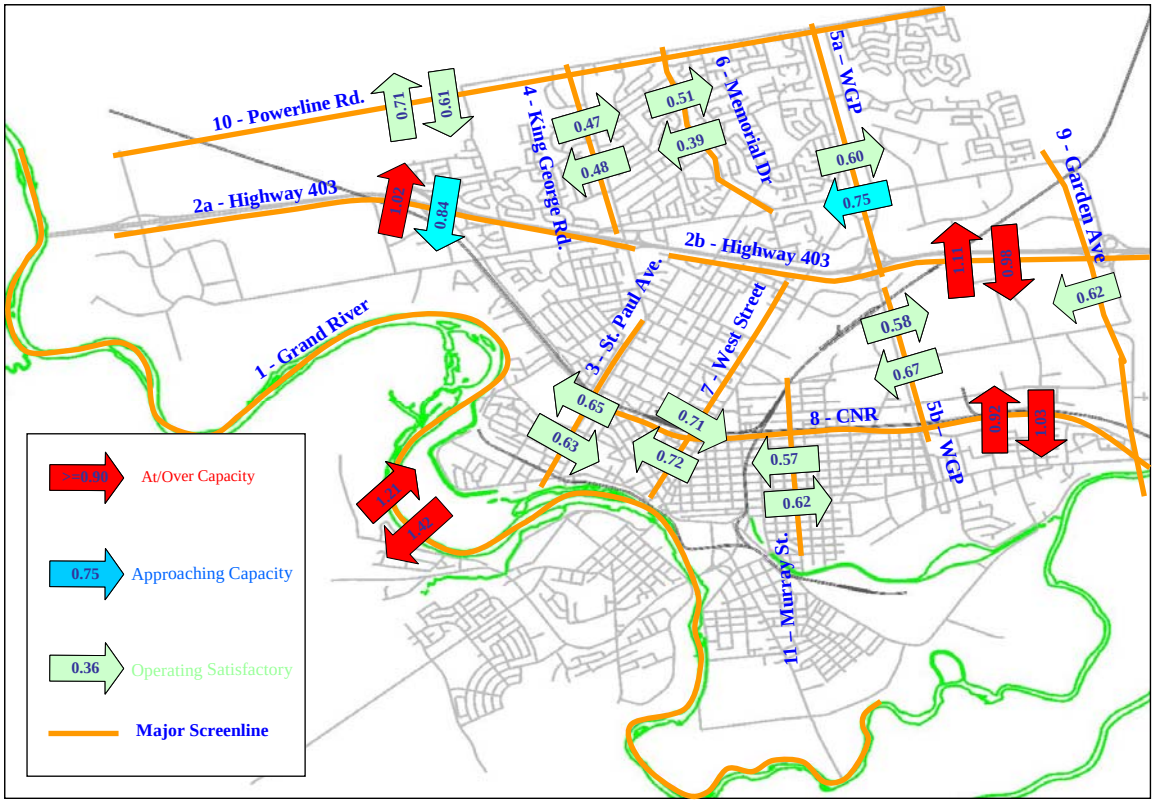


Figure 3.7 – 2031 Screenline Deficiencies – Compact City Scenario – 3% Transit

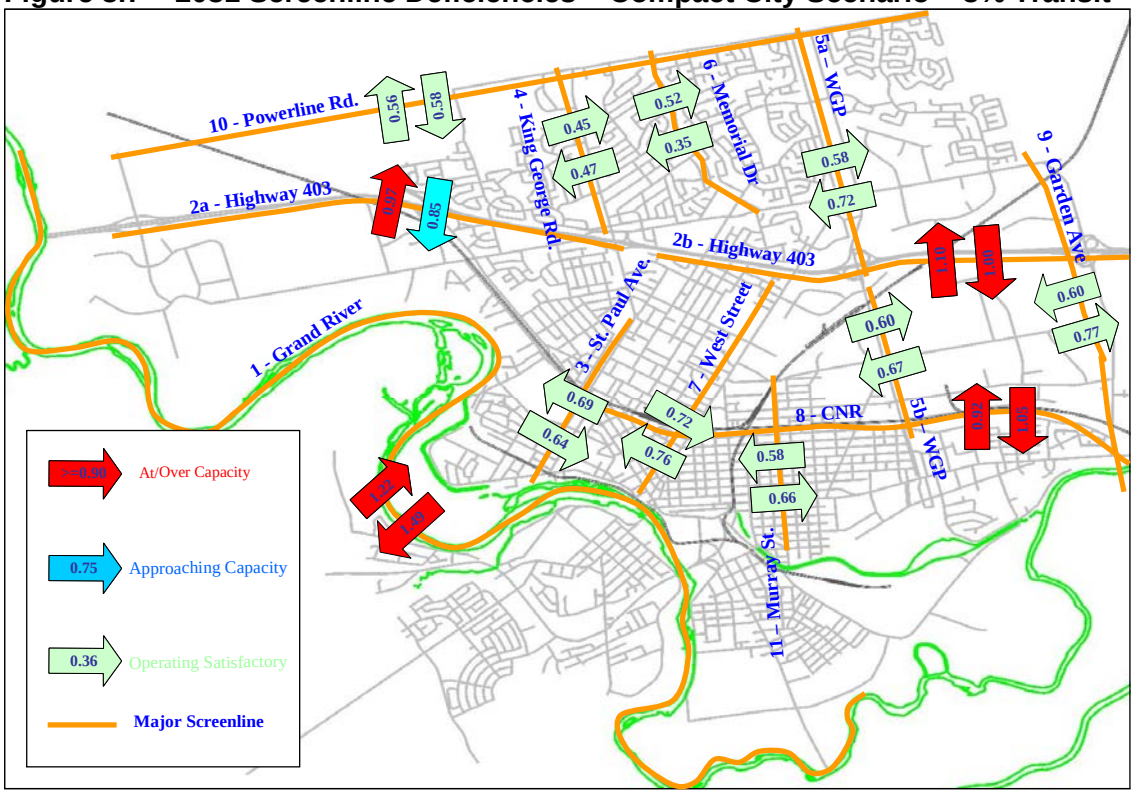
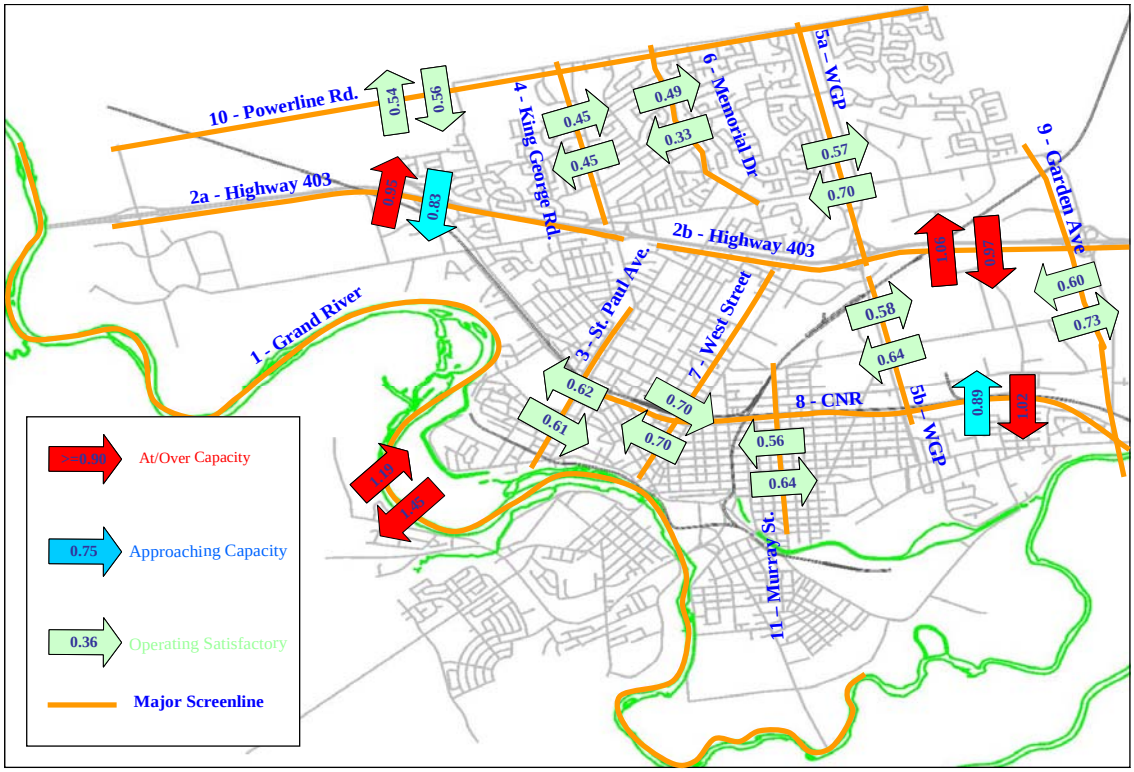


Figure 3.8 – 2031 Screenline Deficiencies – Compact City Scenario – 7% Transit



For each of the 3 model runs, screenline 1 (Grand River) and screenline 2 (Highway 403) are both forecast to be over capacity by 2031, and many of the individual roadways crossing each screenline are forecast to be operating well over their theoretical capacity. The Current Planning Scenario shows slightly worse results on the Highway 403 screenline due to the additional population growth to the north assumed to reside to the north of the City.

The results for the Compact City Scenario are marginally better on this screenline, since more of the growth is contained within existing growth areas, with higher densities and therefore, higher population forecasts. This is particularly noticeable in the existing Southwest Growth Area, where the additional population density results in a higher demand crossing the Grand River screenline, which is forecast to operate at a volume to capacity (v/c) ratio of approximately 1.49 in the peak direction at current transit usage levels. All of the City arterial roads crossing this screenline are forecast to be operating at or over capacity. The results for both of these scenarios are only marginally improved when the transit mode split is improved to 7%.

The CN Railway Line and Highway 403 screenlines are also forecast to operate at or over capacity for the 2031 horizon, although some of the key arterial roadways making up these screenlines are forecast to exceed their theoretical capacities by 2031.

Table 3.4, below, provides a further comparison of the growth scenarios in terms of the average trip lengths. For all of the growth scenarios, the average trip lengths are forecast to get longer as a result of continued growth in the Greenfield areas around the edges of the City. From a base of 8.7 km today, average trip lengths are to increase to 10.6 km under current planning conditions. This reduces to 10.3 km with the Compact City Scenario. While this difference does not appear too great, the major differences can be seen in the shorter trip lengths. For the Compact City Scenario, there is a higher proportion of trips in the 0-5 km range, representing increased opportunities for shifting to transit, walking /cycling, and other non-auto modes of travel. On a total future demand of close to 59,000 PM Peak hour trips, this difference translates into about 1,200 new trips in the 0-5km distance range for the Compact City Scenario. There is also a moderate difference in the share of trips in the 5-10 km range as well, with the Compact City Scenario showing better results.

Table 3.4 – Comparison of Future PM Peak Hour Travel Demands

Scenario Trip Length (Km)	2005 Base Percentage	2031 Current Planning Scenario Percentage	2031 Compact City Scenario Percentage
0-5	46.7%	29.4%	31.4%
5-10	22.5%	25.4%	26.7%
10-15	14.4%	21.8%	20.7%
15-20	3.8%	6.5%	5.8%
20-25	6.3%	8.9%	8.2%
25-30	4.3%	4.9%	4.6%
30-35	1.0%	2.1%	1.6%
>35	1.0%	1.0%	1.0%
Total	100.0%	100.0%	100.0%
Average Trip Length (km)	8.7	10.6	10.3

The transportation assessment of the various growth alternatives found that the increased density of land uses for the Compact City Scenario would improve the ability to service the City efficiently with transit, by reducing long route structures through low density neighbourhoods. The higher proportion of short trip lengths, while offering a modest difference from current planning trends, does introduce additional trips that could be served by improved transit, walking, and cycling facilities. The higher density of population and employment within the downtown area also represents a potential opportunity to implement enhanced transit services in this area and should promote a more walkable downtown.

The Compact City growth scenario offers slight improvements to the volume to capacity ratio of the Highway 403 screenline versus the Current Planning scenario, although this is somewhat offset by slightly worse performance on the Grand River screenline. Both of these screenlines are critical as they represent major barriers to mobility between sections of the City, and would typically require costly improvements to address future capacity deficiencies.

It must be recognized, however, that implementing more effective forms of land use will not solve future transportation problems by itself. Based on the Compact City Growth Scenario, PM peak hour travel demands will still increase by 72% over today.

The land use assessment found that, without a noticeable increase in transit ridership or use of other alternative modes of transportation, increased traffic congestion could result on many major road corridors within the City.