



ARGYLE STREET BRIDGE

TRAFFIC STUDY

Prepared For:

Haldimand County

Prepared By:

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EXECUTIVE SUMMARY

The Ministry of Transportation of Ontario (MTO) is currently conducting a study of upgrading or replacement of the Argyle Street Bridge in Caledonia. This study is being conducted in consultation with Haldimand County, the authority responsible for municipal roadways in Caledonia. In conjunction with the Ministry's study of the bridge structure, Haldimand County has conducted this traffic study to examine the existing and future traffic conditions in the Argyle Street Bridge corridor and to assess the potential benefits of replacing the existing bridge with a structure providing three roadway lanes across the Grand River.

The Argyle Street Bridge is a critical link in the Caledonia area roadway network. Most traffic activity in Caledonia that needs to cross the Grand River uses this roadway link. The current traffic volumes using the bridge are as follows:

- ▲ About 710 vehicles per hour (vph) northbound and 515 vph southbound during the AM peak hour.
- ▲ About 1,110 vph southbound and 615 vph northbound during the PM peak hour.

The planned development pattern in Caledonia is based on most additional residential development occurring on the south and southeast areas of the community. Future development is also planned for the northeast area of Caledonia but this development is expected to occur later due to the lack of sanitary sewer service capacity to this area. The primary future industrial/commercial vacant land areas in Caledonia are on the north side of the community. Also, since Caledonia traffic tends to be oriented to the north, the additional development in the community will increase the volume of peak hour traffic using the Argyle Street Bridge across the Grand River. Over the next 10 years, an additional 1,400 new residential housing units are expected to be developed in the areas on the south and southeast periphery of the community. In the longer term, in about 25 to 30 years, development of the designated growth areas in Caledonia will result in at least an additional 3,800 residential units in addition to existing development.

The planned future growth will result in a significant increase in peak hour traffic demand in the Argyle Street Bridge corridor as follows:



- ▲ The 10 year traffic forecast anticipates the AM peak hour traffic volume increasing to about 1,165 vph northbound and about 695 vph southbound and the PM peak hour volumes increasing to about 1,515 vph southbound and 915 vph northbound.
- ▲ The long term traffic forecast anticipates an unconstrained PM peak hour traffic demand of about 1,935 vph southbound and 1,045 vph northbound on the Argyle Street Bridge corridor. It is recognized that this demand can not be accommodated in the corridor and the actual “constrained” traffic volumes that would utilize the bridge would be lower due to traffic diverting to alternate routes to cross the river.

The amount of additional capacity that can be provided on the Argyle Street Bridge corridor is constrained by a number of specific features of the roadway corridor, including:

- ▲ The two roadway lanes on the bridge.
- ▲ The 20 metre roadway right-of-way through the business area of the town in the vicinity of the Argyle Street and Caithness Street intersection.
- ▲ The on-street traffic operational features of Argyle Street, north and south of Caithness Street.

This study has assumed that the provision of a new three lane bridge is possible and feasible as part of the MTO project. However, with the considerable amount of commercial building development immediately adjacent to the Argyle Street right-of-way from the Bridge north through the central business area to Sutherland Street, it is assumed that it is not feasible to widen the existing travel portion of the Argyle Street roadway beyond the current limits. However, there are aspects of the Argyle Street traffic operations such as on-street parking, traffic control signals and turning provisions that could be changed to provide improved traffic operations in the corridor and it is assumed in this study that these changes are feasible.

The study has reviewed the capability of the current Argyle Street Bridge corridor to accommodate the anticipated 10 year traffic volumes with no changes to the Bridge and related roadway configuration. The assessment determined that the AM and PM peak hour traffic conditions would deteriorate significantly with no improvements to the corridor and the resulting traffic congestion would not be acceptable to motorists.

Three alternative improvement schemes for the corridor were assessed that are based on the Argyle Street Bridge being widened to three lanes and other related traffic operational improvements such as restrictions to on-street parking on Argyle Street, improved or modified traffic control in the corridor and restrictions on some turning movements at the intersection of Argyle Street and Caithness Street. The study found that all three of the alternatives considered would provide improvements in the peak hour traffic conditions when compared to the “do nothing” alternative. One alternative, based on three lanes on the bridge, on-street parking restrictions on Argyle Street and left turning restrictions at the intersection of Argyle Street and Caithness Street, was found to provide peak hour level of service conditions with the 10 year traffic volumes that are similar to the current level of service conditions in the corridor. Figure ES.1 below provides an illustration of this traffic plan for the corridor that utilizes a new three lane bridge along with a number of traffic operational



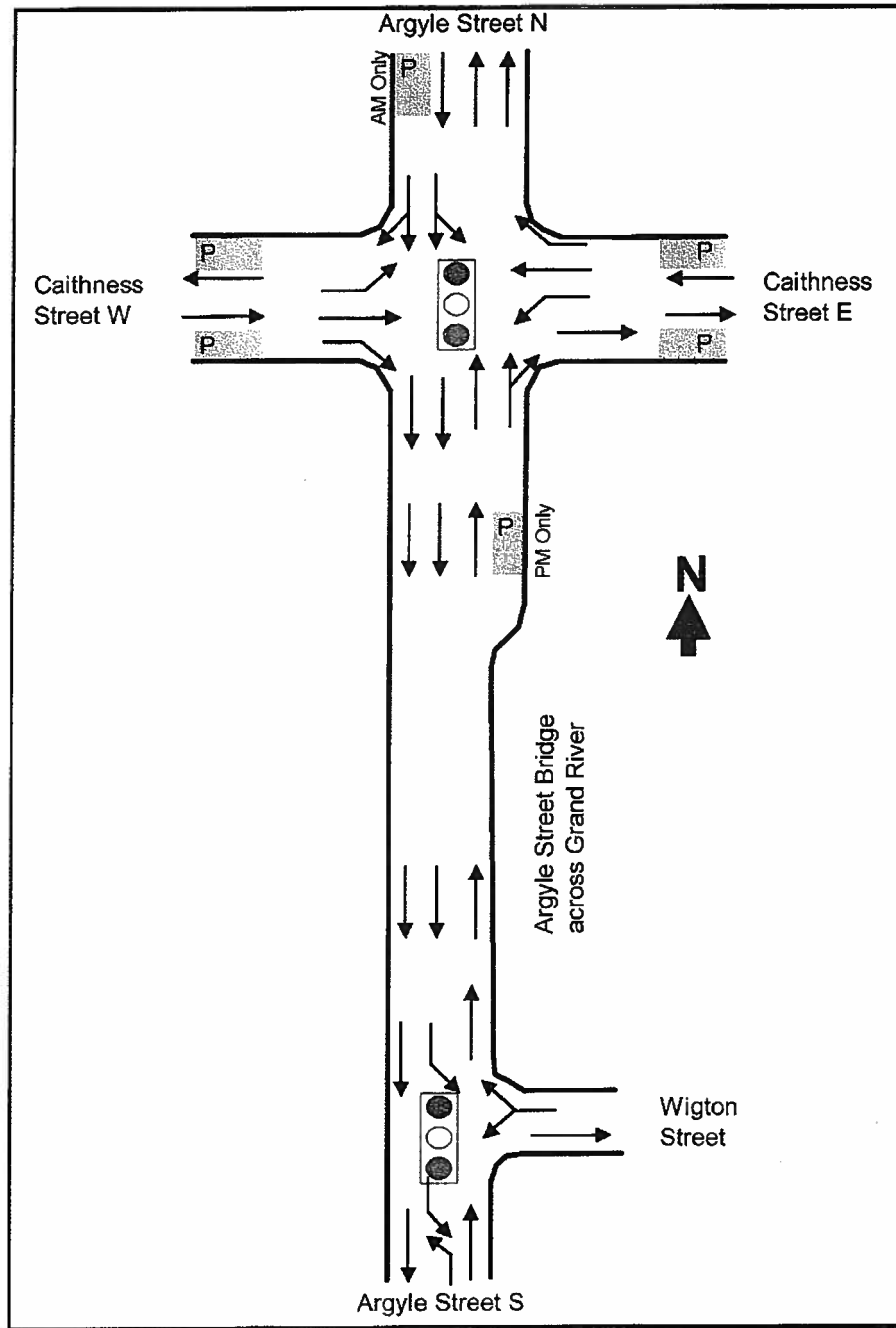
changes to provide increased peak hour traffic capacity in the Argyle Street corridor.

In conclusion, the study has found that the widening of the Argyle Street Bridge to three lanes will enable a significant amount of additional peak hour roadway capacity to be provided that would enable the anticipated traffic growth over the next 10 years to be accommodated.

However, traffic operational changes, such on-street parking restrictions on Argyle Street and turning restrictions at the intersection of Argyle Street and Caithness Street will be required to take full advantage of the widened bridge structure. The study has not included consultation with the various stakeholder groups and this will be necessary before a specific traffic plan can be recommended. The study has also found that the widening of the Argyle Street Bridge to three lanes does not provide sufficient river crossing capacity to accommodate longer term traffic growth associated with the anticipated 25 year to 30 year planned development in Caledonia.



FIGURE ES.1: EXAMPLE OF IMPROVED TRAFFIC CONCEPT
UTILIZING THREE LANE ARGYLE STREET BRIDGE





1.0 INTRODUCTION

The Argyle Street Bridge across the Grand River is a critical link in the roadway network in the Town of Caledonia. This bridge provides the only river crossing within the town and accommodates the original Highway 6 route connecting Hamilton to the Lake Erie area. The structure is approximately 80 years old and is in need of repair or replacement. The Ministry of Transportation of Ontario (MTO) is undertaking a structural engineering study of the bridge with a view to developing a plan for a major rehabilitation or replacement of the existing bridge. This study is being carried out in close consultation with Haldimand County as the County anticipates assumption of ownership of the bridge when the upgrading project by the MTO is completed.

Recognizing the important transportation function of the Argyle Street Bridge, the MTO and Haldimand County are concerned that the new or upgraded bridge will accommodate future traffic needs in an efficient manner. Paradigm Transportation Solutions Ltd has been retained by the County to carry out a traffic study to assess existing and future traffic conditions and to investigate the benefits of increasing the number of lanes on the bridge. The intent of this study is not to identify a recommended traffic plan for the corridor but to determine if the provision of a third traffic lane on the Bridge provides overall capacity improvements in the Argyle Street corridor.

This report documents the findings of the traffic study. The study approach was based on utilizing the available information on traffic and future development as provided by the County and others. Haldimand County is currently preparing a Master Servicing Plan for Caledonia that is investigating the required services for the full development of the designated urban lands in Caledonia. The long term traffic forecasts from that study have been utilized for this study. However, further specific traffic forecasts have been prepared for a 10 year horizon based on recent growth forecasts prepared by the County.

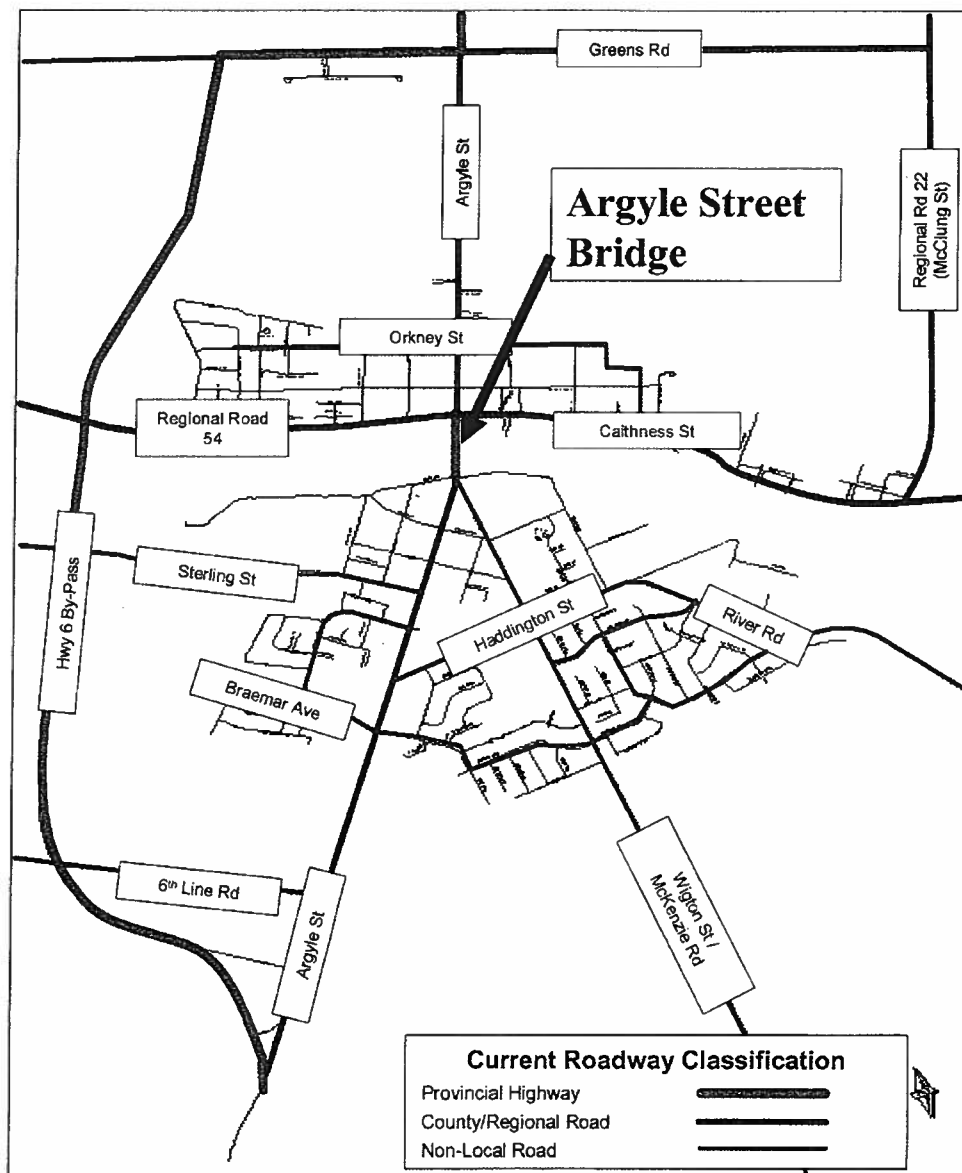


2.0 EXISTING CONDITIONS

2.1 Existing Roadways

The location of the Argyle Street Bridge is shown in Figure 1 below. The bridge provides a roadway connection across the Grand River for Argyle Street which was part of the original Provincial Highway 6 route from Hamilton to the Port Dover area. The bridge itself spans approximately 200 metres across the Grand River, providing one roadway lane in each direction with a separate outside sidewalk on each side of the bridge arches.

FIGURE 1: LOCATION OF ARGYLE STREET BRIDGE





The key roadways in the vicinity of the bridge are discussed below:

- ▲ Argyle Street provides the only continuous north-south route through the town.
 - Argyle Street has a constrained right-of-way and cross-section through the business area north of the river. The building face to building face right of way is approximately 20 metres while the actual pavement width is about 13 metres. In this area, there is limited 2 hour parking available on each side of Argyle Street both north and south of Caithness Street. At the signalized intersection of Argyle Street and Caithness Street, the northbound and southbound approaches have separate right turn, through and left turn lanes. These lanes are approximately 2.6 metres in width with about 14 metres of vehicle storage length available in the right and left turn lanes. North of the business area, Argyle Street has one lane in each direction and a centre turn lane. South of Greens Road/Highway 6 intersection, Argyle Street widens to two lanes in each direction and this lane configuration continues north to the existing Highway 6, north of Greens Road.
 - South of the River, Argyle Street has one lane in each direction with a centre turn lane. There is existing residential and commercial development along Argyle Street south to the current limit of development. Further south, the street has a rural two lane cross-section.
- ▲ Caithness Street is a major east-west street through Caledonia along the north side of the Grand River and it continues as County Road 54 further to the east and the west. It has a basic two lane cross-section throughout. At the signalized intersection of Caithness Street and Argyle Street, Caithness has separate right turn, through and left turn lanes on each approach. These lanes are approximately 2.6 metres in width with about 14 metres of vehicle storage length available in the turn lanes. There is two hour parking on each side of Caithness Street within the business area.
- ▲ Immediately north of the bridge, there is a public parking lot access connection to the west side of Argyle Street. This parking lot also has access to Caithness Street, west of Argyle Street.
- ▲ Forfar Street is a local street intersecting Argyle Street on the south side of the bridge. On the east side of Argyle Street, it provides two way access to a utility building, local parkland and a few residences. On the west side of Argyle Street it is one way westbound, providing access to some residential development along the river. The intersection with Argyle Street is controlled by stop signs on Forfar Street.
- ▲ Wigton Street is a two lane collector standard street connecting to the east side of Argyle approximately 50 metres south of the Forfar Street intersection. Wigton Street provides a roadway connection to the southeast area of Caledonia and continues beyond the town as McKenzie Road. The intersection with Argyle Street is controlled by stop sign control on Wigton Street.
- ▲ The only other crossing of the Grand River in the vicinity of Caledonia is the Highway 6 bypass route west of the town. This route is a two lane Provincial highway with an

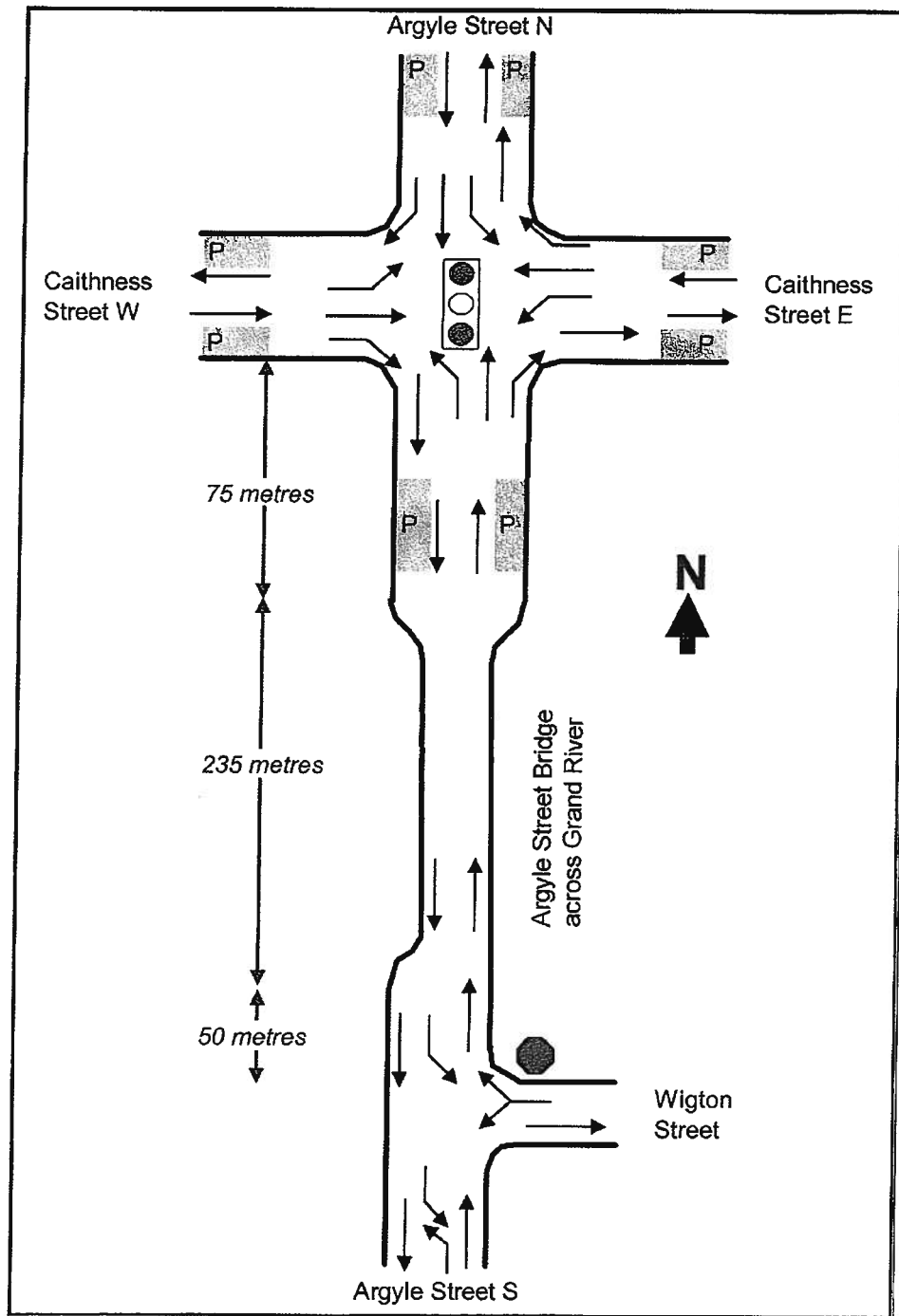


intersection with Argyle Street south of Caledonia and an intersection with Greens Road on the north side of the town. It is not heavily utilized by Caledonia traffic to cross the river since it involves a detour of at least several kilometres for most trips.

The traffic conditions related to the Argyle Street river crossing are controlled primarily by the operation of the intersection of Argyle Street and Caithness Street within the Caledonia business area and to a lesser extent by the intersection of Argyle Street and Wigton Street on the south side of the river. Figure 2 below provides an overview of the lane configuration and traffic control on the primary roads within this area. Forfar Street and the parking lot connection to Argyle Street are not shown since the traffic volumes are very low at these locations.



FIGURE 2: EXISTING LANE CONFIGURATION AND TRAFFIC CONTROL

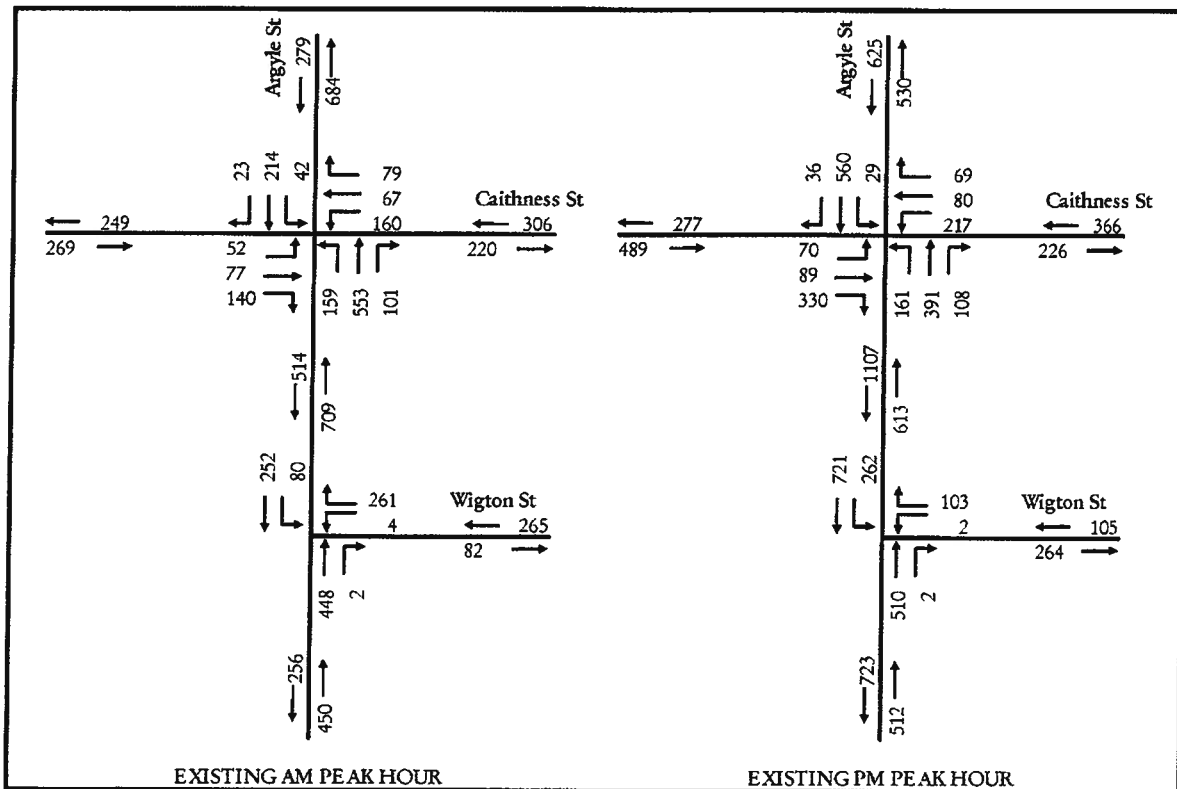




2.2 Existing Traffic Volumes

The existing traffic volumes at the key intersections at either end of the Argyle Street Bridge have been estimated based on weekday turning movement counts provided for Haldimand County for the intersection of Argyle St and Caithness St (count conducted September 2002) and the intersection of Argyle St and Wigton St (count conducted July 2002). The 2002 traffic volumes were checked with counts at other adjacent intersections and were increased by 2% to represent existing (2004) conditions. A daily traffic volume count was conducted in October 2004 on Forfar St to confirm the general traffic levels. This count indicated that the daily traffic volumes on Forfar St are about 780 vehicles per day on the east side of Argyle St and about 290 vehicles per day on the west side of Argyle St. Since the traffic volumes are so low on Forfar St it has not been included in the traffic analyses. The existing AM and PM weekday peak hour traffic volumes are shown in Figure 3 below.

FIGURE 3: EXISTING WEEKDAY PEAK HOUR TRAFFIC VOLUMES



The traffic data in Figure 3 indicate that the highest traffic volumes in the corridor occur on the Argyle St Bridge. The two way volume during the AM peak hour is about 1,223 vehicles per hour (vph) with about 58% of the traffic flow in the northbound direction. The PM peak hour volume is over 40% higher than the AM peak hour volume with about 1,720 vph and



about 64% of the traffic flow in the southbound direction. The primary turning movements in the corridor are as follows:

- ▲ The Wigton westbound to Argyle northbound right turn volume in the morning and the Argyle southbound to Wigton eastbound left turn volume in the afternoon are both in the order of 260 vph indicating the significant flow of traffic to and from the southeast area of Caledonia using the Wigton Street route.
- ▲ The Argyle northbound to Caithness westbound left turn volume is about 160 vph in both the morning and afternoon.
- ▲ The Caithness eastbound to Argyle southbound right turn volume is about 140 vph in the AM and about 330 vph in the PM peak hour.
- ▲ The Caithness westbound to Argyle southbound left turn volume is about 160 vph in the AM and 217 vph in the PM peak hours.

These turning movement volumes tend to be relatively high, reflecting the convergence of peak hour traffic to and from the bridge. The other turning volumes at these intersections are generally lower since there are other alternate routes available for traffic.

2.3 Existing Level-of-Service

Intersection Level of Service (LOS) is an industry standard method of quantifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles desiring to make a particular movement, compared to the estimated capacity for that movement. The capacity is based on a number of criteria related to the opposing traffic flows.

Table 1 contains the Level-of-Service criteria for stop-controlled and signalized intersections. The highest possible rating is Level-of-Service A, under which the average total delay on a movement, approach or intersection is less than 10 seconds per vehicle. Level-of-Service E is the point at which remedial measures are considered, depending on the nature and extent of the delays. However, Level-of-Service E is commonly accepted for left-turning traffic at unsignalized intersections with major roads. When the average delay exceeds 50 seconds at unsignalized intersections, or the stopped delay exceeds 80 seconds at signalized intersections, the movement is classed as LOS F and remedial measures are usually implemented, if they are feasible.



TABLE 1: LEVEL-OF-SERVICE DEFINITIONS

Level of Service	Stop-Controlled	Signalized
	Average Total Delay (sec/veh)	Average Total Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

For this study, the level of service analyses has been conducted using Synchro (version 6) software. A list of the Synchro files utilized is provided in Appendix B of the report. The level of service conditions for the existing traffic volumes and roadway configuration are shown in Table 2 below. It should be noted that the analyses is based on the signal timing at the intersection of Argyle St and Caithness St being updated (i.e., optimized splits). The level of service analyses indicates that generally the traffic operating conditions in the corridor are at acceptable levels. The two way stop controlled (TWSC) intersection of Argyle St and Wigton St operates at acceptable levels of service in both the AM and PM peak hours. The intersection of Argyle St and Caithness St operates well in the AM peak hour but has some minor congestion on specific movements during the PM peak hour.



TABLE 2: EXISTING INTERSECTION LEVEL OF SERVICE CONDITIONS

AM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wighton St (TWSC)		
	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
EB Left	27	C	0.28			
EB Thru	25	C	0.27			
EB Right	9	A	0.43			
WB Left	32	C	0.64	18	C	0.50
WB Thru	17	B	0.17			
WB Right	6	A	0.22	18	C	0.50
NB Left	13	B	0.46			
NB Thru	26	C	0.82	0	A	0.29
NB Right	5	A	0.19	0	A	0.29
SB Left	20	B	0.24	9	A	0.08
SB Thru	22	C	0.50	0	A	0.16
SB Right	7	A	0.06			
Overall	20	C		5		
PM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wighton St (TWSC)		
	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
EB Left	42	D	0.46			
EB Thru	36	D	0.36			
EB Right	33	C	0.87			
WB Left	50	D	0.82	16	C	0.25
WB Thru	22	C	0.19			
WB Right	7	A	0.19	16	C	0.25
NB Left	52	D	0.82			
NB Thru	25	C	0.66	0	A	0.33
NB Right	9	A	0.23	0	A	0.33
SB Left	10	A	0.11	10	A	0.28
SB Thru	24	C	0.78	0	A	0.46
SB Right	6	A	0.07			
Overall	30	C		3		

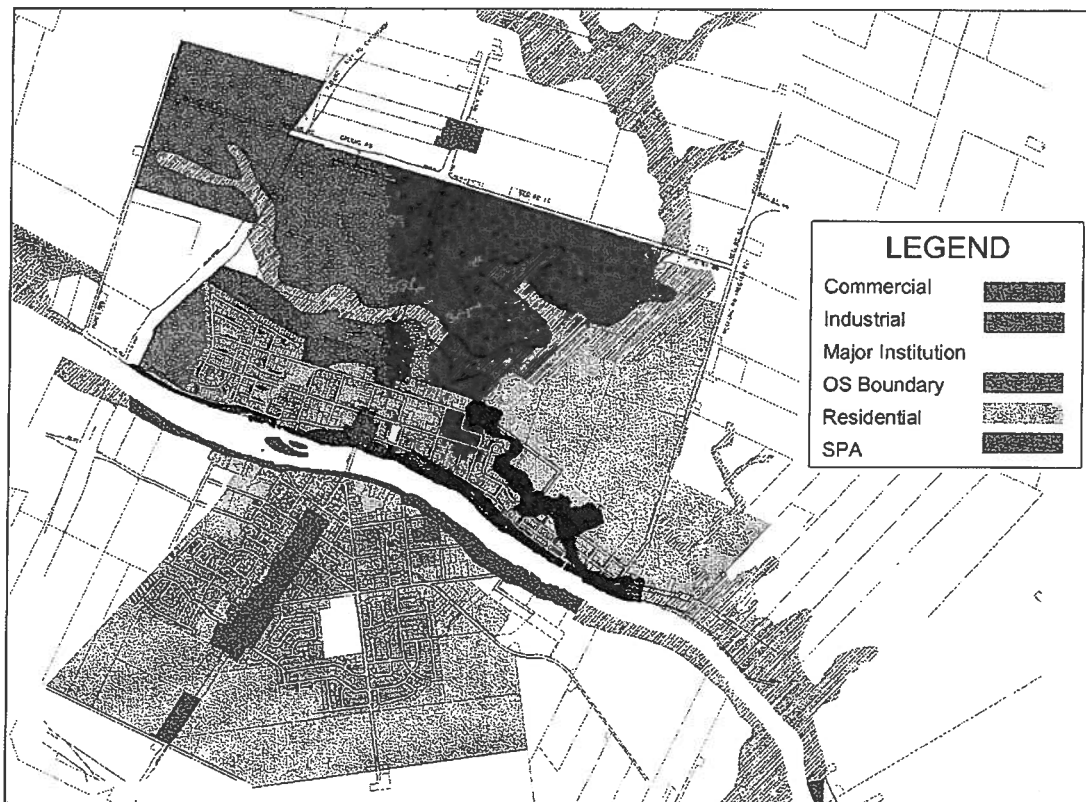


3.0 FUTURE TRAFFIC FORECASTS

3.1 Caledonia Development Plans

Caledonia currently has a population of approximately 10,000 persons located in residential areas both north and south of the Grand River. The current development plans for Caledonia anticipate an increase in population to over 16,000 persons over the next 25 years. Although specific data are not available, it is estimated that roughly 60% of the existing residential development is located south of the river. The main business area of the town is located north of the river in the area of the Argyle St and Caithness St intersection and there is also commercial/retail development located along Argyle Street south of the river. There is some industrial development in the north area of the town, including a large gypsum mining operation. Figure 4 below provides an overview of the existing and planned future land use in the community by type.

FIGURE 4: CALEDONIA LAND USE



The location of planned future development in Caledonia is generally indicated in Figure 4. Future residential development is planned to generally occur in the south and southeast areas of the town as well as in the area along McClung Rd, north of the river. At the present time, new residential development is occurring south of the river since sanitary sewer services are



not available for the future residential area along McClung Road. New development in this area is likely to occur in the longer term with the future provision of a sanitary sewer connection to the sewage treatment plant on the south side of the river.

Most of the future industrial and commercial development is planned for the north area of Caledonia although some additional commercial retail development is planned in conjunction with residential development in the south. It should be noted that significant portions of the lands on the north side designated as industrial are not currently developable due to underground gypsum mining activities.

The Caledonia Master Servicing Plan (MSP) estimates that the complete build-out of the available lands within the current urban boundary will accommodate an additional 3,938 residential units over the occupied development in December 2003. With some adjustments for ongoing development and less than 100% utilization of available properties, the 25 to 30 year estimate of growth is based on approximately 3,800 additional residential units (80% single family detached and semi-detached, 4% apartments and 16% townhouses). Estimates of population and household growth for Caledonia have recently been prepared in a study ("Population & Household Forecasts Haldimand County", Hemson Consulting Ltd, May 2004) by Hemson Consulting Ltd. The "high growth" forecast from the Hemson report for Caledonia is shown in Table 3 below.

This data indicates a growth in households of about 1,370 units in the 10 year period from 2001 to 2011 and about 3,410 units in the 25 year period from 2001 to 2026. Since the full build-out development is estimated to accommodate about 3,900 residential units, it would appear that the full residential build-out will occur beyond year 2026.

**TABLE 3: POPULATION AND HOUSEHOLD FORECAST
FOR CALEDONIA (HIGH SCENARIO)**

Year	Caledonia Population	Caledonia Households
2001	9,560	2,910
2006	10,330	3,510
2011	11,590	4,280
2016	13,110	5,050
2021	14,620	5,730
2026	15,870	6,320

The vacant designated industrial and commercial lands within Caledonia are expected to accommodate approximately 2.4 million square feet of gross floor area of new development. This is based on development floor space coverage averaging about 15% of the available vacant land area. Since the intensity of development, the possible uses and the staging of development can vary considerably for industrial/commercial lands, it is recognized that there could be considerable variation in the development on specific sites. For study purposes, it is estimated that about 25% of this development could occur within the next ten years or about 600,000 square feet of industrial/commercial floor space.



3.2 Ten Year Traffic Forecast

Based on the foregoing estimates of future development plans, the ten year traffic forecast is based on the following level of new development in Caledonia:

- ▲ 1,370 new residential units
- ▲ 600,000 square feet of new industrial/commercial floor space

The major area where new development activity is currently being planned and is expected to occur within the next few years is on the south side of Caledonia. Recent traffic impact studies for Douglas Creek Estates (located west of Argyle St, south of existing urban area) and McKenzie Meadows (located between Argyle St and McKenzie Rd) are summarized in Table 4 below. These two developments will provide an additional 1,097 residential units and 115,900 sq ft of non-residential floor space when completed. For this study, it is assumed that these two developments will be completed within the next ten years.

The additional residential development is assumed to take place on the south side of Caledonia in the area between McKenzie Rd and River Rd. This development will consist of the remaining 273 residential units and is expected to comprise 218 single family units, 34 townhouses and 20 apartment units. The additional 484,000 square feet of industrial/commercial development is assumed to occur on the north side of Caledonia, probably on lands adjacent to Argyle Street and Greens Road.

TABLE 4: FINDINGS OF RECENT TRAFFIC IMPACT STUDIES FOR NEW DEVELOPMENT IN CALEDONIA

<i>Douglas Creek Estates Traffic Impact Study, Paradigm Transportation Solutions Ltd, April 2003</i>					
Total Development:		Trip Estimates	in	out	total
Single family residential units	352	AM peak hour	187	328	515
Semi-detached residential units	104	PM peak hour	423	289	713
Mixed commercial (sq ft GFA)	105,000				
<i>McKenzie Meadows Traffic Impact Study, Paradigm Transportation Solutions Ltd, May 2004</i>					
Total Development:		Trip Estimates	in	out	total
Single family residential units	414	AM peak hour	112	265	378
Townhouse units	50	PM peak hour	306	205	511
Condos/apartment units	138				
Senior apartment units	39				
Office/commercial (sq ft GFA)	10,930				

The estimated total peak hour trip generation related to the expected new development over the ten year period is summarized in Table 5 below. The trip generation has been estimated based on the estimates in traffic impacts studies for the two developments noted and using the Institute of Transportation Engineers (ITE) Trip Generation Manual (7th Edition) for the remaining development.



TABLE 5: TEN YEAR NEW DEVELOPMENT TRIP GENERATION ESTIMATES

Description of Land Use Type	Units	Number of Peak Hour Trips					
		AM			PM		
		In	Out	Total	In	Out	Total
Douglas Creek Estates Full Development	456 units Res, 105 K sq ft Comm	187	328	515	423	289	713
McKenzie Meadows Full Development	641 units Res, 10.9 K sq ft Office/Comm	112	265	378	306	205	511
Additional Southeast Residential Development	218 SF, 34 Th, 20 Apts Res units	47	145	192	162	95	257
Total South Side New Development		346	738	1085	891	589	1481
Industrial/commercial development (sq ft GFA) (Assume Industrial Park)	484,000	333	73	407	87	329	416
Total North Side Development		333	73	407	87	329	416

The estimated distribution of the additional development traffic has been estimated using the trip distribution model developed for the Master Servicing Plan. That study found that a high portion of the trips generated by residential development on the south side of the river travel to and from the north side of Caledonia and beyond. The estimated distribution of south side development trips using the Argyle Street river crossing is summarized in Table 6 below along with the breakdown of traffic turning movements at the critical Argyle St and Caithness St intersection.

TABLE 6: TRIP DISTRIBUTION FOR NEW SOUTH SIDE DEVELOPMENT

Trip Distribution based on MSP Study		
	To north	From north
AM Peak Hour	82%	69%
PM Peak Hour	69%	82%
Estimate 75% of new trips to & from North use Argyle Corridor		
Turning Patterns based on existing counts		
AM NB	Argyle N	68%
	Caithness W	20%
	Caithness E	12%
AM SB	Argyle N	45%
	Caithness W	25%
	Caithness E	30%
PM NB	Argyle N	60%
	Caithness W	25%
	Caithness E	15%
PM SB	Argyle N	50%
	Caithness W	30%
	Caithness E	20%

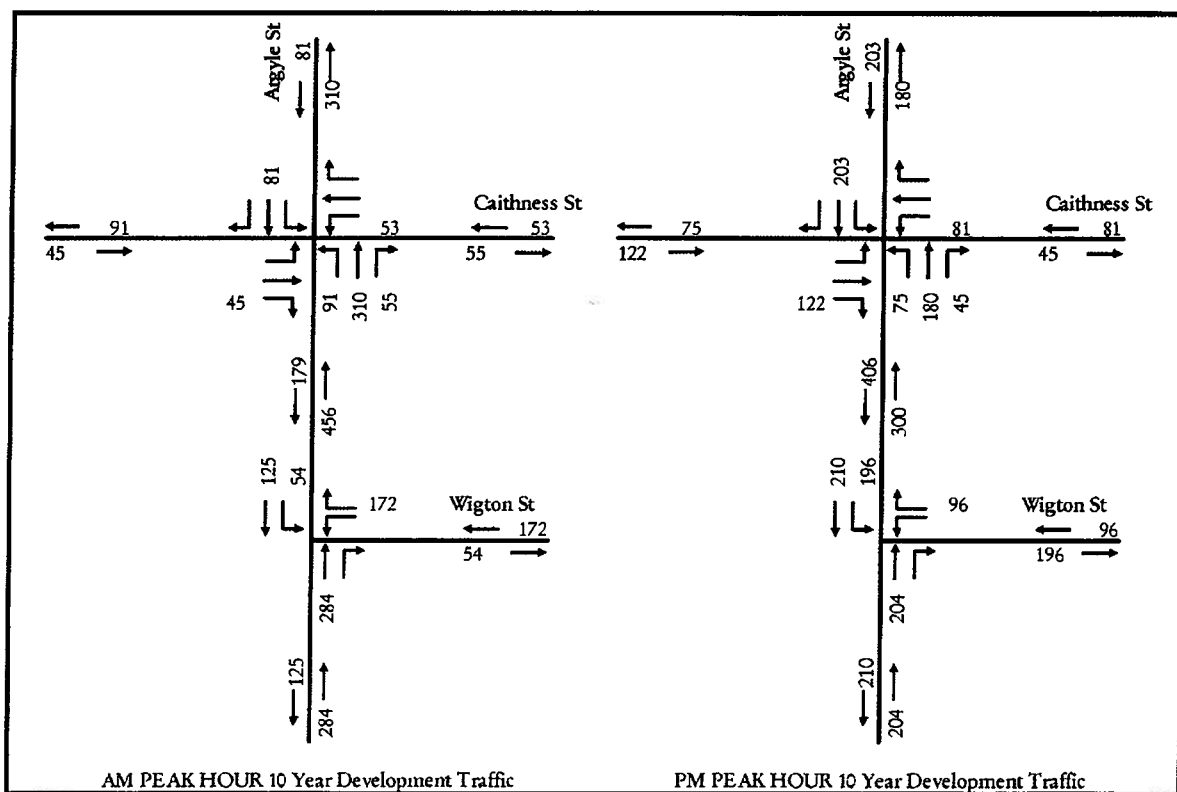
The future industrial/commercial development on the north side of the river is assumed to not contribute towards additional traffic on the Argyle Street Bridge. This premise is based on this development providing the destination end of trips originating south of the river and also generally being oriented to the north. Therefore, the traffic impact of this development is



inherently reflected in the traffic generated by the new development on the south side of the river.

The additional traffic generated by the new development taking place over the next ten years was assigned to the roadway network on an "all-or-nothing" basis without any consideration of the effects of congestion on traffic routing. The resulting estimates of the additional development traffic on the Argyle Street river crossing are summarized in Figure 5 below. The anticipated additional development over the ten year forecast period is expected to add about 635 vph two way traffic in the AM peak hour and about 706 vph two way traffic in the PM peak hour to the Argyle Street Bridge.

FIGURE 5: TEN YEAR DEVELOPMENT TRAFFIC



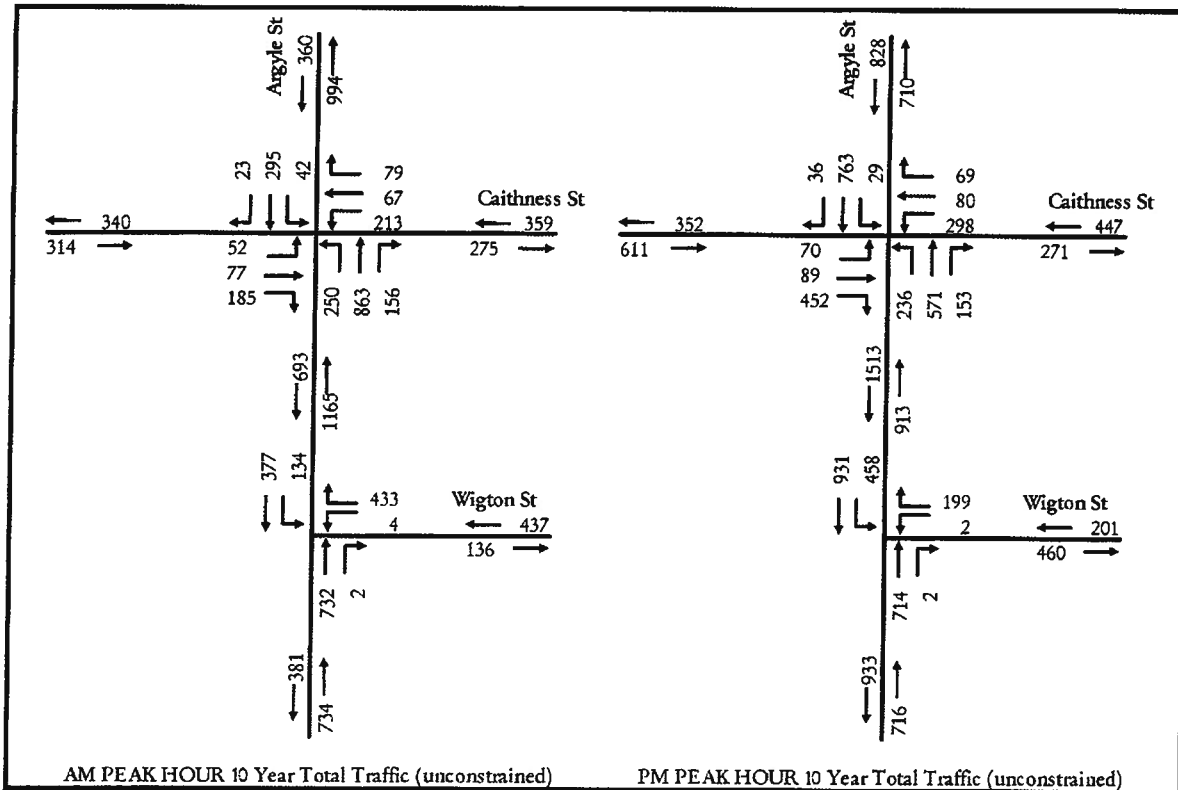
The estimated total peak hour traffic for the ten year forecast period is estimated as the sum of the existing peak hour traffic and the additional peak hour traffic generated by the anticipated new development over that period. The resulting estimates of the total ten year peak hour traffic volumes are shown in Figure 6 below. Comparing these estimates with the existing traffic volumes shown previously indicates that:

- ▲ The AM peak hour traffic volume on the bridge increases by 52% from 1,223 vph to 1,858 vph.



- ▲ The PM peak hour traffic volume on the bridge increases by 41% from 1,720 vph to 2,426 vph.
- ▲ The AM peak hour approach traffic volumes at the Argyle and Caithness intersection increase by 38% from 1,667 vph to 2,302 vph.
- ▲ The PM peak hour approach traffic volumes at the Argyle and Caithness intersection increase by 33% from 2,140 vph to 2,846 vph.

FIGURE 6: ESTIMATED TEN YEAR PEAK HOUR TOTAL TRAFFIC VOLUMES



3.3 Long Term Traffic Forecast

Estimates of the future PM peak hour traffic volumes associated with development of the vacant lands within the Caledonia designated urban area have been prepared as part of the County's Master Servicing Plan (MSP) study. Appendix A of the report provides an overview of the traffic estimates developed through that study. The MSP study developed a PM peak hour "all-or-nothing" traffic assignment and a PM peak hour capacity constrained traffic assignment. The "all-or-nothing" or unconstrained assignment estimated that full development would increase traffic volumes on the Argyle Street Bridge to about 3,000 vph with an increase of about 830 vph southbound and 430 vph northbound in the weekday PM peak hour. However, the study recognized that the bridge does not have sufficient capacity to



accommodate this increase in volume and that this level of traffic growth will need to find alternate routes to cross the river. The primary alternative route is expected to be the Highway 6 bypass route. Recognizing this limitation, a capacity constrained assignment was developed based on limiting the traffic across the bridge to about 2,150 vph. This assignment is felt to more realistically represent the long term traffic conditions. It should be noted that the MSP study specifically assumes that widening of Argyle Street through the central business area of Caledonia is not feasible.

A comparison with the existing PM peak hour traffic volumes as well as the ten year forecast traffic volumes on the Argyle Street Bridge is provided in Table 7 below. It should be noted that the ten year traffic forecast, based on an unconstrained assignment of traffic to the Argyle Street corridor, provides a slightly higher estimate of traffic on the bridge than does the long term capacity constrained traffic assignment.

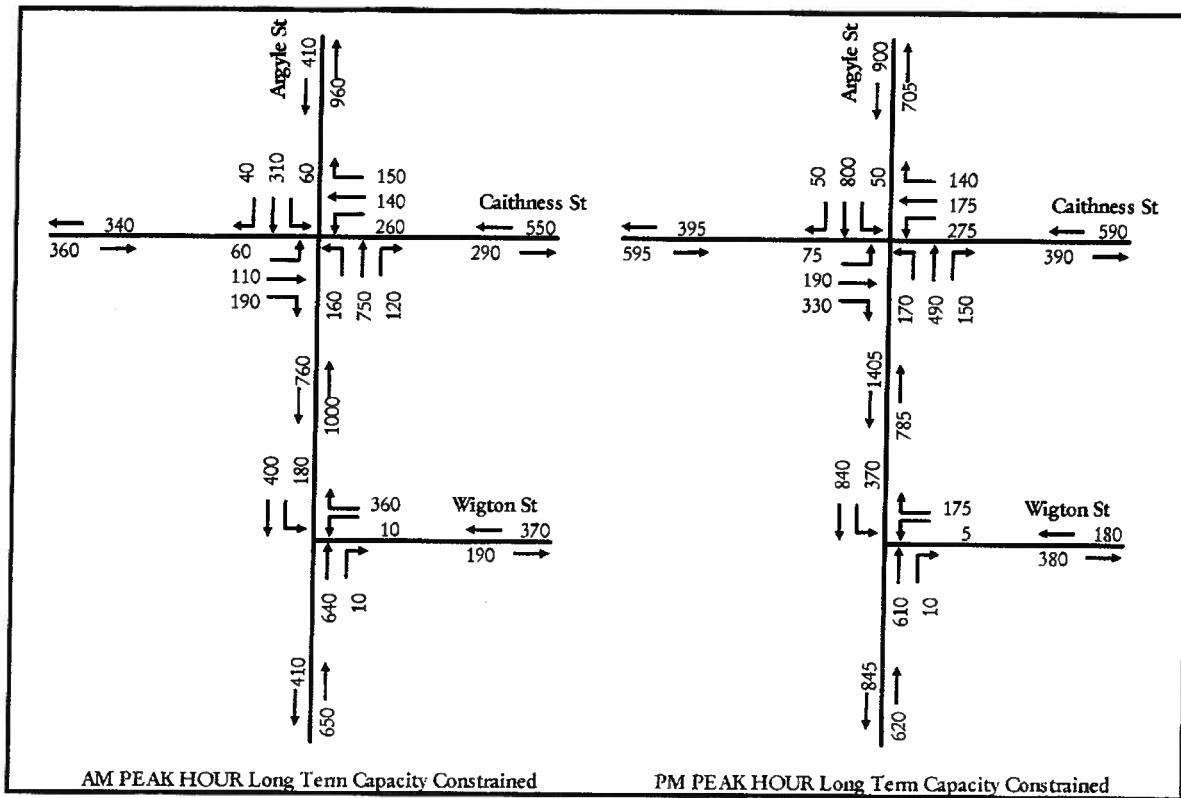
TABLE 7: COMPARISON OF PM PEAK HOUR TRAFFIC FORECASTS FOR ARGYLE ST BRIDGE

	PM Peak Hour Volumes on Argyle Street Bridge		
	Northbound	Southbound	Total
Existing	613 vph	1,107 vph	1,720 vph
Ten Year Forecast (Unconstrained)	913 vph	1,513 vph	2,426 vph
Long Term Forecast (Unconstrained)	1,045 vph	1,934 vph	2,979 vph
Long Term Forecast (Capacity Constrained)	809 vph	1,313 vph	2,122 vph

Based on the MSP traffic forecast with a capacity constraint on the Argyle Street Bridge, long term AM and PM peak hour traffic turning movement volumes have been estimated for the bridge area as shown in Figure 7 below. These estimated long term volumes are slightly less than the unconstrained traffic volumes estimated previously for the ten year time horizon.



FIGURE 7: LONG TERM PEAK HOUR TRAFFIC TURNING MOVEMENT ESTIMATES





4.0 ASSESSMENT OF ARGYLE ST BRIDGE ALTERNATIVES

The key focus of this study is to assess the potential traffic benefits of widening the existing Argyle Street Bridge beyond the current two lanes as part of the planned upgrading project. It has been noted previously that this study, as well as the Caledonia Master Servicing Plan (MSP) Study, assume that a major widening of Argyle Street through the central business area of Caledonia is not feasible due to the impacts on existing development. Therefore, alternatives to provide improved traffic conditions in the corridor have been limited to widening the bridge to accommodate a third traffic lane and traffic operational measures such as traffic signal changes, restrictions to on-street parking, turning restrictions and time-of-day lane control.

The estimates of future traffic outlined in Section 3.0 of the report generally estimate that the long term traffic volumes associated with the future development of the vacant lands in Caledonia would generate traffic volumes significantly exceeding the capacity of the Argyle Street Bridge corridor. The estimated capacity constrained traffic volumes were generally similar to but slightly less than the estimated ten year unconstrained traffic volumes. Therefore, the primary focus of the assessment of the Argyle St Bridge alternatives is based on the estimated ten year traffic volumes.

4.1 Do Nothing Alternative

The do-nothing alternative represents the situation with the ten year forecast peak hour traffic volumes but no roadway or traffic operational improvements in the Argyle Street Bridge corridor. The resulting level of service conditions are summarized in Table 8 below. The analysis indicates that:

- ▲ The intersection of Argyle and Caithness is essentially operating at capacity in the AM peak hour with some movements experiencing level of service F conditions. This traffic condition may exist in some large urban areas but would not be considered acceptable in a smaller community.
- ▲ The intersection of Argyle and Caithness is severely congested in the PM peak hour with unacceptable delays on most movements. This condition would not be acceptable to motorists in any urban setting and would lead to major complaints and traffic diversion.
- ▲ The intersection of Argyle and Wigton has some significant delays, particularly in the AM peak hour for the stop sign controlled traffic turning from Wigton on to Argyle.

Overall, these traffic conditions are considered unacceptable and clearly indicate the need to consider alternative improvements. When it is considered that these traffic volumes are expected in approximately ten years, it is recognized that the capacity constraint in this corridor is relatively critical.



TABLE 8: LEVEL OF SERVICE CONDITIONS WITH NO IMPROVEMENTS AND TEN YEAR TRAFFIC VOLUMES

AM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Winton St (TWSC)		
Movement	Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
EB Left	48	D	0.41			
EB Thru	44	D	0.39			
EB Right	14	B	0.60			
WB Left	94	F	0.99	163	F	1.25
WB Thru	29	C	0.20			
WB Right	8	A	0.26	163	F	1.25
NB Left	18	B	0.65			
NB Thru	80	F	1.08	0	A	0.47
NB Right	7	A	0.26	0	A	0.47
SB Left	32	C	0.42	10	B	0.18
SB Thru	23	C	0.53	0	A	0.24
SB Right	9	A	0.05			
Overall	50	D		43		
PM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Winton St (TWSC)		
Movement	Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
EB Left	44	D	0.44			
EB Thru	38	D	0.35			
EB Right	112	F	1.16			
WB Left	206	F	1.33	55	F	0.80
WB Thru	27	C	0.21			
WB Right	8	A	0.21	55	F	0.80
NB Left	230	F	1.39			
NB Thru	284	F	0.75	0	A	0.46
NB Right	6	A	0.26	0	A	0.46
SB Left	18	B	0.14	15	C	0.59
SB Thru	196	F	1.31	0	A	0.60
SB Right	13	B	0.08			
Overall	172	F		8		

The existing northbound left turn and right turn lanes on Argyle Street at the Caithness Street intersection currently provide about 14 metres of vehicle storage with minimal taper. This condition impedes the operation of the intersection when the number of turning vehicles exceeds the available turn lane storage since these vehicles then obstruct the through traffic. The desired storage lane requirements have been estimated for northbound Argyle Street at Caithness based on MTO standards (i.e., Geometric Design Standards for Ontario Highways, Ministry of Transportation). The desired turning lane provisions to accommodate the ten year traffic volumes are summarized in Table 9 below. The analysis of turning lane requirements indicate that the northbound left turn lane at Caithness St should be extended south on to the existing bridge structure and, when the taper requirements are included, the bridge would require widening for some distance.



TABLE 9: TURNING LANE STORAGE LENGTH REQUIREMENTS (ARGYLE & CAITHNESS)

Location	Ten Year Peak Hour Turning Volume	Vehicle Storage Length (Based on 120 sec cycle, LOS A, 7.5 m per vehicle)	Provision for Taper
Argyle Street Northbound Left Turn Lane	250 vph	97.5 metres	95 metres
Argyle Street Northbound Right Turn Lane	156 vph	67.5 metres	75 metres

4.2 Improvement Alternatives

A number of improvement alternatives have been developed and assessed to determine the capability of each to accommodate the estimated ten year traffic volumes. Each of these alternatives is based on the Argyle St Bridge being widened to three basic traffic lanes as well as other traffic operational measures to take advantage of the three lanes on the bridge. An overview of each alternative and the level of service assessment are provided below.

Alternative A

A schematic diagram of Alternative A is provided in Figure 8 below. This alternative has the following major changes to the existing traffic configuration:

- ▲ Three traffic lanes on the Argyle St Bridge with two lanes southbound and one lane northbound.
- ▲ Traffic signals installed at Argyle and Wigton intersection.
- ▲ Two through southbound lanes on Argyle at Caithness.
- ▲ A single shared through/right turn lane northbound on Argyle at Caithness.
- ▲ Elimination of on-street parking on both sides of Argyle south of Caithness.
- ▲ Optimized signal timing at both intersections. It is assumed the two intersections will have actuated controllers and will be coordinated.

The resulting level of service conditions for the ten year traffic volumes on this alternative are summarized in Table 10 below. This summary indicates that the conditions at the Argyle and Wigton intersection are improved and would generally be considered acceptable. The Argyle and Caithness intersection is significantly improved from the “do nothing” alternative considered previously. However, the intersection is essentially at capacity in both the AM and PM peak hour with significant congestion on some individual movements.



FIGURE 8: ALTERNATIVE A CONFIGURATION

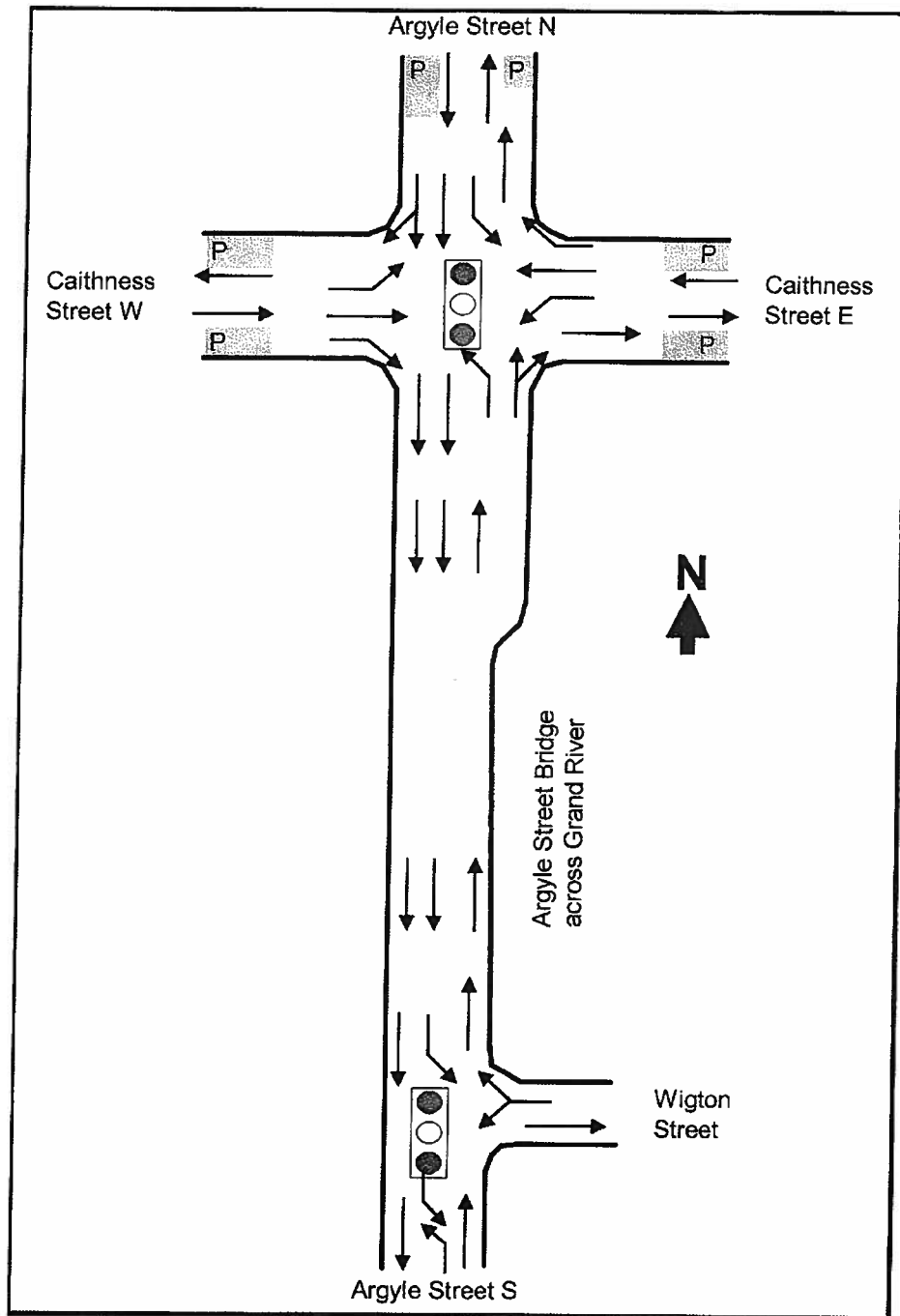




TABLE 10: LEVEL OF SERVICE CONDITIONS FOR TEN YEAR TRAFFIC ON ALTERNATIVE A

AM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wigton St Signalized		
	Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
EB Left	65	E	0.63			
EB Thru	60	E	0.59			
EB Right	17	B	0.70			
WB Left	181	F	1.23	39	D	0.95
WB Thru	39	D	0.26			
WB Right	10	A	0.31	39	D	0.95
NB Left	12	B	0.56			
NB Thru	88	F	1.12	19	B	0.72
NB Right				19	B	0.72
SB Left	62	E	0.63	27	C	0.69
SB Thru	10	B	0.22	7	A	0.38
SB Right						
Overall	66	E		22	C	
PM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wigton St Signalized		
	Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
EB Left	47	D	0.41			
EB Thru	42	D	0.32			
EB Right	71	E	1.04			
WB Left	98	F	1.04	14	B	0.73
WB Thru	27	C	0.18			
WB Right	7	A	0.18	14	B	0.73
NB Left	65	E	0.94			
NB Thru	55	E	1.02	60	E	0.98
NB Right				60	E	0.98
SB Left	52	C	0.26	35	D	0.87
SB Thru	40	D	0.82	5	A	0.72
SB Right						
Overall	56	E		29	C	

Alternative B

A schematic diagram of Alternative B is provided in Figure 9 below. This alternative has the following major changes from the existing configuration:

- ▲ Three traffic lanes on the Argyle St Bridge with two lanes northbound and one lane southbound in the AM peak and the reverse configuration in the PM peak. This arrangement would require variable lane control signals on the bridge and the approaches.
- ▲ Traffic signals installed at Argyle and Wigton intersection.
- ▲ Two through northbound lanes in the AM peak and two through southbound lanes in the PM peak on Argyle at Caithness.
- ▲ Changes to the left turn lane provisions in the AM and PM peak on Argyle at Caithness. This arrangement would require variable lane control signs on Argyle at both approaches to Caithness.



- ▲ Elimination of on-street parking on sections of Argyle both north and south of Caithness.
- ▲ Optimized signal timing at both intersections considered. It is assumed the two intersections will have actuated controllers and will be coordinated.

The resulting level of service conditions for the ten year traffic volumes on this alternative are summarized in Table 11 below. This summary indicates that the conditions at the Argyle and Wigton intersection acceptable, as with Alternative A. The intersection of Argyle and Caithness is near capacity but operating at reasonable levels of service in the AM peak hour. However, in the PM peak hour, it is essentially at capacity and experiencing significant congestion. Alternative B is, however, at a much more acceptable level of service than the “do nothing” alternative with two lanes on the bridge.

FIGURE 9: ALTERNATIVE B CONFIGURATION

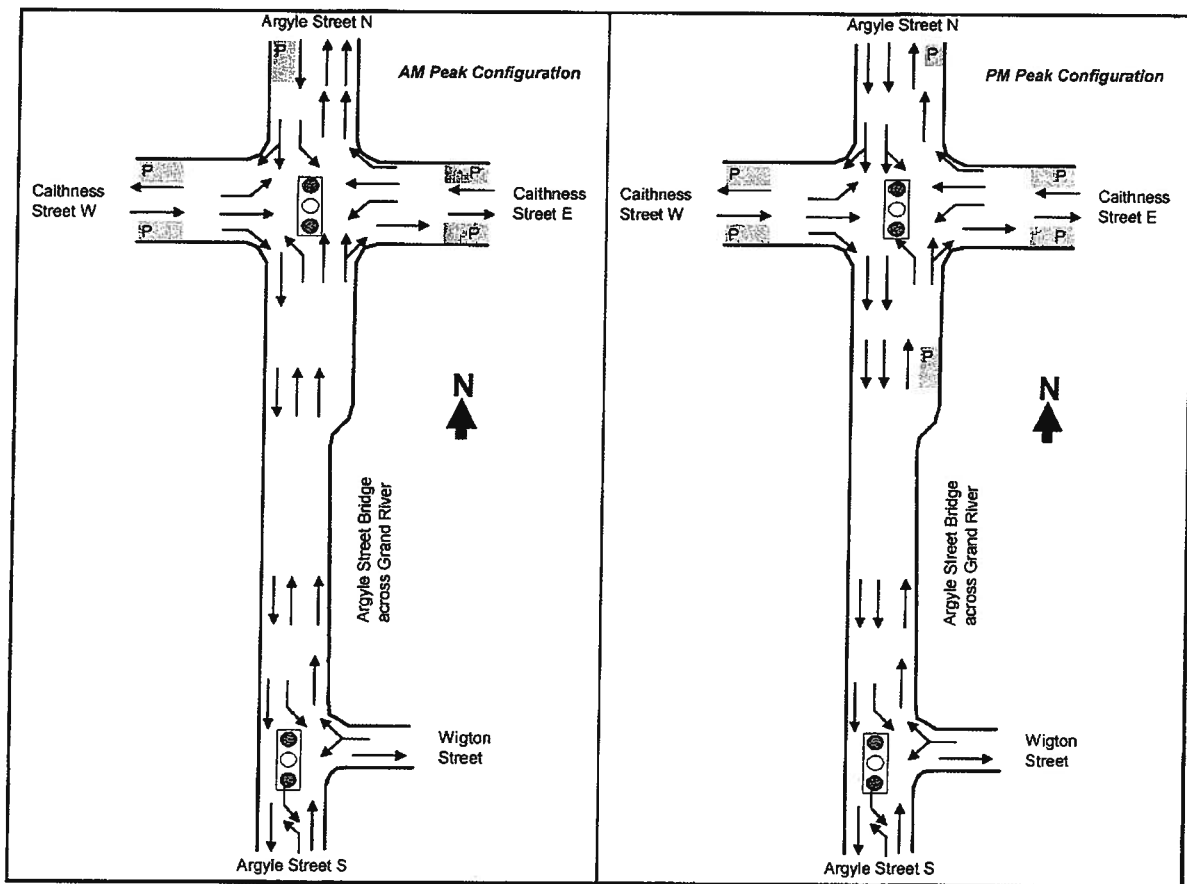




TABLE 11: LEVEL OF SERVICE CONDITIONS FOR TEN YEAR TRAFFIC ON ALTERNATIVE B

AM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wigton St Signalized		
	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
Movement						
EB Left	49	D	0.55			
EB Thru	46	D	0.53			
EB Right	14	B	0.67			
WB Left	57	E	0.84	36	D	0.93
WB Thru	26	C	0.19			
WB Right	7	A	0.25	36	D	0.93
NB Left	18	B	0.71			
NB Thru	15	B	0.67	19	B	0.74
NB Right				19	B	0.74
SB Left	31	C	0.33	27	C	0.72
SB Thru	30	C	0.60	5	A	0.40
SB Right						
Overall	24	C		21	C	
PM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wigton St Signalized		
	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
Movement						
EB Left	43	D	0.39			
EB Thru	38	D	0.31			
EB Right	76	E	1.06			
WB Left	96	F	1.04	13	B	0.71
WB Thru	25	C	0.18			
WB Right	7	A	0.18	13	B	0.71
NB Left	90	F	1.02			
NB Thru	81	F	1.03	71	E	1.03
NB Right	81	F	1.03	71	E	1.03
SB Left	55	D	0.96	39	D	0.88
SB Thru	55	D	0.96	7	A	0.73
SB Right	55	D	0.96			
Overall	69	E		34	C	

Alternative C

The previous analyses have demonstrated that the operation of the Argyle Street corridor across the Grand River is largely controlled by the various constraints at the intersection of Argyle Street and Caithness Street. One of the problems at this intersection is the relatively high volume of turning traffic in both the AM and PM peak hours. Two movements that have relatively high volumes of traffic in both the AM and PM peak hour are the Argyle St northbound to Caithness St westbound left turn and the Caithness St westbound to Argyle St southbound left turn. It is possible to restrict these turning movements through a left turn ban and forcing the traffic to find an alternate route (For example, the Argyle northbound to Caithness westbound left turn movement could be accommodated by vehicles traveling north on Argyle to Sutherland, east on Sutherland to Edinburgh, south on Edinburgh to Caithness and west on Caithness through the intersection). Alternative C is based on utilizing such a left turn ban to reduce the turning conflicts at the critical Argyle and Caithness intersection. This alternative includes the following features:



- ▲ The northbound to westbound left turn movement is banned and the volume of traffic on that particular movement is shifted to Argyle St northbound through and Caithness St westbound through (i.e., it is assumed to travel clockwise around the block).
- ▲ Argyle St is configured to provide two through lanes in each direction in both the AM and PM peak hours. The southbound lanes consist of a shared through/right turn and shared through/left turn lane while the northbound consists of a through lane and a shared through/right turn lane.
- ▲ The Argyle St Bridge would have two lanes southbound and one lane northbound at all times.
- ▲ On-street parking would be removed on the west side of Argyle, south of Caithness, and on the east side of Argyle, north of Caithness. There would also likely be time-of day parking restrictions on other sections of Argyle St north and south of Caithness.
- ▲ The intersection of Argyle and Wigton is signalized.

A schematic layout of this option is shown in Figure 10 below. The level of service summary for this alternative with the ten year traffic forecast volumes is shown in Table 12 below. As indicated in this Table, the level of service conditions with the ten year traffic volumes are very similar to the existing level of service conditions at the Argyle and Caithness intersection, as outlined in Section 2.3 of the report. The overall intersection operates at level of service C in both the AM and PM peak period with no individual movement operating at worse than level of service D conditions. Therefore this alternative appears able to accommodate the estimated 10 year traffic growth of about 40% to 50% in peak hour traffic volumes across the Grand River at acceptable levels of service.

The 10 year traffic forecasts outlined previously estimated that the peak hour, peak direction traffic across the Argyle Street Bridge would increase by approximately 400 vph (PM peak hour) to 450 vph (AM peak hour). As a further assessment of Alternative C, the peak hour, peak direction through volumes utilizing Argyle St across the Grand River were further increased by an additional 300 vph over the forecast 10 year traffic volumes. The level of service conditions for the increased volumes is summarized in Table 13 below. This summary indicates that the corridor would be essentially at capacity and experiencing significant congestion and delay with an additional 300 vph in the peak direction. For assessment purposes, this could be considered the approximate upper limit volume that could be accommodated in the Argyle Street corridor, even with the provision of three lanes on the Argyle Street Bridge.

An overview comparison of the level of service conditions at the critical intersection of Argyle St and Caithness St is provided in Table 14 below for the various scenarios investigated.



FIGURE 10: ALTERNATIVE C CONFIGURATION

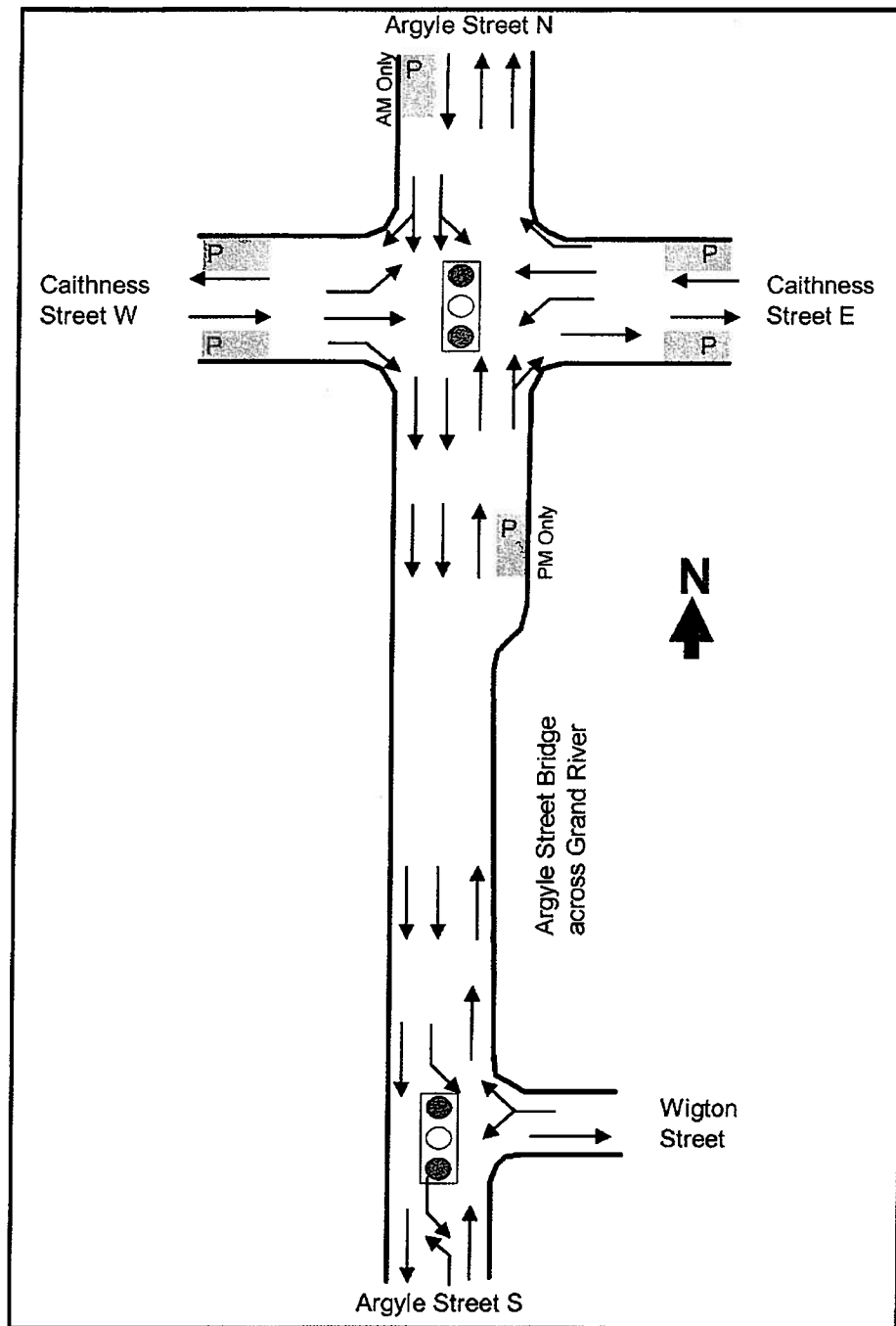




TABLE 12: LEVEL OF SERVICE CONDITIONS FOR TEN YEAR TRAFFIC ON ALTERNATIVE C

AM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wigton St Signalized		
Movement	Delay (Seconds per Vehicle)	Level of Service	Volume/ Capacity Ratio	Delay (Seconds per Vehicle)	Level of Service	Volume/ Capacity Ratio
EB Left	33	C	0.43			
EB Thru	24	C	0.21			
EB Right	7	A	0.45			
WB Left	54	D	0.90	36	D	0.94
WB Thru	50	D	0.91			
WB Right	15	B	0.27	36	D	0.94
NB Left						
NB Thru	20	B	0.85	19	B	0.75
NB Right	20	B	0.85	19	B	0.75
SB Left	10	B	0.36	34	C	0.75
SB Thru	10	B	0.36	34	C	0.75
SB Right	10	B	0.36			
Overall	24	C		22	C	
PM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wigton St Signalized		
Movement	Delay (Seconds per Vehicle)	Level of Service	Volume/ Capacity Ratio	Delay (Seconds per Vehicle)	Level of Service	Volume/ Capacity Ratio
EB Left	22	C	0.31			
EB Thru	19	B	0.16			
EB Right	50	D	0.98			
WB Left	44	D	0.86	14	B	0.73
WB Thru	27	C	0.57			
WB Right	10	B	0.16	14	B	0.73
NB Left						
NB Thru	23	C	0.83	60	E	0.98
NB Right	23	C	0.83	60	E	0.98
SB Left	39	D	0.85	41	D	0.87
SB Thru	39	D	0.85	8	A	0.72
SB Right	39	D	0.85			
Overall	33	C		31	C	



**TABLE 13: LEVEL OF SERVICE CONDITIONS FOR TEN YEAR TRAFFIC PLUS 300 VPH
ON ALTERNATIVE C**

AM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wigton St Signalized		
	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
EB Left	62	E	0.57			
EB Thru	35	D	0.23			
EB Right	9	A	0.47			
WB Left	95	F	0.97	152	F	1.24
WB Thru	94	F	0.96			
WB Right	25	C	0.29	152	F	1.24
NB Left						
NB Thru	37	D	0.98	34	C	0.93
NB Right	37	D	0.98	34	C	0.93
SB Left	11	B	0.37	188	F	1.27
SB Thru	11	B	0.37	7	A	0.39
SB Right	11	B	0.37			
Overall	42	D		71	E	
PM Peak Hour	Argyle St & Caithness St Signalized			Argyle St & Wigton St Signalized		
	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio	INTERSECTION: Delay (Seconds per Vehicle)	Level of Service	Volume / Capacity Ratio
EB Left	27	C	0.33			
EB Thru	21	C	0.17			
EB Right	86	F	1.05			
WB Left	58	E	0.89	14	B	0.73
WB Thru	31	C	0.59			
WB Right	13	B	0.17	14	B	0.73
NB Left						
NB Thru	20	B	0.81	98	F	1.10
NB Right	20	B	0.81	98	F	1.10
SB Left	72	E	1.05	51	D	0.96
SB Thru	72	E	1.05	30	C	0.87
SB Right	72	E	1.05			
Overall	50	D		52	D	

**TABLE 14: OVERVIEW LEVEL OF SERVICE COMPARISON FOR ARGYLE & CAITHNESS
INTERSECTION**

Scenario	AM Peak Hour		PM Peak Hour	
	Overall Average Intersection Delay	Intersection Level of Service	Overall Average Intersection Delay	Intersection Level of Service
Existing roadway configuration & Existing traffic volumes	20 seconds per vehicle	C	30 seconds per vehicle	C
Existing roadway configuration & 10 year forecast traffic volumes	50 seconds per vehicle	D	172 seconds per vehicle	F
Alternative A roadway configuration & 10 year forecast traffic volumes	66 seconds per vehicle	E	56 seconds per vehicle	E
Alternative B roadway configuration & 10 year forecast traffic volumes	24 seconds per vehicle	C	69 seconds per vehicle	E
Alternative C roadway configuration & 10 year forecast traffic volumes	24 seconds per vehicle	C	33 seconds per vehicle	C
Alternative C roadway configuration & 10 year forecast traffic volumes plus 300 vph peak direction	42 seconds per vehicle	D	50 seconds per vehicle	D



5.0 STUDY CONCLUSIONS

The Argyle Street Bridge is a critical link in the Caledonia roadway network. Most traffic activity in Caledonia that needs to cross the Grand River is required to use this roadway link. The current traffic volumes using the bridge are generally as follows:

- ▲ About 710 vph northbound and 515 vph southbound during the AM peak hour.
- ▲ About 1,110 vph southbound and 615 vph northbound during the PM peak hour.

The planned development pattern in Caledonia is based on most additional residential development occurring on the south and southeast area of the community. Future development is also planned for the northeast area of Caledonia but this development is expected be longer term due to the lack of sanitary sewer service capacity to this area. The primary future industrial/commercial vacant land areas in Caledonia are on the north side of the community. Also, since Caledonia traffic tends to be oriented to the north, the additional development in the community will increase the volume of peak hour traffic using the Argyle Street Bridge across the Grand River.

Over the next 10 years, an additional 1,370 new residential housing units are expected to be developed in the areas on the south and southeast periphery of the community. In the longer term, in about 25 to 30 years, the full build-out of the designated growth areas in Caledonia will result in an estimated additional 3,900 residential units over the December 2003 development. This planned future growth will result in a significant increase in peak hour traffic demand in the Argyle Street Bridge corridor as follows:

- ▲ The 10 year traffic forecast anticipates the AM peak hour traffic volume increasing to about 1,165 vph northbound and about 695 vph southbound and the PM peak hour volumes increasing to about 1,515 vph southbound and 915 vph northbound.
- ▲ The long term traffic forecast anticipates an unconstrained PM peak hour traffic demand of about 1,935 vph southbound and 1,045 vph northbound on the Argyle Street Bridge corridor. It is recognized that this demand can not be accommodated in the corridor and the actual "constrained" traffic volumes that would utilize the bridge would be lower than the unconstrained demand.

The amount of capacity that can be provided in the Argyle Street Bridge corridor is constrained by a number of specific features of the roadway corridor, including:

- ▲ The two roadway lanes on the bridge.
- ▲ The maximum 20 metre roadway right-of-way through the business area of the town in the vicinity of the Argyle Street and Caithness Street intersection.
- ▲ The on-street traffic operational features of Argyle Street, north and south of Caithness Street.

The Ministry of Transportation of Ontario (MTO) is currently conducting a review of a major upgrading or replacement of the existing Argyle Street Bridge due to its age and



condition. This study has assumed that the provision of a new three lane bridge is possible and feasible as part of the MTO project. However, with the considerable amount of commercial building development immediately adjacent to the Argyle Street right-of-way from the Bridge north through the central business area past Sutherland Street, it is assumed that it is not feasible to widen the existing travel portion of the Argyle Street roadway beyond the current limits. However, there are aspects of the Argyle Street traffic operations such as on-street parking, traffic control signals and turning provisions that could be changed to provide improved traffic operations in the corridor and it is assumed in this study that these changes are feasible.

The study has reviewed the capability of the current Argyle Street Bridge corridor to accommodate the anticipated 10 year traffic volumes with no changes to the Bridge and related roadway configuration. The assessment determined that the AM and PM peak hour traffic conditions would deteriorate significantly with no improvements to the corridor and the resulting traffic congestion would not be acceptable to motorists.

Three alternative improvement schemes for the corridor were assessed that are based on the Argyle Street Bridge being widened to three lanes and other related traffic operational improvements such as restrictions to on-street parking on Argyle Street, improved or modified traffic control in the corridor and restrictions on some turning movements at the intersection of Argyle Street and Caithness street. The study found that all three of the alternatives considered would provide improvements in the peak hour traffic conditions when compared to the "do nothing" alternative. One alternative, based on three lanes on the bridge, on-street parking restrictions on Argyle Street and left turning restrictions at the intersection of Argyle Street and Caithness Street, was found to provide peak hour level of service conditions under the estimated 10 year traffic volumes that are similar to the current level of service conditions in the corridor.

In conclusion, the study has found that the widening of the Argyle Street Bridge to three lanes will enable a significant amount of additional peak hour roadway capacity to be provided that would enable the anticipated traffic growth over the next 10 years to be accommodated. However, traffic operational changes, such on-street parking restrictions on Argyle Street and turning restrictions at the intersection of Argyle Street and Caithness Street will be required to take full advantage of the widened bridge structure. The study has not included consultation with the various stakeholder groups and this will be necessary before a specific traffic plan can be recommended. The study has also found that the widening of the Argyle Street Bridge to three lanes does not provide sufficient river crossing capacity to accommodate longer term traffic growth associated with the anticipated 25 year to 30 year planned development in Caledonia.

Appendix A

Caledonia Master Servicing Study Traffic Forecasts

FIGURE A.1: CALEDONIA MASTER SERVICING PLAN TRAFFIC ANALYSES ZONES

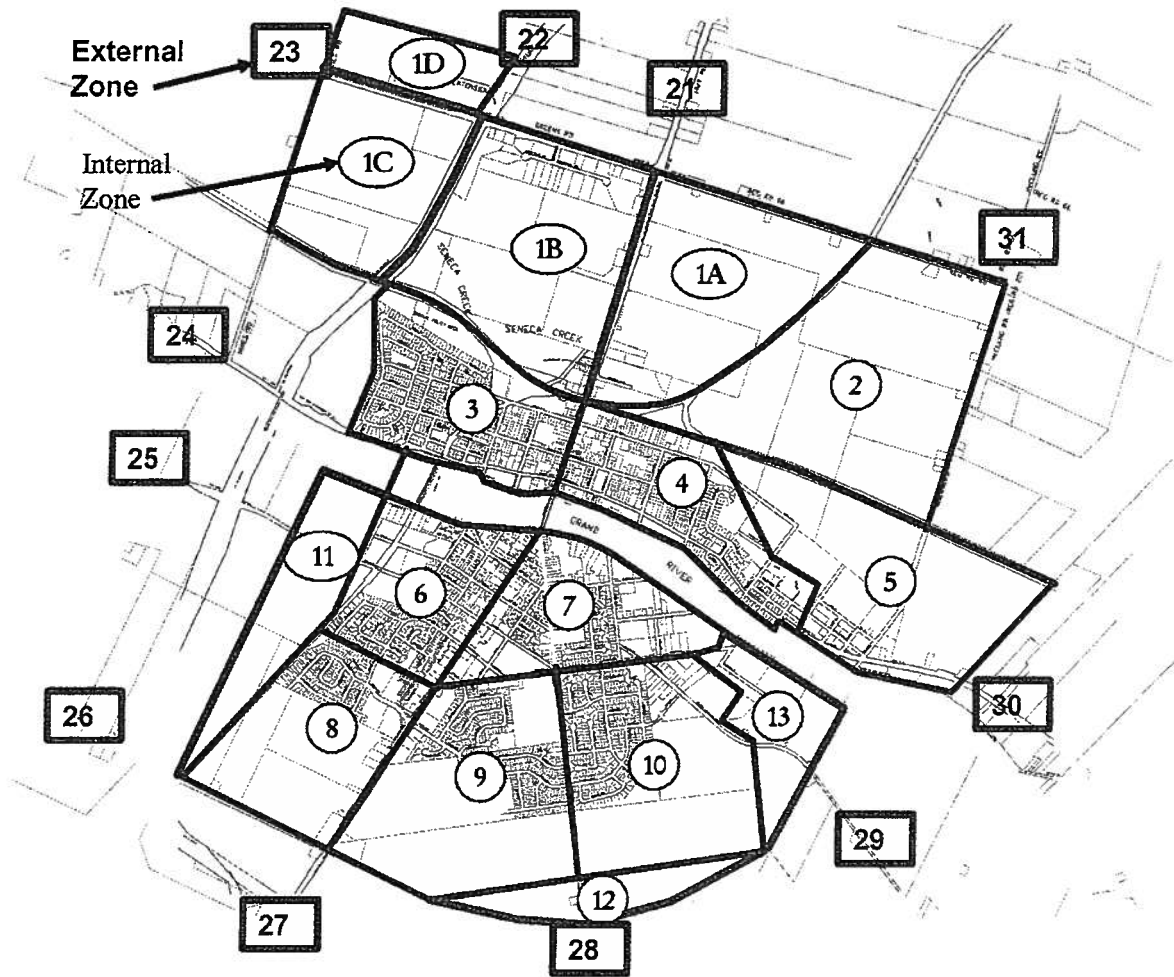


TABLE A.1: CALEDONIA MASTER SERVICING PLAN NEW DEVELOPMENT TRIP GENERATION

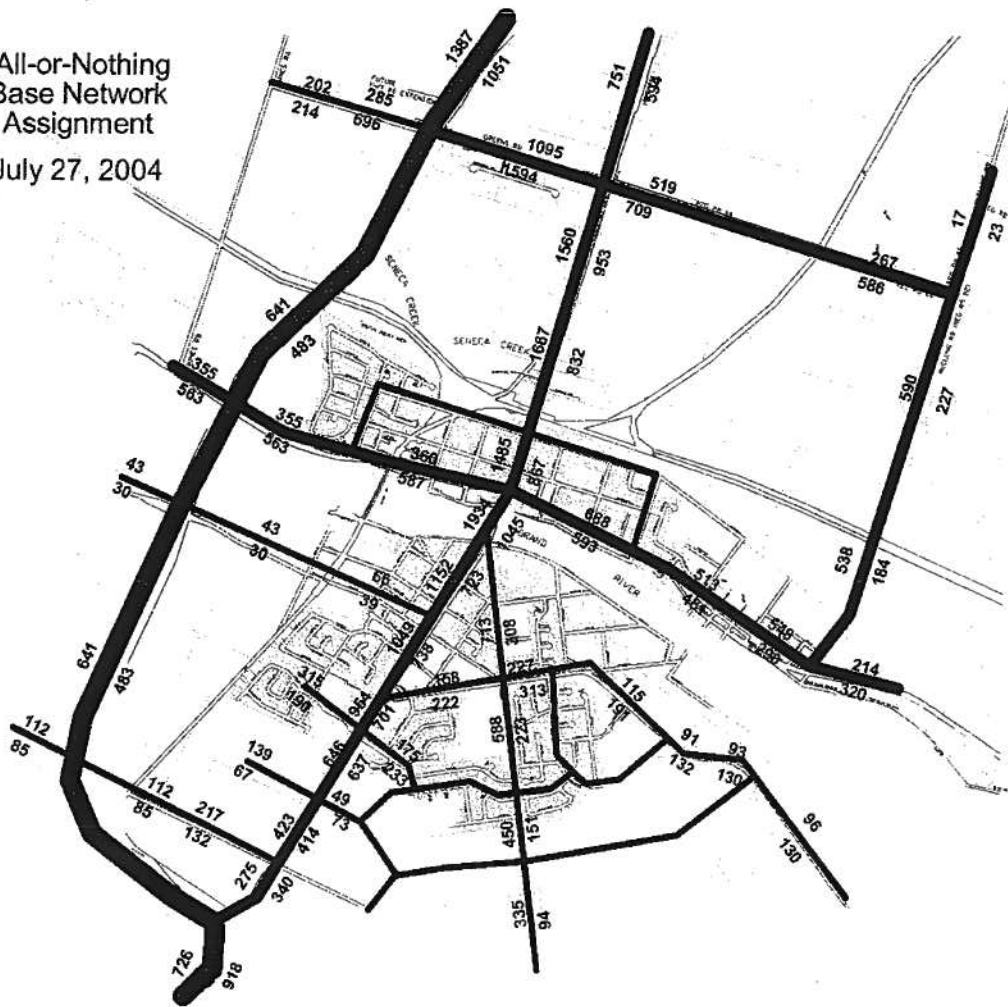
Traffic Zone	AM Peak Hour				PM Peak Hour			
	Residential Trips		Industrial Trips		Residential Trips		Industrial Trips	
	In	Out	In	Out	In	Out	In	Out
1A	0	0	511	112	0	0	134	504
1B	0	0	42	9	0	0	11	41
1C	0	0	363	80	0	0	95	358
1D	0	0	178	39	0	0	47	175
2	149	472	274	60	522	301	72	270
3	0	0	74	16	0	0	20	73
4	33	107	0	0	118	67	0	0
5	150	473	0	0	524	302	0	0
6	5	22	0	0	23	12	0	0
7	1	2	0	0	3	1	0	0
8	115	364	0	0	402	231	0	0
9	48	151	0	0	167	96	0	0
10	124	387	0	0	431	250	0	0
11								
12								
13								
Total	625	1978	1442	317	2188	1262	378	1423

TABLE A.2: CALEDONIA MASTER SERVICING PLAN NEW DEVELOPMENT TRIP DISTRIBUTION (PM PEAK HOUR)

[illegible]

FIGURE A.2: CALEDONIA MASTER SERVICING PLAN UNCONSTRAINED TOTAL TRIP ASSIGNMENT (PM PEAK HOUR)

All-or-Nothing
Base Network
Assignment
July 27, 2004



[illegible]

Total Traffic: Base
Network Capacity
Constrained
July 27, 2004

Appendix B

Synchro Files used in Study

TABLE B.1: SYNCHRO FILES UTILIZED IN STUDY

Synchro File Name	Summary of Contents
AM Existing	Existing configuration, signal timing and AM peak hour volumes
AM Existing Optimized	Existing configuration, Optimized signal split and AM peak hour volumes
AM 10 Yr No Change	Existing configuration and forecast 10 year AM peak hour volumes
AM Long Term No Change	Existing configuration and forecast long term AM peak hour volumes
AM 10 Yr Option A	Option A configuration and forecast 10 year traffic volumes
AM 10 Yr Option B	Option B configuration and forecast 10 year traffic volumes
AM 10 Yr Option C	Option C configuration and forecast 10 year traffic volumes
AM 10 Yr Option C Plus	Option C configuration and forecast 10 year traffic volumes plus 300 vph northbound
PM Existing	Existing configuration, signal timing and PM peak hour volumes
PM Existing Optimized	Existing configuration, Optimized signal split and PM peak hour volumes
PM 10 Yr No Change	Existing configuration and forecast 10 year PM peak hour volumes
PM Long Term No Change	Existing configuration and forecast long term AM peak hour volumes
PM 10 Yr Option A	Option A configuration and forecast 10 year traffic volumes
PM 10 Yr Option B	Option B configuration and forecast 10 year traffic volumes
PM 10 Yr Option C	Option C configuration and forecast 10 year traffic volumes
PM 10 Yr Option C Plus	Option C configuration and forecast 10 year traffic volumes plus 300 vph southbound

Note:

The Synchro files include additional intersections on Argyle Street north and south of the study area. The future traffic volumes at these locations have not been adjusted to reflect future conditions as these intersections are not considered in the analyses.