APPENDIX N

Phase 1 Report

WATERDOWN/ALDERSHOT MASTER EA TRANSPORTATION NETWORK STUDY

PHASE 1 – FINAL REPORT

prepared for the

City of Burlington and the City of Hamilton

Burlington

Hamilton

prepared by:

SNC-Lavalin Engineers & Constructors Inc.

in association with
Totten Sims Hubicki Associates

July 30, 2004

SNC•LAVALIN
Engineers & Constructors in association with TSH

MASTER EA TRANSPORTATION NETWORK REVIEW

of

ALDERSHOT/WATERDOWN

prepared for

the City of Hamilton

and

the City of Burlington

Final Report

August 2004

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1.0 INTRODUCTION

1.1 Background

In September 1999, Stantec Consulting Limited on behalf of the City of Burlington and the Town of Flamborough completed the final draft of the Master EA Transportation Network Study for the Aldershot/Waterdown area with a view to identifying a future transportation network to accommodate urban development in the Waterdown and Aldershot communities. The study area was bounded by Highway 6 to the west, 6th Concession Road to the north, Cedar Springs/Brant Street to the east and Highway 403 to the south. Neither the City of Burlington nor the Town of Flamborough Councils took a formal position on the study findings and recommendations. Subsequently, the Town of Flamborough was dissolved and amalgamated into the City of Hamilton.

Since that time, an Order In Council (#1262/2002, dated June 19, 2002) has been passed by the Ontario Cabinet approving (OPA 28) expansion of the Waterdown urban area and the signed Memorandum of Agreement between the Cities of Hamilton and Burlington and the affected Flamborough landowners requires the completion of an Environmental Assessment Master Transportation Study.

As four years have elapsed since completion of the final draft of the Master EA Transportation Network Study, the Cities of Burlington and Hamilton now wish to review the results of the 1999 study to ensure they are still valid. The completion and approval of the Master Plan would fulfil Phase 1 and 2 of the Municipal Class EA process. Currently the project would be a Schedule C project, therefore, prior to construction, additional class EA studies would have to be completed to fulfil phase 3 and 4 of the planning process.

An update of the 1999 Transportation Network Plan was required because of a number of factors:

- environmental constraints were known to have changed in the meantime;
- planning for the Niagara-GTA Corridor (formerly the Niagara-GTA Corridor) has begun and is thought to have an impact on the need for east-west roads through the Village of Waterdown;
- a number of local road improvements have been made, including: expansion of the Dundas Street/Highway 6/Highway 5 intersection; widening to five-lanes of Dundas Street, east of Highway 6; channelization and signalization of the Hamilton Street/Parkside Drive intersection;
- the 407 ETR toll highway has since been extended to Burlington;
- a number of new developments have taken place in the study area;
- the previous report had not been approved by either Flamborough or Burlington councils and, therefore, had no official status;
- certain agencies had expressed concerns with the plan and these concerns had not previously been addressed; and
- the 1999 Master EA had effectively not been completed as it had not addressed final agency comments, it had not received formal approval and had not been filed.

A Steering Committee consisting of staff from the Cities of Burlington and Hamilton, MTO and the Region of Halton was set up to oversee the review. In addition, Secondary Plan studies are currently being initiated by the developers associated with OPA 28. In order for these studies to commence, they need to know whether the basic components of the previously completed Master EA are still valid.

The purpose of this review was therefore to *review all the land use and transportation network changes, either proposed or constructed, which may effect the study area conclusions and recommendations of the previous Transportation Master Plan Study undertaken by Stantec Consulting Ltd. in September 1999.*

1.2 Study Activities

The following tasks were completed in this study review:

- traffic counts had been completed for the area at most intersections during the past year;
- an origin-destination analysis of traffic entering and leaving Waterdown village along Dundas Street and Parkside Drive was undertaken in May 2003,
- environmental constraint mapping was updated with new Environmentally Significant Areas;
- a mail-out was sent to selected stakeholder government agencies and utilities in order to obtain an update on any issues that may impact the planning of roads in the area;
- the traffic needs analysis for the ultimate road network was updated;
- the interaction between the various Niagara-GTA Corridor options and the Waterdown area road network was assessed; and
- the previous Master Plan was reviewed based on this updated information to ascertain whether the route selection for the new roads is still valid.

The study area for this Master EA review is shown in **Exhibit 1.1**.

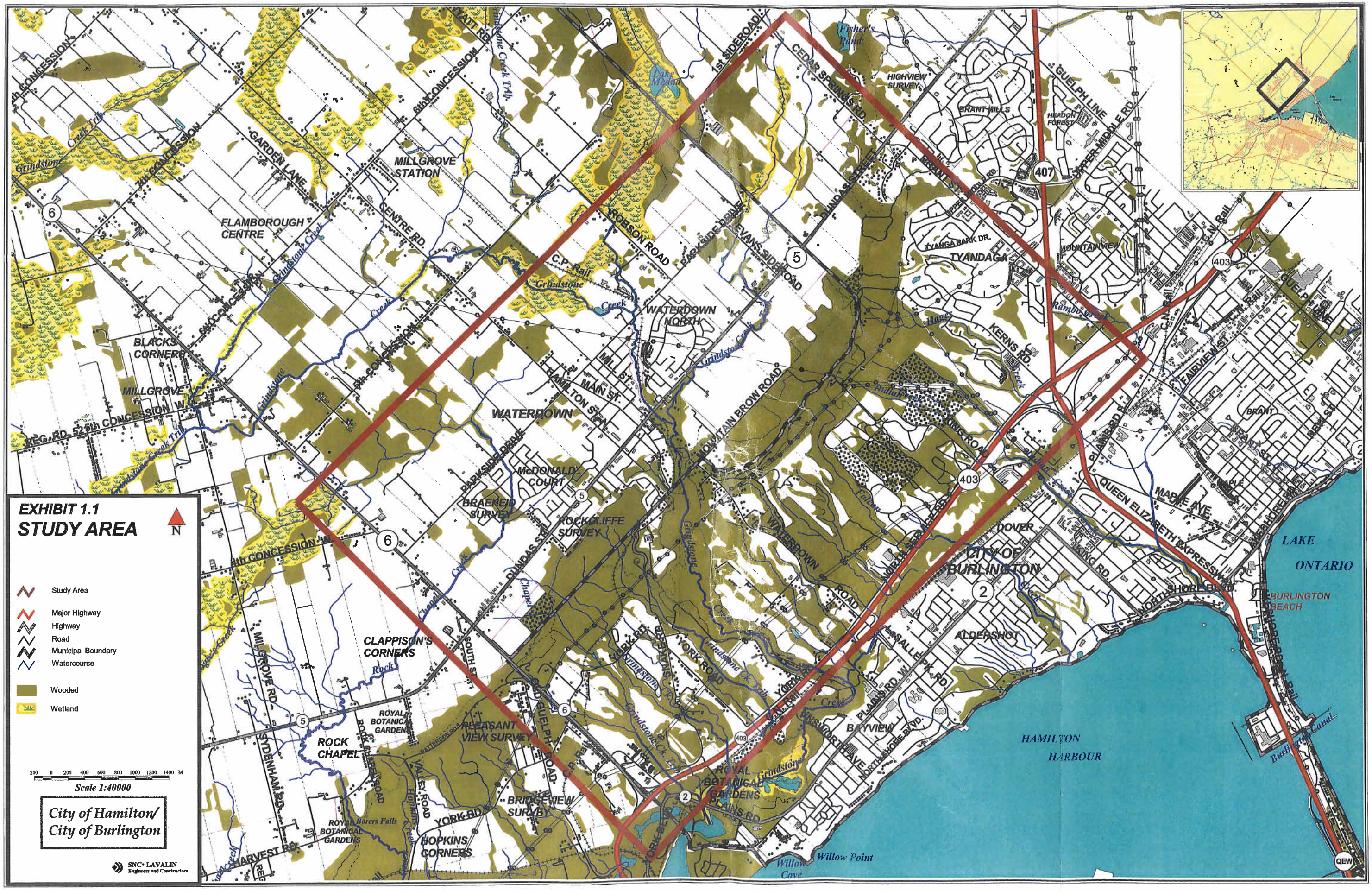


EXHIBIT 1.1
STUDY AREA
N
Study Area
Major Highway
Highway
Road
Municipal Boundary
Watercourse
Wooded
Wetland
200 0 200 400 600 800 1000 1200 1400 M
Scale 1:40000
City of Hamilton/
City of Burlington
SNC• LAVALIN
Engineers and Constructors
MILLGROVE STATION
FLAMBOROUGH CENTRE
BLACKS CORNERS
MILLGROVE
WATERDOWN
WATERDOWN NORTH
McDONALD COURT
BRAEHEID SURVEY
ROCKCLIFFE SURVEY
CLAPPISON'S CORNERS
ROCK CHAPEL
ROYAL BOTANICAL GARDENS
PLEASANT VIEW SURVEY
BRIDGEVIEW SURVEY
HOPKINS CORNERS
HIGHVIEW SURVEY
BRANT HILLS
TYANDAGA
CITY OF BURLINGTON
DOVER
ALDERSHOT
BAYVIEW
HAMILTON HARBOUR
LAKE ONTARIO
BURLINGTON BEACH
Willow Point
Willow Cove
Grindstone Creek
Lake Medad
Fisher's Pond
Rambo Creek
Chapel Creek
Rock Creek
Hopkins Creek
Borers Falls
GARDEN LANE
CENTRE RD.
ROBSON ROAD
PARKSIDE DRIVE
EVANS SIDEROAD
1st SIDEROAD
CEDAR SPRINGS RD.
DUNDAS STREET
GUELPH LINE
UPPER MIDDLE RD.
KERNS RD.
MOUNTAIN BROW ROAD
WATERDOWN ROAD
NORTH SERACK RD.
QUEEN ELIZABETH EXPRESSWAY
MAPLE AVE.
FAIRVIEW ST.
PLAINS RD.
NORTH SHORE BLVD.
SALLE PK. RD.
YORK ROAD
YORK RD.
SOUTH ST.
DUNDAS ST.
MILL ST.
MAIN ST.
HAMILTON ST.
SYDENHAM RD.
HARVEST RD.
MILGROVE RD.
REG. RD. 525th CONCESSION W.
4th CONCESSION W.
6th CONCESSION
7th CONCESSION
C.P. Rail
C.N. Rail
6
5
2
403
407
QEW

2.0 REVIEW OF MASTER PLAN (1999)

The forecast volume/capacity condition on various screenlines were presented in Table 18 (reproduced below) of the *Stantec* report. The 1999 Master EA study preceded the opening of the 407 ETR West extension.

		TABLE 18 (from page 50 of Stantec report)				
		SCREENLINE VOLUME TO CAPACITY RATIOS (PM Peak Hour)				
Screenline	Direction	Link-based Capacity (vph)	Volume to Capacity Ratio			
			Existing	Short	Intermediate	Ultimate
East of Highway 6	Westbound	1700	0.64	0.76	0.93	1.11
	Eastbound	1750	0.57	0.81	1.19	1.41
East of Waterdown Road	Westbound	2000	0.90	1.10	1.25	1.30
	Eastbound	2000	0.57	0.72	1.00	1.32
East of Evans Road	Westbound	2700	0.59	0.71	0.94	0.78
	Eastbound	2200	0.33	0.41	0.58	0.71
North of Dundas St.	Northbound	4400	0.49	0.64	1.06	0.83
	Southbound	4400	0.39	0.47	0.70	0.75
South of Dundas St.	Northbound	4910	0.59	0.75	0.91*	0.89
	Southbound	5350	0.55	0.64	0.72*	0.71
At the escarpment crossing	Northbound	5225	0.57	0.66	0.88*	0.91
	Southbound	5225	0.60	0.68	0.84*	0.94

** with Hwy. 407, could potentially improve the v/c by 0.1.*

In order to address the v/c short-comings contained in the table, the recommended improvements were (extracted from Table 19, page 52 of the Stantec report):

Intermediate Growth Horizon
- additional lane of capacity east/west through Flamborough;
- additional lane on North Service Road east of King Road;

Ultimate Growth
- additional lane of north/south capacity across escarpment;
- additional lane on North Service Road between King Road and Waterdown Road;
- additional lane on King Road between North Service Road and Plains Road; and ramps to/from the east at Hwy. 403; and
- South Service Road between King Road and Waterdown Road (required for development access).

The 1999 Master EA recommendations for roadway improvements are indicated on **Exhibit 2.1** (reproduced from the 1999 report). The main additions to the network were:
- the "Red Route" which was an east west corridor immediately north of Parkside Drive extending between Highway 5 (west of Highway 6) and Dundas Street (west of Evans Sideroad); and
- the "Green Route" (extending between Dundas Street and the North Service Road) which was an improved connection between Dundas Street and the North Service Road generally following the King Road alignment.

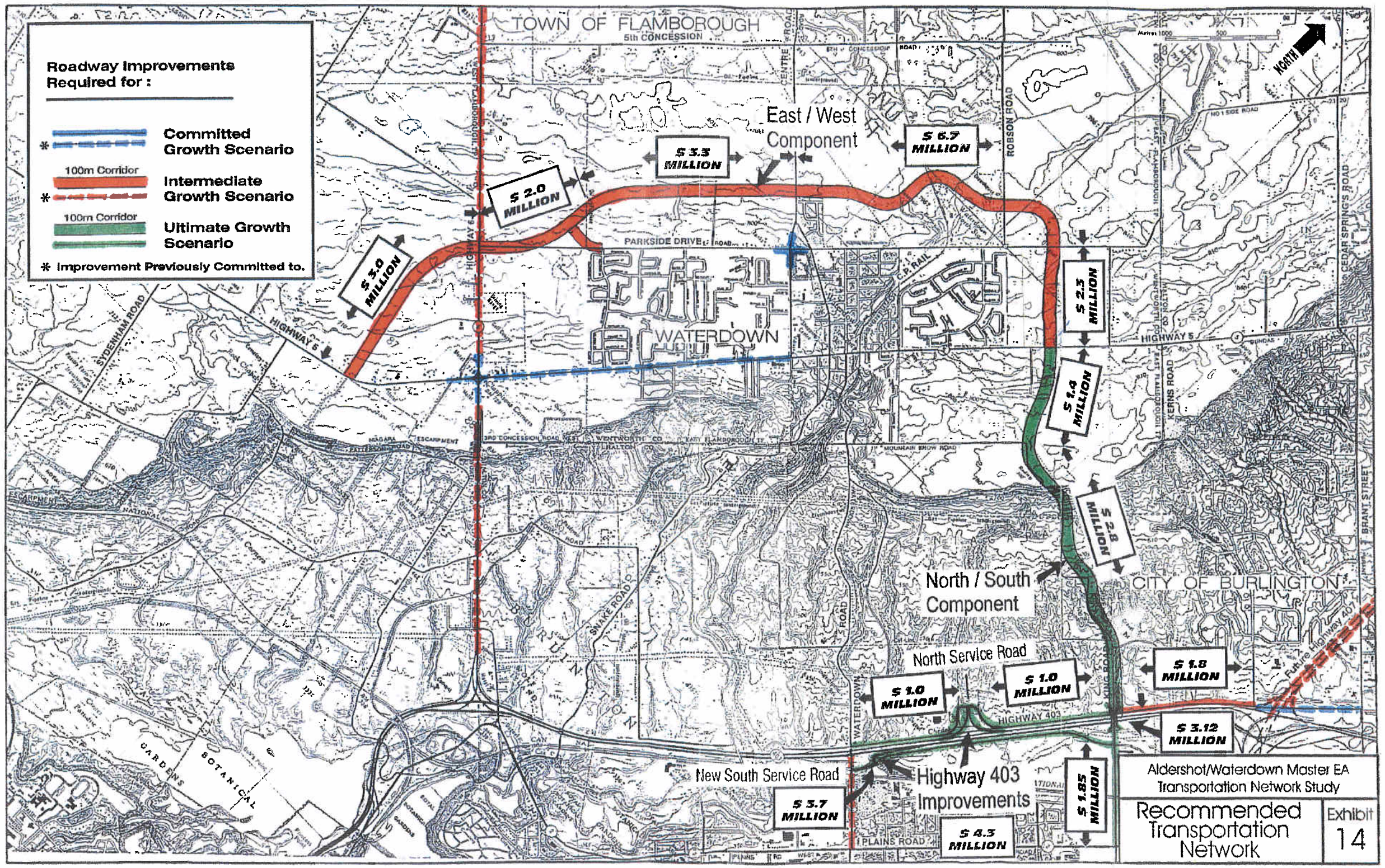


EXHIBIT 2.1 – RECOMMENDED TRANSPORTATION NETWORK
(reproduced from Aldershot/Waterdown Master EA Transportation Network Study – September 1999)

It should be noted that for some screenlines, traffic forecasts for the ultimate horizon year are lower than the intermediate year. Presumably, this is a result of modelling of the potential impacts of the opening of 407 ETR (assumed to be open only by the ultimate horizon year). The model forecasted a significant drop in traffic volumes at both the north-south and east-west screenlines (see shaded areas of above table) as a result of the 407 ETR west extension.

The 407 ETR has not relieved the east-west travel volumes since its opening in 2001; however, there has been a small reduction in north-south volumes (see Section 4.2).

In retrospect, the modelled impacts of the 407 ETR were probably over-stated in the 1999 report. For this reason, the ultimate road needs in the study area may well have been understated, particularly in the east west direction, east of Evans Road.

This review study will re-examine the needs as identified in the 1999 report.

3.0 DEMAND FORECASTING METHODOLOGY

The intention of this review was to investigate the needs analysis for future road capacity in the Waterdown/Aldershot area from a number of perspectives, including both regional impacts and effects of other road initiatives as well as determining the needs on individual links.

To address this array of issues requires the approach of using both a *strategic* high level modelling exercise and a more concentrated detailed local area model (*sub-area modelling*). The strategic modelling exercise will address questions on network expansion and other major network influences, particularly the potential impact of the proposed Niagara-GTA Corridor as planned by the Ministry of Transportation, Ontario, while the sub-area modelling will focus on the details of infrastructure requirements within the study area. A discussion of the modelling methodology is presented in Sections 3.2 and 3.3.

3.1 Hour of Analysis

The Strategic Model uses an AM Peak Hour for modelling purposes. This is because the AM Peak is generally more easily modelled with "home-to-work" trips heavily predominating at that time of day. In the PM peak hour, there are many other trip types taking place and it is not as easy to correlate trip making to the basic inputs of population and employment.

The assessment of current conditions (see Section 4.1) illustrates that the PM peak hour is significantly worse in terms of congestion than the AM peak hour for this study area. This is illustrated by a simple statistic that shows PM peak hour in-bound traffic volumes to the village are currently 29% higher than the outbound flows in the AM peak hour as shown in the following table:

	Current Outbound Traffic – AM	Current Inbound Traffic – PM
Parkside Dr. (east of Hwy. 6)	186	229
Dundas St. (east of Hwy. 6)	666	776
Dundas St./Regional Road 5 (west of Brant St.)	1503	1967
Mill St. (south of Dundas St.)	205	336
TOTAL TRAFFIC	2560	3308

It is also interesting to look at the difference in trip generation rates (using ITE rates) for the AM and PM peak hours. The study area total trip generation for Aldershot and Waterdown (see section 5.1.1 for further details) is summarized below:

AM Peak Hour		PM Peak Hour	
Inbound	**Outbound**	**Inbound**	**Outbound**
2970	4880	5671	4301
7850		9972	

This suggests a 27% greater trip generation in the PM peak hour than in the AM peak hour.

In order to determine infrastructure needs, the sub-area model focussed the analysis on the PM peak hour, while AM peak outputs from the strategic model were factored to the PM peak in order to maintain consistency in the analysis.

3.2 Sub-Area Modelling

The sub-area modelling was done by using current traffic turning movement counts as a base, factoring in background growth and then adding to the network the impact of the local development using a simple trip generation (using ITE rates), distribution (using 2001 TTS data) and (hand) assignment of trips. The critical intersections in the study area were analyzed for their capability of handling the resulting forecast traffic volumes using the SYNCHRO/SimTraffic traffic simulation package. Capacity deficiencies were identified and improvements tested for their ability to satisfy the capacity shortfall.

The sub-area modelling process is suitable for:

- short range time horizons only (less than 10 years);
- in situations where the strategic network is unlikely to change considerably; and
- analyzing the impacts and needs of individual links and intersections.

It is not a suitable technique for long range forecasting (greater than 10 years).

3.3 Strategic Modelling

The strategic modelling was done by adapting the City of Hamilton's current model. It has a gravity model based trip generation module and a capacity restraint assignment algorithm.

The results of the model are:

- suitable for identifying capacity conditions on a screenline basis only;
- not suitable for individual link (without significant refinement) or intersection analysis;
- appropriate for identifying impacts from external network improvements;
- appropriate for long range forecasting of impacts.

The main reason for utilizing a Strategic Model for this project was to examine the potential impacts of the Niagara-GTA Corridor and whether its implementation might negate the need for improvements to the arterial road network in the study area.

4.0 EXISTING CONDITIONS

4.1 Current Capacity Deficiencies

Recent turning movement counts at the main intersections in the study area are shown in **Exhibits 4.1** and **4.2** for AM and PM peak hours respectively. A review of both SYNCHRO intersection analysis and SimTraffic simulation results was carried out using these current traffic counts (including minor smoothing of data in places) and existing signal timing plans. The results show that while most intersections are operating well, there are certain specific movements that are experiencing delays and evidence that capacity may soon be (or already has been) reached.

Since the turning movement counts used for this examination of existing conditions were actually observed, in theory none of the movements should have a volume to capacity (v/c) ratio in excess of 1.0. That is to say, if 500 vehicles were observed making a certain movement, then the capacity of that movement cannot be less than 500 based on that particular signal timing. Some effort had to be made to calibrate SYNCHRO and SimTraffic to reflect this truth, as in certain cases the default analysis parameters showed the observed flows to be over capacity.

The table in **Exhibit 4.3** shows the worst existing individual intersection movements in the study area, for the AM and PM peak periods. The table shows all movements which exhibited a v/c ratio of greater than 0.80. As can be seen, PM peak hour conditions are more congested than the AM peak hour, with numerous movements near to, or at capacity.

4.2 Recent Growth

Between 1997 and 2002/03, background traffic volumes in the study area rose along Dundas Street (approximately 2% per year) but declined along the north-south escarpment crossings.

EXHIBIT 4.4 – CHANGES IN RECENT PEAK HOUR TRAFFIC VOLUMES

Inbound gateways into the Waterdown area:	1997 Count (PM Peak Hour)	2002/03 Count (PM Peak Hour)	Change
Centre Road SB (north of Parkside Drive)	530	621	91 (17%)
Dundas Street EB (east of Hwy. 6)	710	780	70 (10%)
Dundas Street/Reg. Road 5 WB (west of Brant Street)	1480	1608	128 (9%)
Kerns Road NB (south of Dundas Street/Reg. Road 5)	200	61	-139 (-70%)
Mill Street NB (south of Dundas Street) *	500	336	-164 (-33%)
TOTAL	**3420**	**3406**	**-14 (-0%)**

* Note: Mill Street gateway includes traffic from Waterdown Road and King Road

The overall change (0%) in gateway (inbound) crossings of the escarpment is negligible which would reflect the minimal new development that has taken place in Waterdown in the last 5 years. Traffic growth at the Brant Street/Regional Road 5 intersection and Dundas Street /

Highway 6 / Highway 5 intersections was 12% and 11% respectively over the same time period.

EXHIBIT 4.3 – CURRENT CRITICAL TURNING MOVEMENTS

Intersection	Movement	Demand volume	v/c	Average delay/veh (s)
AM Peak Hour				
Dundas St. at Mill St.	EB through/right	985 through 53 right	0.88	EBT 33.3 EBR 33.2
Dundas St. at Evans Road	SB left/right	339 left 26 right	0.83	SBL 28.0 SBR 22.5
Regional Road 5. at Brant St.	EB through	1214	0.92	38.8
Hwy. 6 at Parkside Dr.	SB left	144	0.83	55.4
PM Peak Hour				
Hwy. 6 at Hwy. 5 / Dundas St.	WB left	432	0.85	62.8
Hwy. 6 at Parkside Dr.	SB left	155	0.83	43.1
Dundas St. at Hamilton St.	EB left	149	0.93	24.9
Dundas St. at Main St.	WB through	1040	0.89	30.9
Dundas St. at Mill St.[1]	WB through	927	0.83	56.6
Hamilton St. at Parkside Dr.	NB left	89	0.85	39.8
Regional Road 5 at Brant St.[2]	NB left WB left WB through	385 492 1562	1.10 1.21 0.94	NBL 233.3 WBL 335.2 WBT 56
North Service Rd. at Brant St.	EB right WB left NB left NB through	435 378 538 1376	0.85 0.82 0.93 1.03	EBR 14.6 WBL 349.7 NBL 108.0 NBT 101.7
Kerns Rd. at North Service Rd.	WB through	680	0.86	32.3
King Rd. at North Service Rd.	WB through	630	0.91	105.3
Waterdown Rd. at North Service Rd.	WB through/left	274 left 349 through	0.96	WBL 95.3 WBT 98.9

N.B. Turning movements shown with a v/c over 1.0 are likely operating at greater saturation flow rates than assumed.

[1] There is significant recurring queuing westbound on Dundas St. in the PM peak where the 4-lane section ends approaching Mill St., and this meters demand making the intersection appear to function, when in reality there is a capacity deficiency on Dundas St.

[2] This intersection is in need of improvement by the addition of double left turn lanes (NBL, WBL). This need was also identified in the *Transportation Master Plan for Regional Road 5 (Dundas Street) and 25 Corridors*, undertaken by Halton Region in 1999.

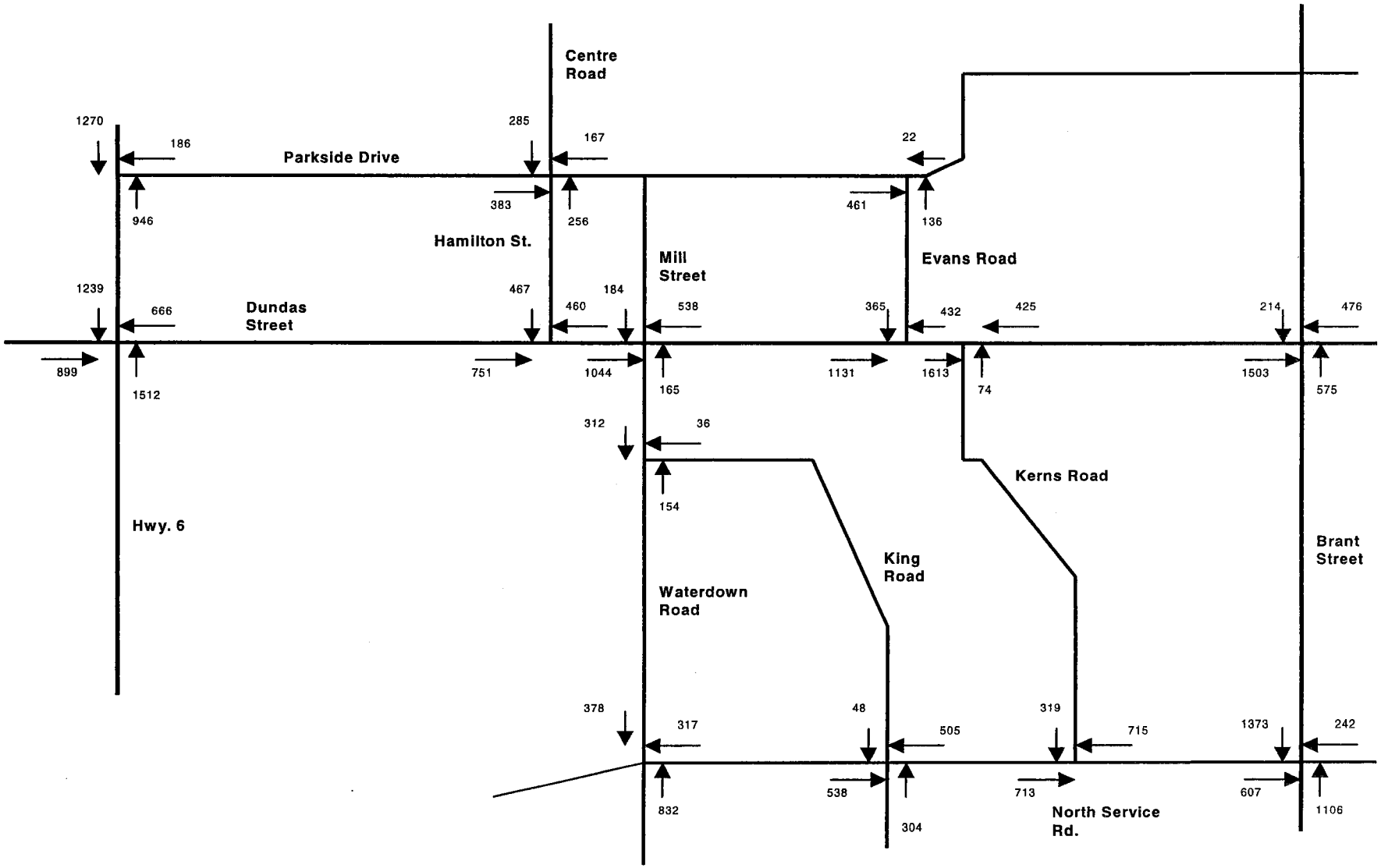


EXHIBIT 4.1 - AM PEAK HOUR TRAFFIC VOLUMES (2002/03)

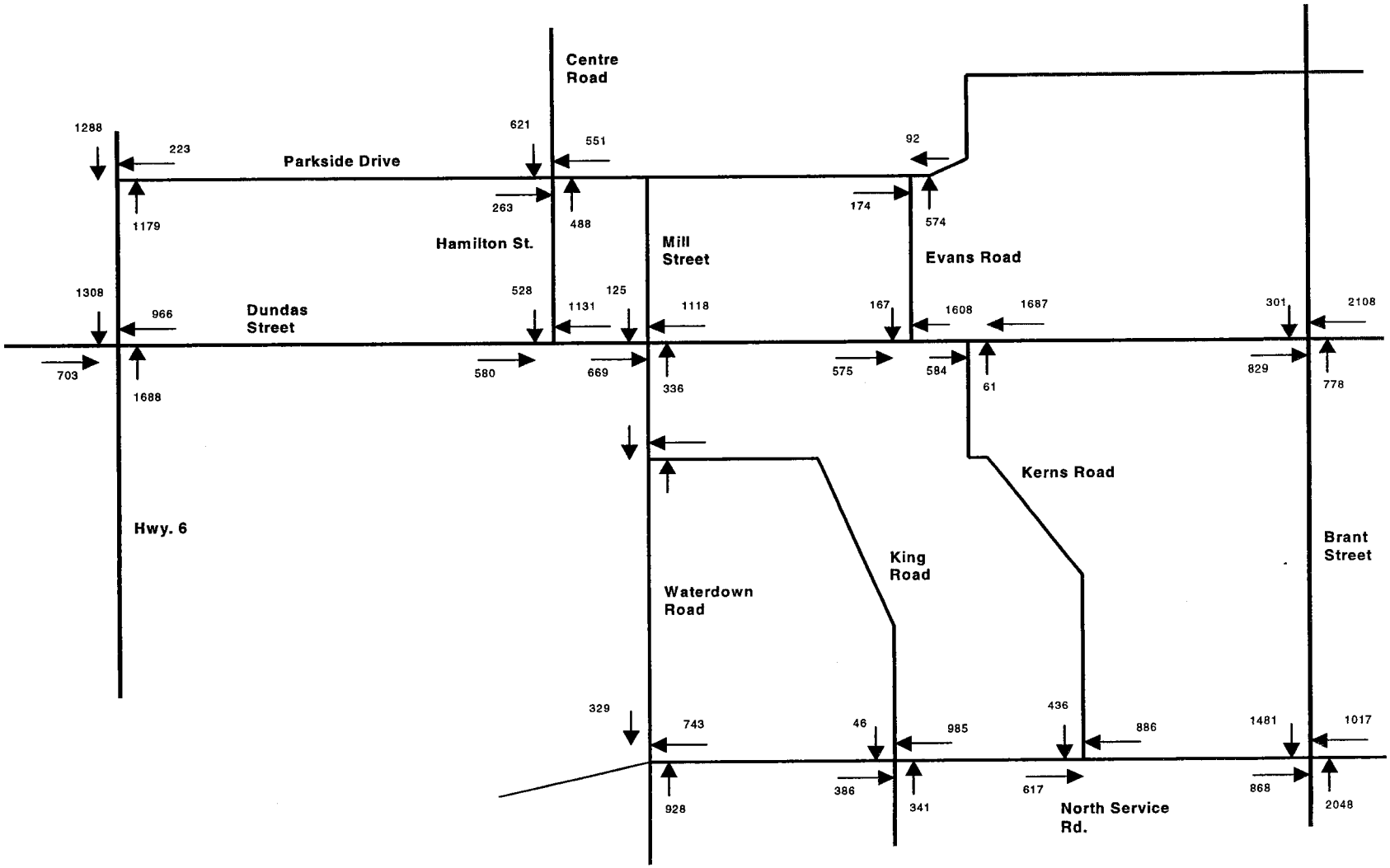


EXHIBIT 4.2 - PM PEAK HOUR TRAFFIC VOLUMES (2002/03)

5.0 SUB-AREA MODELLING

5.1 Sub-Area Model Development

5.1.1 Trip Generation

In order to estimate the new trips that will use the Waterdown area road network in the future, a list of land development projects was obtained, as shown in **Exhibit 5.1** below. See **Exhibit 5.2** for the referenced development areas.

EXHIBIT 5.1 – POPULATION & EMPLOYMENT FORECASTS

			Residential Units	Employment
ALDERSHOT & TYANDAGA				
Sketch #				
1	Jannock Brick Plant		0	30
2	King's Forest Bus. Park		0	3400
3	Jannock/CNR lands		0	3500
4	Blue Circle lands		0	725
5	Waterdown Rd lands		0	600
6	Howard Rd lands		0	350
7	DeGroote Project		215	0
8	Plains Rd lands		100	100
9	Emshih east of Costco		0	550
10	Amherst Drive		230	0
11	United Lands		100	0
12	Geofcott lands		0	400
13	Grindstone Owners		650	250
14	Garden Trails		200	0
15	Easterbrook lands		100	0
16	Bridgeview Office		0	100
17	Snake Rd Cemetery		0	0
18	Dundas Pleasantview		25	0
22	West Plains		50	0
23	Aldershot Plaza		500	0
24	RBG Expansion		0	100
		subtotal	2170	10105
			(5880 pop.[1])	

[1] approx. growth from 1999 on

WATERDOWN				
Sketch #				
19	South of Dundas Street		3500	0
20	North of Dundas Street		1000	0
21	Parkside Drive Corridor		2000	0
		subtotal	6500	0
			(19500 pop)	

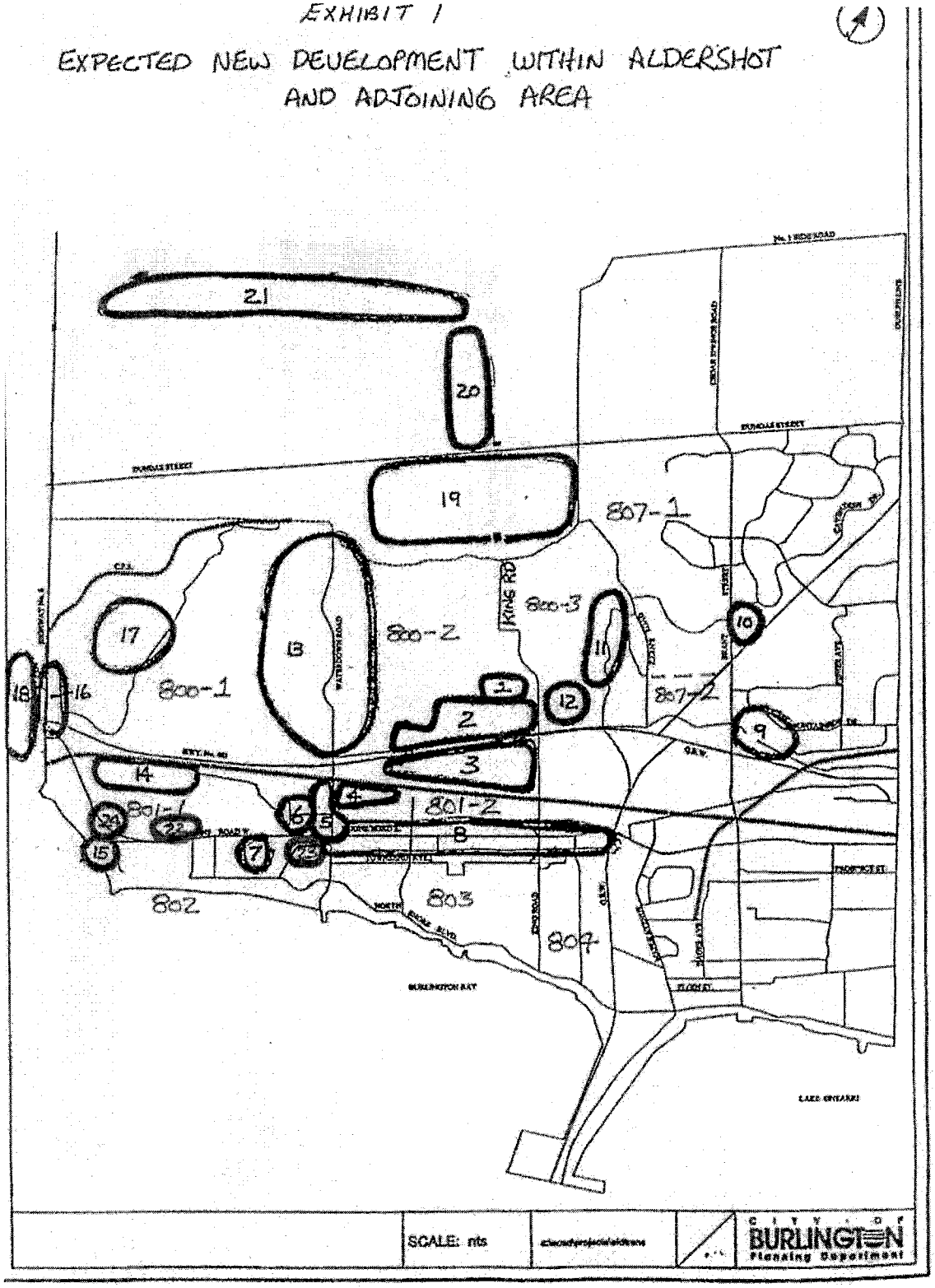


EXHIBIT 5.2 - LOCATIONS OF EXPECTED NEW DEVELOPMENT IN WATERDOWN & ALDERSHOT

These proposed development sites were sorted into the sub-area zone system used for this study, which involved putting from 1 to 8 developments into a single traffic zone depending on location. An exception was the Parkside Drive Corridor development which was split over two traffic zones due to its size.

Zones within Waterdown's OPA 28 were assumed to be completely developed by the 2008 horizon year, while those zones located in Aldershot and Tyandaga were scaled to reflect likely level of development completion by the year 2008, based on planning data received form the City of Burlington for 2011 and 2021.

For each planned land use type (residential or industrial), standard ITE Trip Generation rates were used for both the total generation, and the inbound/outbound split of traffic flow. The resulting trip generation and directional splits are shown in **Exhibit 5.3** below.

EXHIBIT 5.3 – TRIP GENERATION CALCULATIONS

			PM peak Trip Generation (p265, p92)				AM peak Trip Generation (p264, 91)			
			Residential		Employment		Residential		Employment	
		in/out splits:	0.64	0.36	0.21	0.79	0.25	0.75	0.83	0.17
ALDERSHOT & TYANDAGA		direction:	in	out	in	out	in	out	in	out
Sketch #		trips / unit or emp.:	1.02		0.42		0.75		0.44	
1	Jannock Brick Plant		0	0	1	2	0	0	3	1
2	King's Forest Bus. Park		0	0	71	268	0	0	295	61
3	Jannock/CNR lands		0	0	73	276	0	0	304	62
4	Blue Circle lands		0	0	38	143	0	0	157	32
5	Waterdown Rd lands		0	0	38	142	0	0	156	32
6	Howard Rd lands		0	0	22	83	0	0	91	19
7	DeGroote Project		119	67	0	0	34	102	0	0
8	Plains Rd lands		63	36	6	21	18	55	23	5
9	Emshih east of Costco		0	0	49	182	0	0	201	41
10	Amherst Drive		0	0	0	0	0	0	0	0
11	United Lands		65	37	0	0	19	56	0	0
12	Geofcott lands		0	0	29	108	0	0	119	24
13	Grindstone Owners		328	184	7	27	94	282	30	6
14	Garden Trails		131	73	0	0	38	113	0	0
15	Easterbrook lands		55	31	0	0	16	47	0	0
16	Bridgeview Office		0	0	9	33	0	0	37	7
17	Snake Rd Cemetary		0	0	0	0	0	0	0	0
18	Dundas Pleasantview		8	5	0	0	2	7	0	0
22	West Plains		33	18	0	0	9	28	0	0
23	Aldershot Plaza		276	155	0	0	79	238	0	0
24	RBG Expansion		0	0	6	24	0	0	26	5
			1078	606	349	1309	309	928	1442	295
		Subtotals:	Total trips:	1684	Total trips:	1658	Total trips:	1237	Total trips:	1737
				Total trips: 3342				Total trips: 2974		
WATERDOWN										
Sketch #										
19	South of Dundas Street		2285	1285	0	0	656	1969	0	0
20	North of Dundas Street		653	367	0	0	188	563	0	0
21	Parkside Drive Corridor		1306	734	0	0	375	1125	0	0
			4244	2386	0	0	1219	3657	0	0
		Totals:	**5322**	**2992**	**349**	**1309**	**1528**	**4585**	**1442**	**295**
				Total trips: 9972				**Total trips: 7850**		

(page references are from ITE Trip Generation Manual, 6th Edition)

5.1.2 Trip Distribution

The trip distribution was done according to the 2001 Transportation Tomorrow Survey (TTS - version 1.0 database) results for the zones in the study area. External trips were aggregated based on distance from the study area - the further from the study area, the larger the aggregation. For example, only one external zone was necessary to represent all trips to and from Oakville and all points east, as all these trips would share the same access points to the sub-area study area (in this particular case being Regional Road 5 and the QEW).

Origin-Destination matrices were developed for AM and PM peak periods to include all the zones used in the sub-area model, and all the external aggregated zones. The new trips generated by the expected development activity for the AM and PM peak hours were then distributed according to the proportions in the OD matrix.

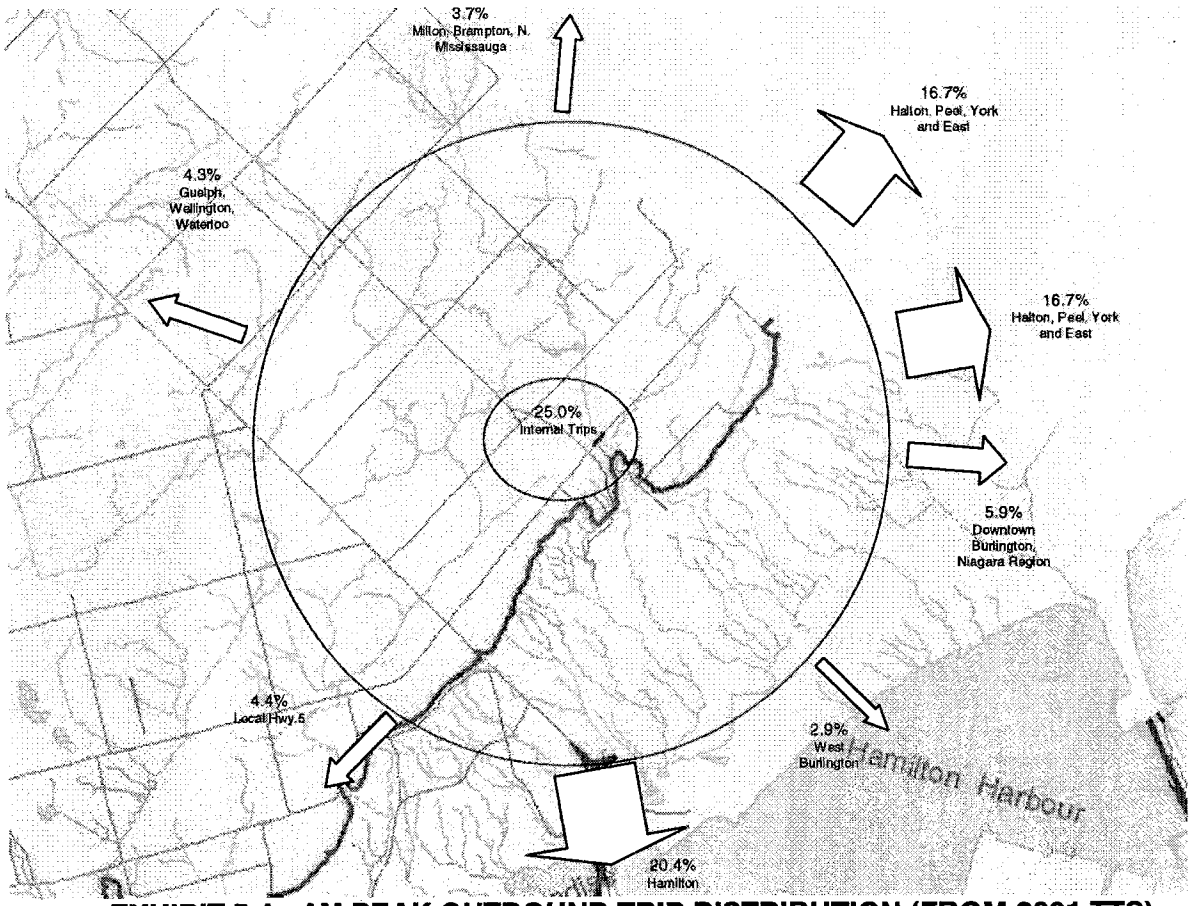


EXHIBIT 5.4 - AM PEAK OUTBOUND TRIP DISTRIBUTION (FROM 2001 TTS)

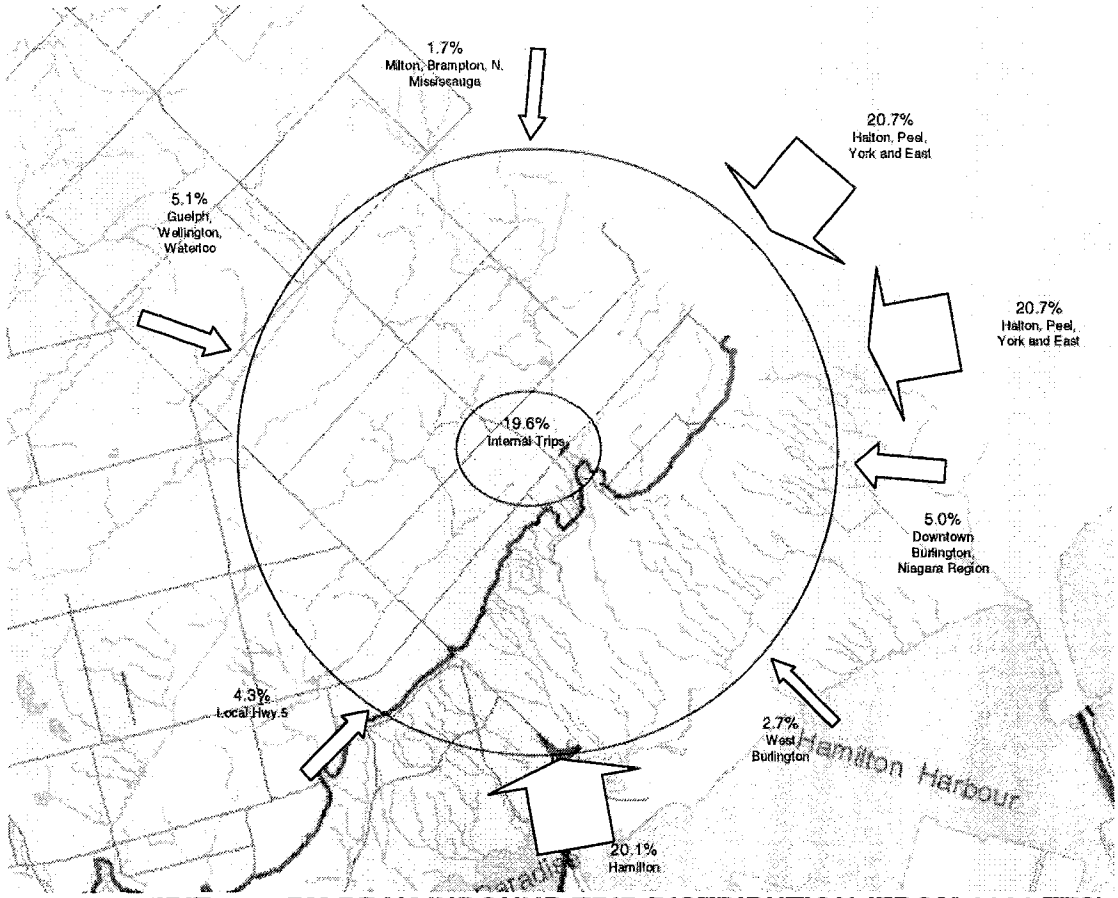


EXHIBIT 5.5 - PM PEAK INBOUND TRIP DISTRIBUTION (FROM 2001 TTS)

5.1.3 Trip Assignment

The trips were assigned to the network using from 1 to 3 paths for each OD pair, depending on the locations and network scenario, and hence the availability of likely route options. Any trips which would not use links within the sub-area were not assigned, e.g. trips from South Aldershot to downtown Burlington would not appear within the sub-area road system. The assignment took into account the access points for Hwy. 403, including the planned new interchange ramps at Waterdown Rd.

As part of this sub-area modelling exercise, the terms of reference called for a testing of the previously recommended transportation network contained in the 1999 Stantec report. The testing of this network (and variations) is presented in Appendix A.

5.1.4 Currently Planned Road Improvements

The following are improvements to Highway 6 planned by the MTO:

- Hwy. 6 widening to 5 lanes (3 NB / 2 SB) south of Highway 5 / Dundas St. – the detailed design is underway, construction is subject to funding in relation to other provincial priorities.
- Highway 5 / Dundas St. / Highway. 6 interchange (Parclo A) EA was recently completed – detailed design and construction will depend on traffic volumes, property acquisition and funding in relation to other provincial priorities.

- Highway 6 (north of Highway 5 / Dundas St.) – a planning study is to be initiated to review the ultimate need and configuration of the highway.
- Highway 5 (west of Highway 6 - potential widening) – a Preliminary Design and Environmental Assessment Study is currently underway.

The existing over-capacity conditions at the Highway 6/Dundas Street/Highway 5 intersection will demand the grade-separation be made as soon as possible. The grade-separation was assumed to be in place by the time of the full-build out of OPA 28 and Aldershot, as was the Highway 403/Waterdown Road complete interchange (addition of ramps to and from the east).

5.1.5 General Implications of the Development Scenarios

The analysis of base conditions (see Section 4) reveals a current road network that is straining at the exit/entry points to Waterdown village, particularly at points along Dundas Street, i.e. Highway 6, Mill Street and Brant Street. These are the main escarpment crossing points for traffic to get into and out of the village. In examining the trip distribution of future trips (as discussed in Section 5.1.2), it is clear that the new residential development will need to use these same exit/entry points for commuting access to destinations in Burlington and beyond.

The addition of either 50% or 100% of OPA 28 and associated Aldershot development results in an extremely overloaded current network. The 50% OPA 28 development scenario (including a scaled Aldershot development) places the following additional traffic volumes on the key "gateway" roadway segments:

EXHIBIT 5.6 – ADDITIONAL GATEWAY PRESSURES DUE TO OPA 28 (50%)

	50% OPA 28 + Aldershot Development assigned to base network	
	Outbound – AM	**Inbound – PM**
Parkside Dr. (east of Hwy. 6)	250	420
Dundas St. (east of Hwy. 6)	450	270
Dundas St. / Regional Road 5 (west of Brant St.)	610	860*
Kerns Rd. (south of Dundas St. / Regional Road 5)	210	10*
Mill St. (south of Dundas St.)	220	480

* in reality, more traffic may use Kerns Road as Brant/Regional Road 5 would be extremely overloaded in this hypothetical scenario.

The addition of the complete OPA 28 development and scaled Aldershot development results in the following pressures in the PM peak.

EXHIBIT 5.7 – ADDITIONAL GATEWAY PRESSURES DUE TO OPA 28

	100% OPA 28 + Aldershot Development assigned to base network	
	Outbound - AM	**Inbound – PM**
Parkside Dr. (east of Hwy. 6)	490	840
Dundas St. (east of Hwy. 6)	870	540
Dundas St. / Regional Road 5 (west of Brant St.)	1160	1650*
Kerns Rd. (south of Dundas St.)	420	10*
Mill St. (south of Dundas St.)	360	890*

* in reality, more traffic may use Kerns Road as Brant/Regional Road 5 would be extremely overloaded in this
hypothetical scenario.

Based on these assignments (unrealistic without significant improvements), without considering the small amounts of available capacity remaining, nominally:

- an additional high capacity east-west lane (equivalent to an arterial lane) is required to the west (Parkside + Dundas with new demands of 840 + 540 = 1380),
- an additional high capacity east-west lane (equivalent to an arterial lane) is required to the east (Dundas new demands of 1650);
- and one new north-south lane is required to relieve impacts on Waterdown and Kerns with new demands of 890 + 10 = 900).

These future requirements may be modified slightly when considering links that currently have some spare capacity (e.g. Waterdown Road/Mill Street) and roadways that will be improved (e.g. Highway 6/Dundas Street/Highway 5 interchange). The results are presented initially in this manner in order to provide a quick snapshot of the implications of the future development scenarios in terms of the major gateway requirements into and out of Waterdown village. This overview does not include other pressures that may also exist elsewhere in the network.

5.2 Future Conditions

A nominal horizon year and full build out of OPA 28 was considered to be 2008. The labelling of the horizon year is somewhat academic. It is meant to be a near/mid-term horizon suitable for the modelling technique being used - longer term horizons are not appropriate for this technique. Background traffic volumes along Dundas Street had grown by approximately 12% between 1997 and 2002/03, this same growth was applied to the existing through movement counts at intersections along Highway 6 and Dundas Street to get to a background growth scenario for the horizon year.

In analyzing this background growth scenario (i.e. no new development in Waterdown or Aldershot), the results show a worsening of traffic conditions at the three main bottlenecks (Dundas Street at Hwy. 6, Mill Street and Brant Street). While it appears that most of these background demand increases can be handled for the most part with signal timing adjustments (e.g. longer cycle lengths to improve capacity at the expense of delay), this assumes that current intersection improvement needs at the intersection of Regional Road 5 and Brant Street (double left turn WB to SB and NB to WB, and possible problems with WB through traffic in PM peak) have been undertaken.

For both the 50% and 100% build-out scenarios for development in Aldershot and Waterdown, the current road network becomes completely overloaded. As noted before, the entry/exit points to Waterdown are congested today and in these future scenarios of 50% or full development build-out, these gateways become extremely overloaded.

The main roadway links that are overloaded include:

- Dundas Street/Regional Road 5 (east of Waterdown village);
- Parkside Drive;
- Waterdown Road between Waterdown village and Highway 403; and
- North Service Road east of Waterdown Road.

Many of the links are overloaded to the point that the traffic assignment is theoretical only as current intersections could not process such volumes of traffic making intersection analysis redundant.
Based on the current network choices available, the main conclusion that can be drawn from these results is that both additional east-west capacity and north-south capacity is required for the study area around the Village of Waterdown and depending on what configuration this network would take further improvements would likely be required in Burlington to receive this additional traffic, e.g. North Service Road widening.

In order to test whether any of these network deficiencies are diminished by an aggressive pro-transit strategy, a scenario of high transit modal share is reviewed in Section 7.

As this report ultimately concludes, the next phase of this Master EA update has to analyze all potential north-south and east-west network improvement options in various combinations that could potentially cater to these very high traffic demands stemming from the future development of Waterdown and Aldershot.

6.0 STRATEGIC MODELLING

The purpose of the strategic modelling component of the study is to assess the implications of the various Niagara-GTA Corridor options on the need for arterial road improvements in the study area.

The Niagara-GTA Corridor is a proposed new facility that would stretch from the QEW, in the Niagara Falls/Fort Erie area, through the Niagara Peninsula to connect to the existing freeway network in the GTA. The need for the facility and a number of alternative alignments has been documented in prior studies. A number of potential alignments pass near to the study area, with some having greater impacts on the road network in the Waterdown/Aldershot Study Area than others. The location of the potential corridors being reviewed are shown in **Exhibit 6.1**.

The results of the analysis are presented in Appendix B of this report, a summary of the approach and findings are provided in the rest of this section.

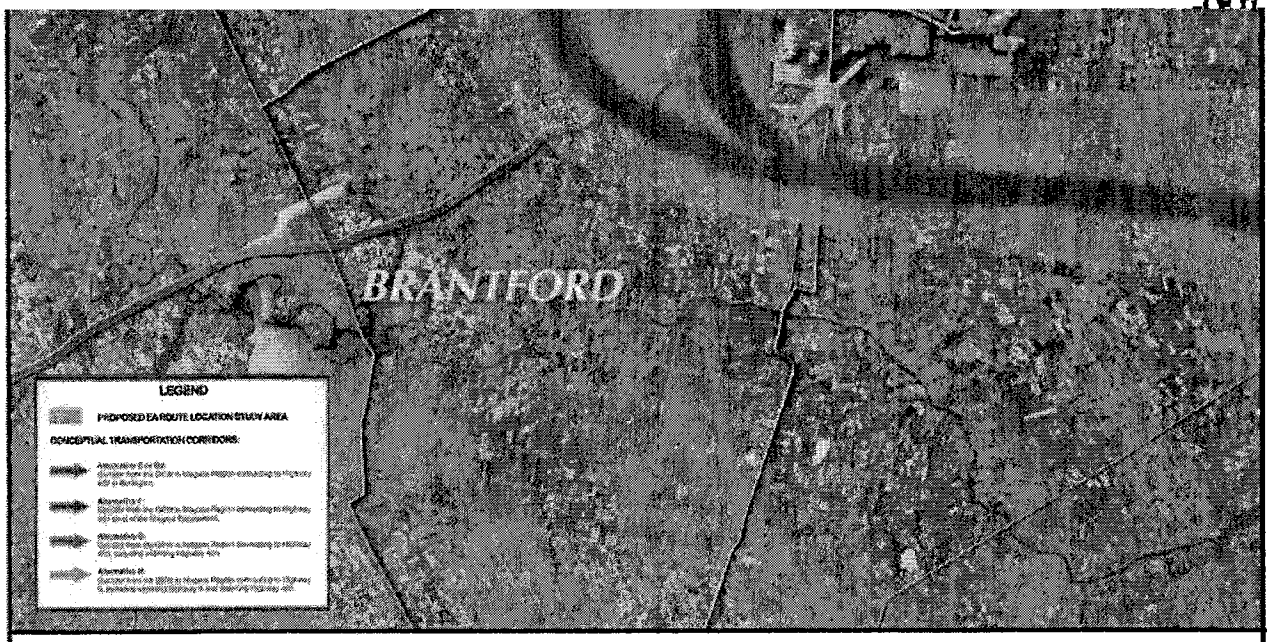
6.1 Methodology

Strategic forecasting was undertaken for this study using the City of Hamilton's EMME/2 demand forecasting tool. Assumptions built into the model forecasts related to municipal and study area land use (population and employment) and transportation infrastructure (road network) were confirmed and modified to reflect current expectations related to the development area for the base and 2021 horizon years. Model derived AM peak hour forecasts were converted to PM peak hour conditions to reflect the critical time period in the study area. A screenline analysis was then conducted to assess existing conditions, and to strategically assess any deficiencies in the future road networks.

6.2 Land Use

For the modelling work undertaken, population and employment forecasts from the City of Hamilton Official Plan were used along with latest figures from the City of Burlington. Updates to the model to represent the most recent land use expectations of the City were performed. These updates included land use assumptions for:

- ROPA 9 in Glanbrook;
- Stoney Creek Urban Boundary Expansion;
- Setting Sail (downtown Hamilton population and employment review); and
- 1999 Waterdown Master Plan.



Alternative Mid-Peninsula Transportation Corridors
EXHIBIT 6.1

EXHIBIT 9.1 – SUMMARY OF COMMENTS RECEIVED FROM PUBLIC OPEN HOUSE HELD ON JUNE 24, 2004				
#	**ATTENDEE** (all Waterdown addresses, unless stated)	**COMMENT**	**RESPONSE FROM STAFF (If applicable)**	**WISHES TO BE ON MAILING LIST**
18	Calmusky (sp?), Cottonwood Crescent, Oakville	What is relationship between this EA and Watedwon/H403 EA?	Response to explain the relationship.	Yes
19	O'Brien, Kerns Road	Concerns: Traffic through Burlington roads; Loss of green belt; Impact on escarpment with new roads.	None	Yes
20	Lee, McDonald Court	Make sure modelling uses 2+ cars per household. Consider transit to Burlington and GO Station. Expand parking lots at GO Stations. Secondary planning important. Concern for environmentally sensitive areas. Improve escarpment crossings. Increase EW capacity in at least 2 corridors. Don't do anything until MOT have a plan for Clappison Corners. Maintain current level of Vinegar Hill – no more lanes. Make development pay for a by-pass.	None	Yes
21	Taylor, Flatt Road, Burlington	Good presentation. Please add Bill 27 (Green belt) lands on maps when possible. GO Transit expansion may happen, will affect traffic levels. NS Roads from Stantec study should be resurrected, new escarpment crossing is necessary.	None	Yes
22	Allan Flanders Dr.	When will public transit in Waterdown? Concerned about volumes of traffic that could be routed along Mountain Brow Road. Don't extend Flanders Drive to the new development area. Who are the landowners signing the Memorandum of Agreement.	Letter to respond to various questions.	Yes
23	Vanca, Cumberland	Widen Parkside Drive	None	Yes

EXHIBIT 9.1 – SUMMARY OF COMMENTS RECEIVED FROM PUBLIC OPEN HOUSE HELD ON JUNE 24, 2004				
#	**ATTENDEE** (all Waterdown addresses, unless stated)	**COMMENT**	**RESPONSE FROM STAFF (If applicable)**	**WISHES TO BE ON MAILING LIST**
	Avenue, Burlington	Plan for the Waterdown By-Pass possible using Mid-Pen Corridor. Do things more quickly. Contact drivers in the area to get suggestions.		

APPENDIX A

SUB-AREA MODELLING

APPENDIX A – SUB-AREA MODELLING

A.1 Trip Assignment

The terms of reference for this study included the completion of a sub-area model in order to both identify future network needs while also testing the results of the 1999 Stantec study. The Stantec report resulted in recommendations for additional east-west and north-south capacity which were identified as being the "Red Route" and "Green Route" respectively (refer to Exhibit 2.1). This analysis is presented here for academic interest only as an assessment of the previous work done in 1999 by Stantec.

As this report concludes, the Red and Green Routes have no current validity. The identification of a future network will be the subject of intensive investigation in a subsequent phase of this study.

It should be noted that a short section of a new north-south roadway is included in all network scenarios between Parkside Drive and just south of Dundas Street as this would be required as a collector road (at least) in order to serve the development areas adjacent to it.

A nominal horizon year and full build out of OPA 28 was considered to be 2008. The labelling of the horizon year is somewhat academic. It is meant to be a near/mid-term horizon suitable for the modelling technique being used - longer term horizons are not appropriate for this technique.

To calculate the total future traffic for a given development scenario, the individual turning movements for each trip assignment were summed and added to the established base year (existing traffic) plus background growth. This background growth represents increases in the through traffic flows in Waterdown unrelated to development otherwise taken into consideration. For this purpose, a growth rate of 2% per annum (12.6% over 6 years from 2002 to 2008) was applied to through trips only on Hwy. 6 and Dundas Street.

The various trip assignments are shown summarized at the end of this Appendix (**Exhibits A3.4 to A3.21**) for each of the scenarios identified by a tick in the following table.

EXHIBIT A1.1 – TRIP ASSIGNMENT SCENARIOS

	Development scenario	
Network Scenario	50% OPA 28 + all Aldershot	100% OPA28 + all Aldershot
Base Network	✓	✓
Base network with Red Route added	✓	✓
Base network with Green Route added	✓	
Base network with both Green & Red Route added		✓

A.2 Network Analysis

The total traffic assigned to the various networks were then subjected to SYNCHRO network-wide timing and offset optimization as some modifications to timing will certainly occur by the horizon year, however no geometric changes were assumed other than those reflecting either

the Red or Green routes (depending on the scenario). See scenarios examined in **Exhibit A.2.1** below.

EXHIBIT A2.1 – DEVELOPMENT/NETWORK SCENARIO ANALYZED

	Development scenario			
Network Scenario	none	Background Growth only	50% OPA 28 + part Aldershot	100% OPA28 + all Aldershot
Base Network	✓	✓	✓	✓
Base network with "Red Route" added			✓	✓
Base network with "Green Route" added			✓	
Base network with both Red and Green Routes added				✓

Detailed operational analysis was carried out for the PM peak hour to represent the worst case, as the PM generates considerably more traffic than the AM, and is already considered the worst time period under existing conditions. To summarize the effects on the key intersections:

- Hwy. 6 at Parkside: acceptable at 50% OPA 28, several movements reach capacity at 100% OPA 28 development with the base network. The Red route will attract additional traffic from the north and south but will also alleviate problems to some degree as the intersection would be improved at Hwy. 6, so overall operations are expected to be acceptable at 50% OPA 28, and slightly over capacity at 100% OPA 28. The Green route is not expected to have a significant impact at this location.
- Hwy. 6 at Hwy. 5/Dundas Street: in the base network several movements reach capacity at 50% OPA 28, and several are significantly over capacity at the 100% OPA 28 level. The Green route offers no significant benefits, the Red route makes things somewhat worse by attracting additional traffic to Hwy. 6 instead of letting it go through the village.
- Parkside at Centre/Hamilton: fails at 50% and 100% OPA 28 due mainly to conflicts between strong east-west through demand and opposing left turns. With the Red route present, it returns to good operations. The Green route is not expected to have an impact here.
- Dundas at Hamilton / Main / Mill: these closely-spaced string of signals will have failed movements (particularly at Mill St.) at the 50% OPA 28 level with the base network, and these worsen considerably at the 100% OPA 28 level. The Green route offers clear improvements by giving new OPA 28 traffic a more direct route to/from the south. The Red route offers little improvement at all.
- Dundas at Evans: approaching capacity at 50% OPA 28 and just over capacity at 100% OPA 28 without network improvements. The Green route offers significant benefits by allowing more traffic direct access to/from the south. The Red route makes things somewhat worse by diverting traffic from the right turn to NB Evans to the WB through movement, though it will be acceptable at the 50% level, going over-capacity at the 100% level. The combination of Red and Green routes should let the intersection run near capacity at the 100% OPA 28 level.
- Regional Road 5 at Brant: several heavy conflicting movements fail in both the 50% and 100% OPA 28 scenarios. The Green route offers considerable improvements by significantly reducing the NB-L movement, however it will still be over capacity at the 50% level. The Red route offers minor improvement, mainly by improving the connection to Hwy. 6 at the west end of Waterdown, resulting in traffic using Hwy. 6 instead of Brant St. for

N-S movement. Both Red and Green routes combined still do not permit acceptable operations at this intersection.

- Brant at North Service: some movements will exceed capacity at the 50% OPA 28 level. The Green route will allow the intersection to operate at capacity at the 50% level, but the Red route has minimal effect here. The 100% OPA 28 level results in several over-capacity movements even with both the Red and Green routes in place.
- North Service at Kerns: this location will be just at capacity at the 50% level and slightly worse 100% level with the existing network. Addition of the Green route at 50% OPA 28 understandably increases the through traffic on North Service, though no movements reach capacity. The Red route offers significant improvement over the base network, as traffic is attracted to the more northern Waterdown access points. At 100% OPA 28, the Red route alone shows demand to be near capacity, but adding both the Red and Green routes to the 100% scenario makes the intersection fail due to the increase in E-W traffic on North Service resulting from the attraction to the Green route.
- North Service at King: expected to be at capacity at both the 50% and 100% OPA 28 development levels in the base network. Adding the Green route at the 50% development level re-routes some traffic from the WB through movement to the WB right turn, but the intersection can be maintained at capacity. Adding the Red route alone causes a significant improvement by diverting traffic from North Service Rd., and the intersection shows no over-capacity movements. At the 100% development level the Red route alone maintains all movements at below-capacity, but adding the Green and Red routes together at 100% causes significant over-capacity problems due to the attractiveness of the new escarpment crossing offered by the Green route. However, the existing intersection geometry is simple and addition of some auxiliary lanes would likely offer significant improvements.
- North Service at Waterdown: both the 50% and 100% OPA 28 development levels will have this intersection well over capacity. The Green route will make things somewhat worse by increasing pressure on North Service Rd., and the Red route will not help at this location – it appears to make things slightly worse, perhaps by giving north Waterdown development traffic an easier route to Waterdown Rd. The combination of Red and Green routes at the 100% level shows considerable problems here.
- Waterdown at Hwy. 403 off-ramp / GO Station: this location appears relatively insensitive to the new routes, with movements over capacity at both the 50% and 100% OPA 28 development levels regardless of the new routes implemented. Its proximity to the key intersection of North Service and Waterdown to the north may constrain the flexibility in signal timing due to the limited queue storage on the bridge over Hwy. 403.

The results for intersection movements with v/c greater than 0.80 are summarized at the end of this appendix. It should be noted that in a number of locations the traffic model was unable to insert the entire projected vehicle demand into the model (e.g. at Regional Road 5 and Brant, and at Hwy. 6 at Hwy. 5 /Dundas) due to the over-capacity conditions, so the delay figures are not particularly practical – suffice it to say that delays at the over-capacity locations will be considerable.

A.3 Ultimate Network Needs

Following a review of the initial assignments and SYNCHRO results, a final ultimate road scenario (again based on the 1999 Master EA "Red and Green" routes) was prepared with some minor refinements of the assignments as well as an identification of all the improvements

that would be required for the final network to operate within or as near to capacity as possible. This section documents the road network improvements which will likely be required to service the traffic growth resulting from the following changes in the study area:

- the full development of OPA28 lands;
- the planned developments in Aldershot to the year 2008; and
- background trip growth along Hwy. 6 and Dundas St.

A new SYNCHRO network was prepared to model the PM peak hour (worst case). The network included the following improvements:

- the Red Route (assumed to terminate at Hwy. 6 at the current location of the Parkside and Hwy. 6 intersection, although MTO has made no commitment that this will be permitted);
- the Green Route, connecting King Rd. to Dundas St.;
- widening of North Service Rd. to a basic 4-lane cross-section from Brant St. to Waterdown Rd.; and
- sufficient other improvements to have no single intersection movement with a forecast v/c of over 1.0.

No improvements were assumed for the intersection of Hwy. 6 and Hwy. 5/Dundas St. however, as it is in Provincial jurisdiction and there are plans for it to be grade separated at some time in the future. The analysis also supported this improvement as it appeared impossible to get reasonable operations at that location with future traffic projections and an at-grade intersection. While the Red Route will relieve some traffic, the intersection will still suffer from heavy conflicting through and turning movements from multiple directions, for which a grade separation of some type appears to be the only solution.

In addition, the results of the licence plate survey conducted for this study were used to estimate the likely magnitude of background traffic that could be shifted from Dundas St. (and to a much lesser extent Parkside Dr.) to the Red Route as a by-pass of downtown Waterdown Village. The PM peak hour survey determined that 27.5% of westbound traffic east of Evans Rd. on Regional Road 5 would go through Waterdown and end up west of Hollybush Dr., with the vast majority on Dundas St. and a small remainder (approximately 5%) on Parkside Dr. On the assumption that these trips would use the Red Route to get around the Village, approximately 480 background westbound through trips were shifted from Dundas St. and assigned to the Red Route.

Based on SYNCHRO and SimTraffic analysis of the study area with the demand volumes assigned as described above, the list below gives the additional improvements that would appear to be needed in order that no intersection movements have a v/c exceeding 1.0 in the PM peak hour. Except for localized intersection widening, the Red Route can have a basic two-lane cross section.

Additional network needs:

- Widening of Regional Road 5 from 4 lanes to a basic 6-lane cross section from Brant St. to the intersection with the Red and Green Routes (at which point a large proportion of traffic will flow to/from the north or south to access the OPA28 developments and the Red Route Waterdown by-pass and the existing cross-section will be adequate to the west);

- A basic 4-lane cross section on the Red Route immediately north of Dundas St. to improve intersection capacity, which can be tapered to a 2-lane section between Dundas St. and Hwy. 6. Local widenings of the Red Route at intersections may also be required at Hwy. 6, Centre Rd. and Parkside Dr., depending on the future geometry of those roads;
- A localized widening of Waterdown Rd. to provide 2 north-south through lanes at North Service Rd. in each direction (this improvement is proposed as part of Highway 403/Waterdown Road interchange plan), this to make better use of the green time that is limited by the conflicting movement westbound to the Hwy. 403 on-ramp. In addition two westbound discharge lanes from North Service Rd. into the westbound Hwy. 403 on-ramp will be needed;
- Traffic signals will likely be required at a number of development access points (e.g. for developments accessed from Waterdown Rd. and King Rd.), depending on how traffic can be distributed among the access points – this is a matter for the planning of individual subdivisions. Similarly a signal may be required at Mountain Brow Rd. and Waterdown, and at Mountain Brow Rd. and the Green Route / King Rd., depending again on how traffic access is distributed.
- Continuation of the basic 6-lane cross section on Hwy. 6 from north of Dundas St. intersection through the Red Route (former Parkside Dr.) intersection, to make better use of north-south green time at that signal (again not certain as it depends on MTO's future configuration at this point).

The described PM peak period capacity improvements can generally be assumed to be reflected for the AM case, i.e. a widening in the eastbound direction for PM traffic will imply that a widening in the westbound direction will be needed for AM traffic, or in the case of a double left turn, a channelized free-flow right turn lane can be employed for the reverse movement.

The road infrastructure improvements for the 50% and 100% development scenarios of OPA 28 are shown figuratively in **Exhibits A3.1 and A3.2** respectively. This is basically a refinement of the recommended network plan in the 1999 Master EA report.

With full development of OPA 28 and implementation of the improvements shown in Exhibit 5.11, there will still remain some localized operational deficiencies in the Village of Waterdown. In addition, there will be some locations where operations will be approaching capacity, those being mostly on roads crossing North Service Rd., however these should not present a problem unless there is further growth in background trips or new development. These are illustrated in **Exhibit A3.3**.

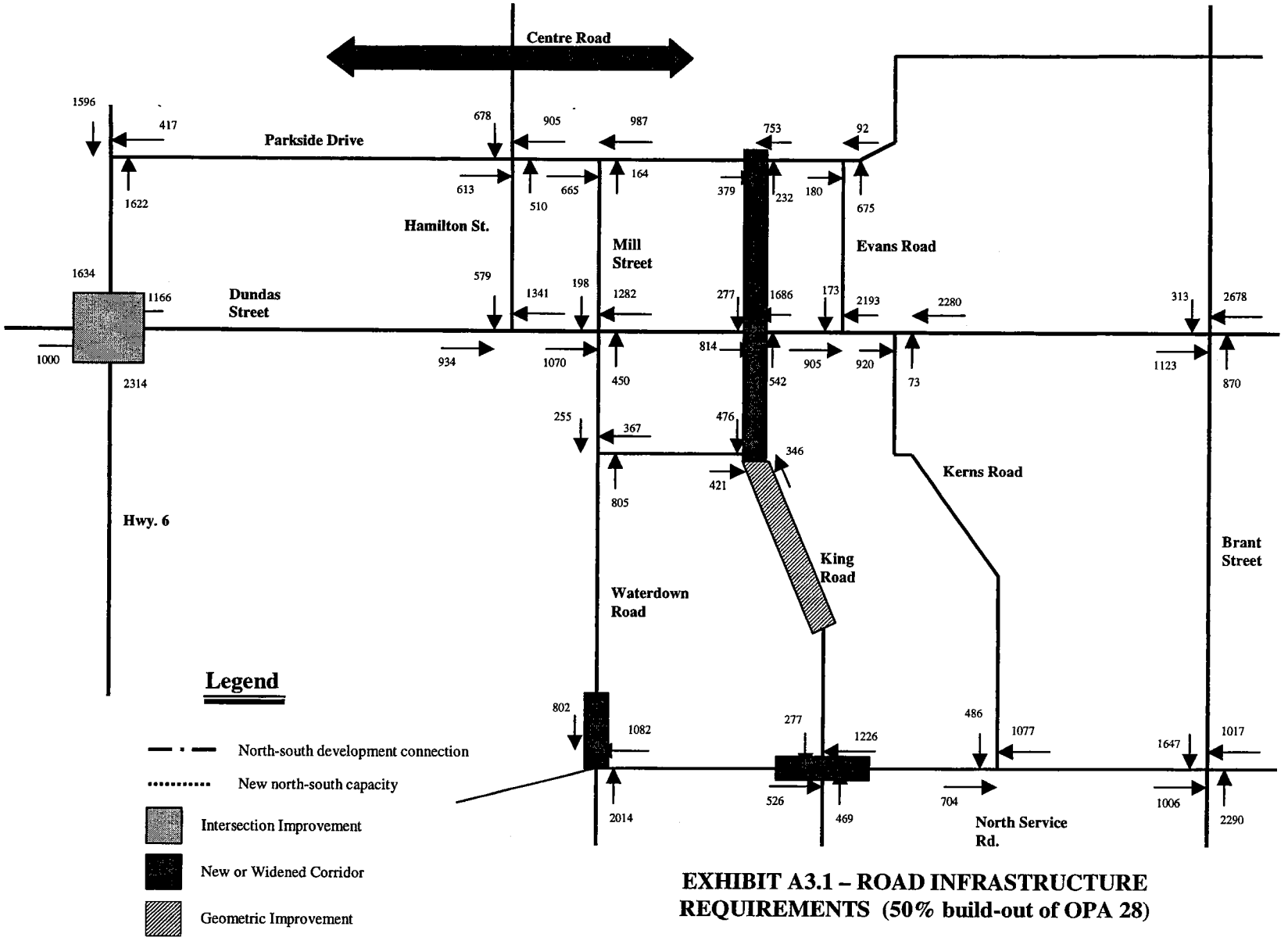


EXHIBIT A3.1 – ROAD INFRASTRUCTURE REQUIREMENTS (50% build-out of OPA 28)

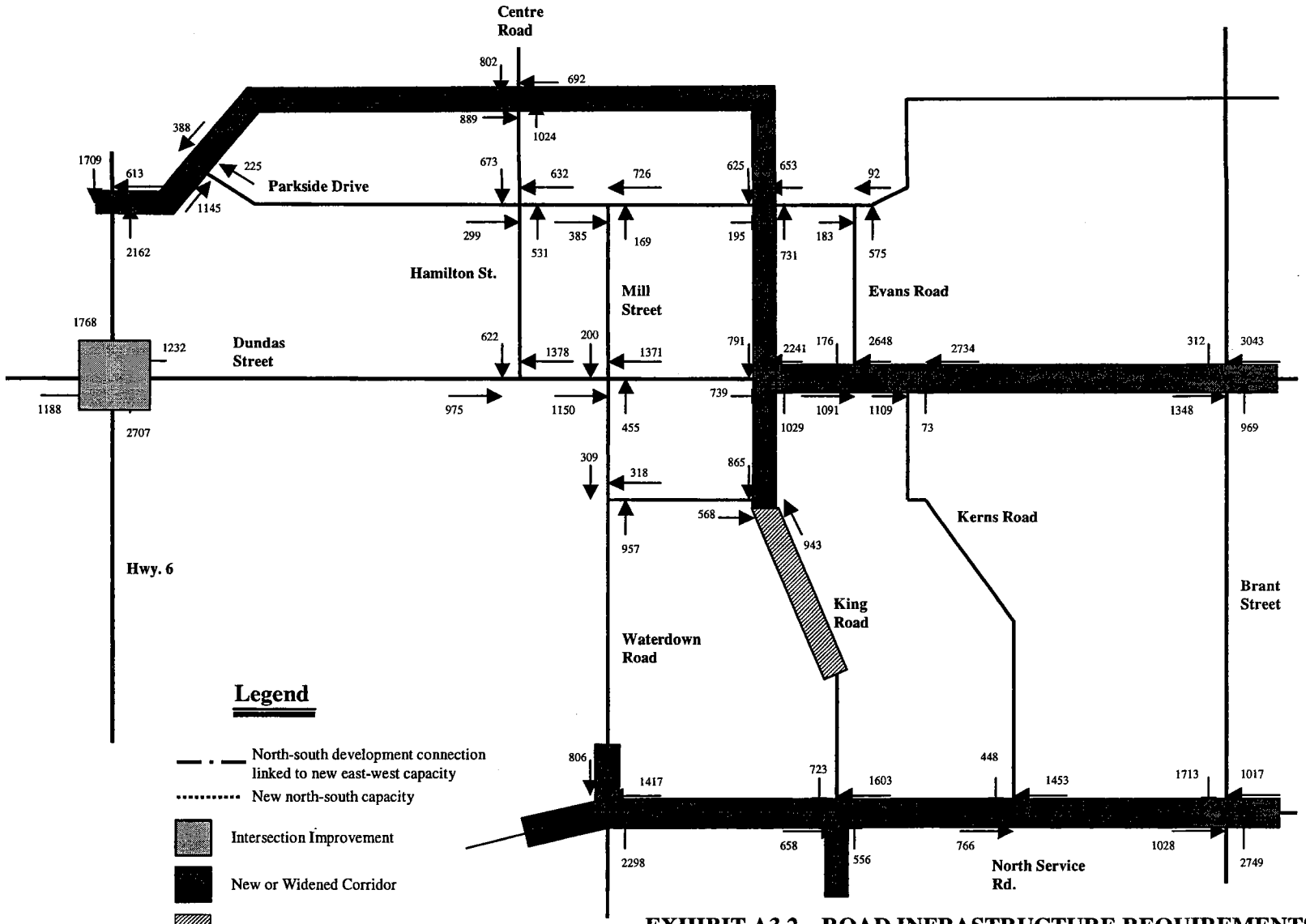
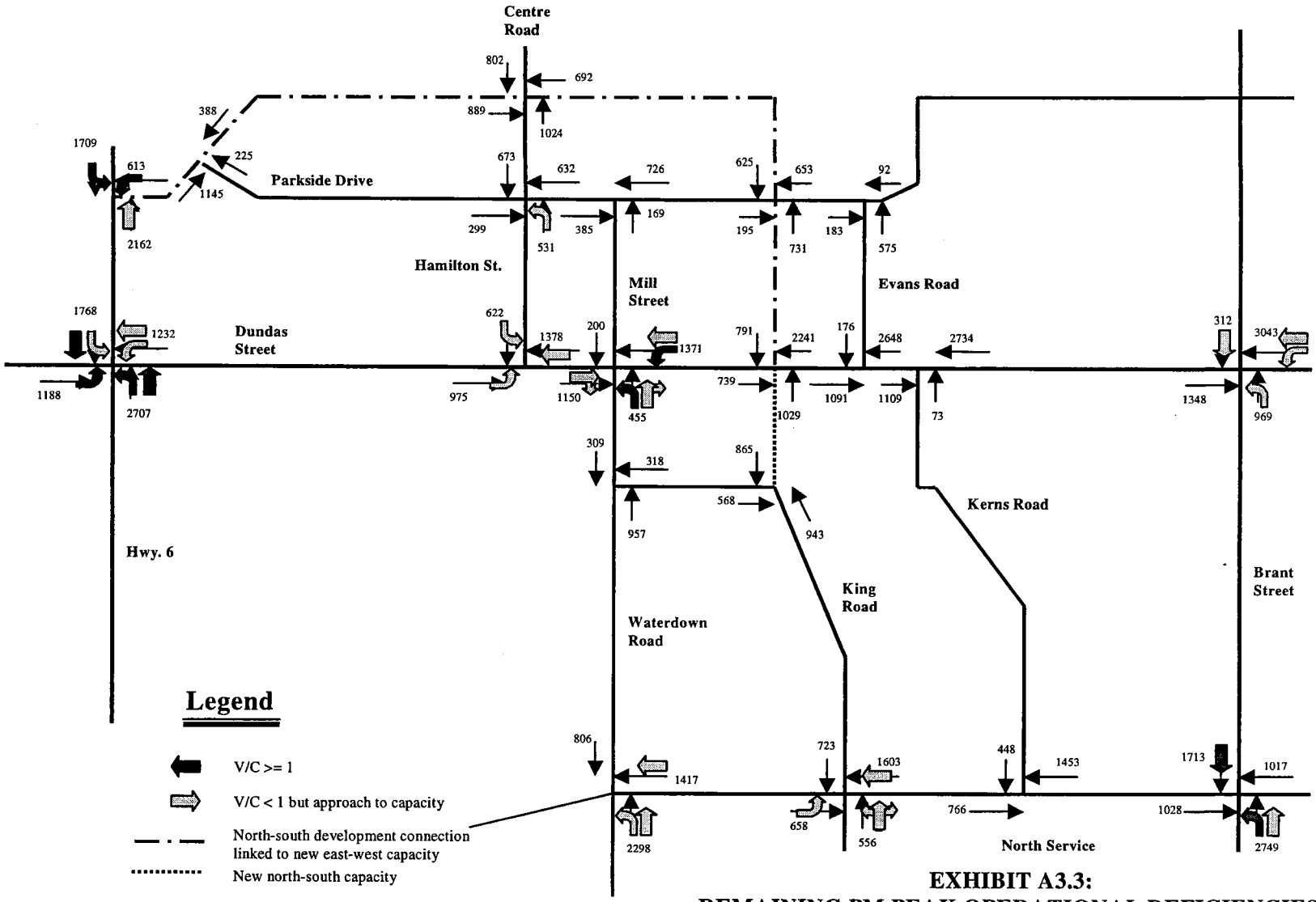


EXHIBIT A3.2 – ROAD INFRASTRUCTURE REQUIREMENTS
(100% build-out of OPA 28, PM peak demand volumes shown)



Legend

- V/C >= 1
- V/C < 1 but approach to capacity
- North-south development connection linked to new east-west capacity
- New north-south capacity

EXHIBIT A3.3:
REMAINING PM PEAK OPERATIONAL DEFICIENCIES
(after full build-out & recommended improvements, PM peak hour demand volumes shown)

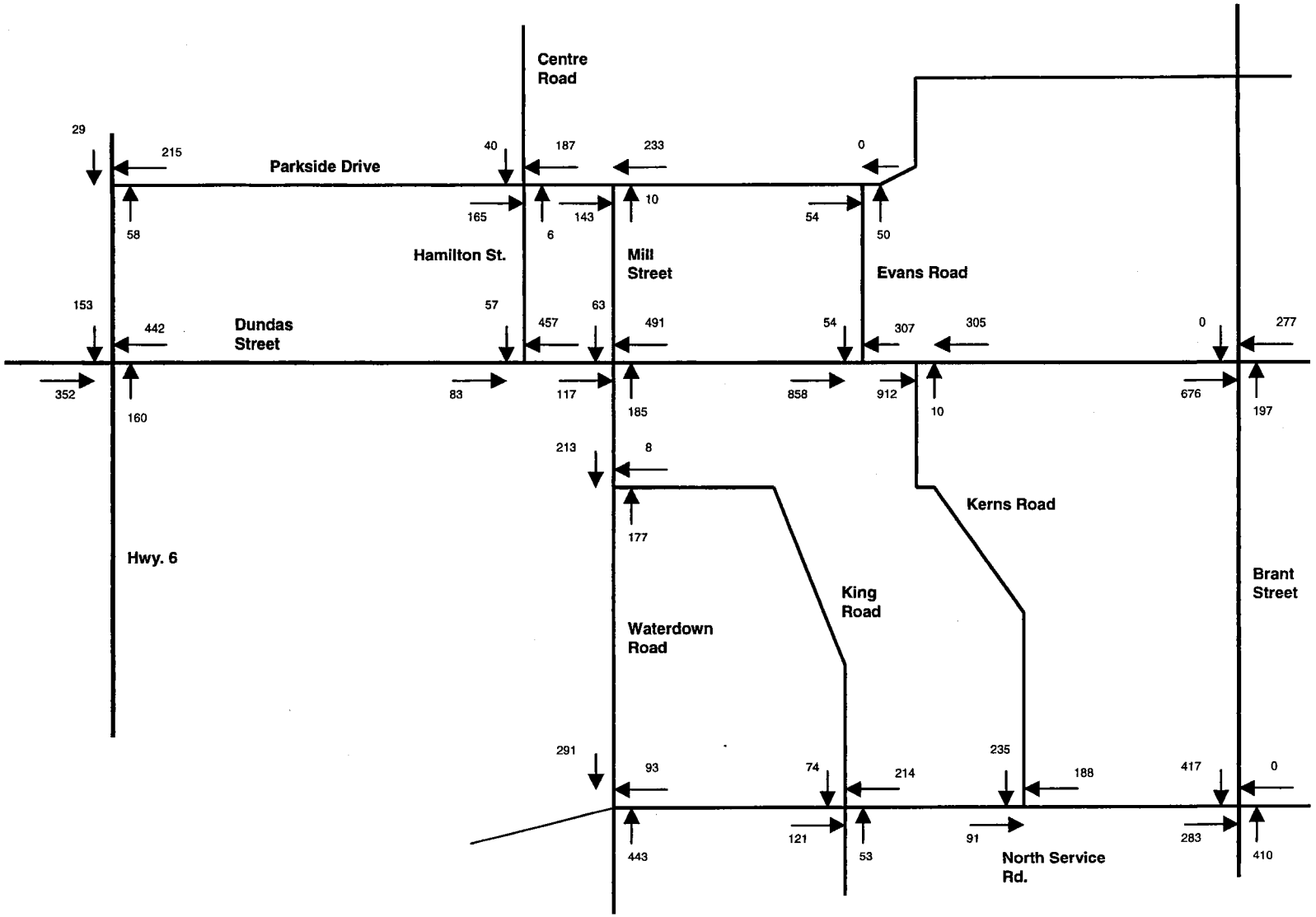


EXHIBIT A3.4 - ASSIGNMENT OPA 28 (50%) + ALDERSHOT – (AM pk hr, with base network)

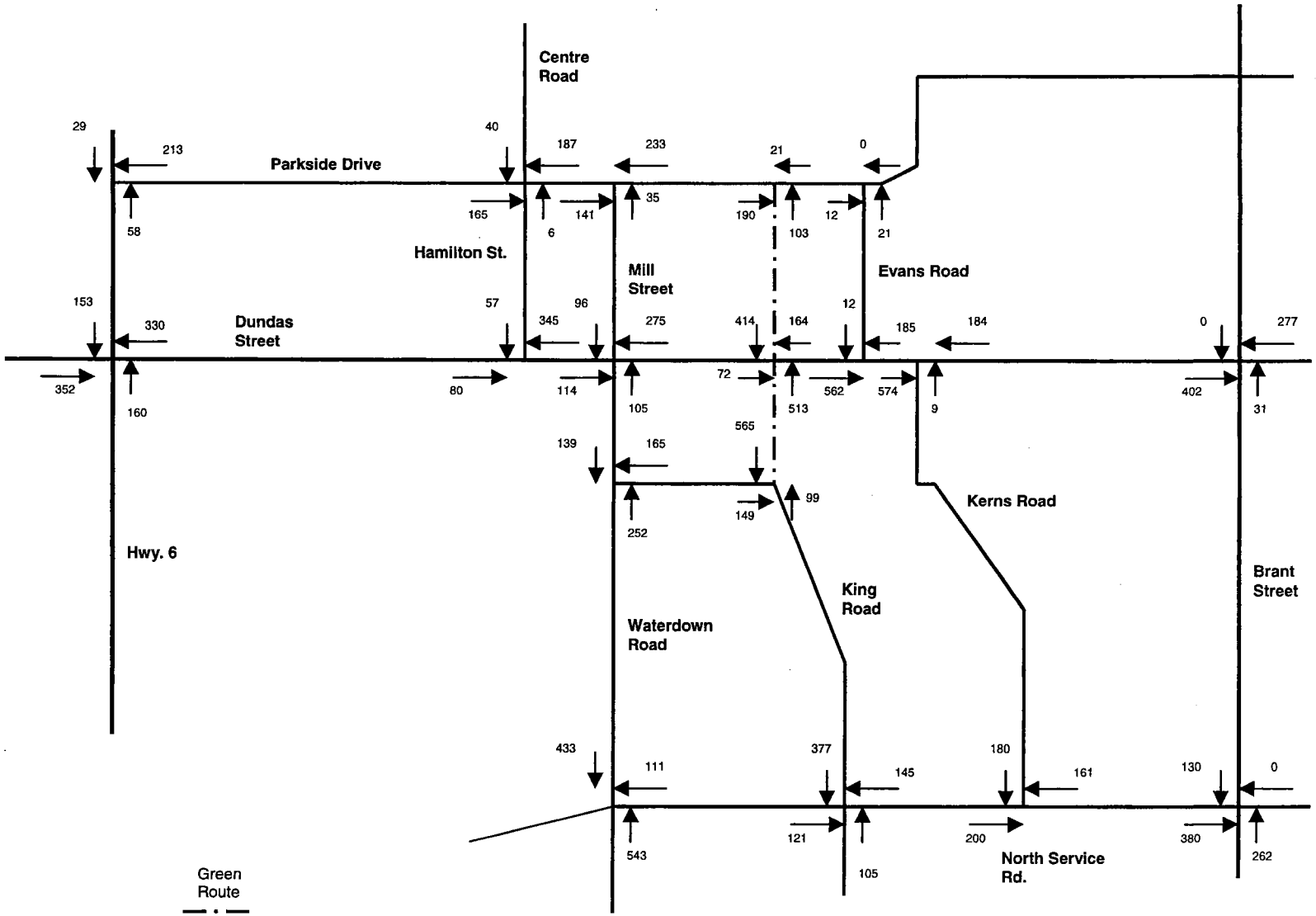


EXHIBIT A3.5 – ASSIGNMENT OPA 28 (50%) + ALDERSHOT – (AM pk hr, with green network)

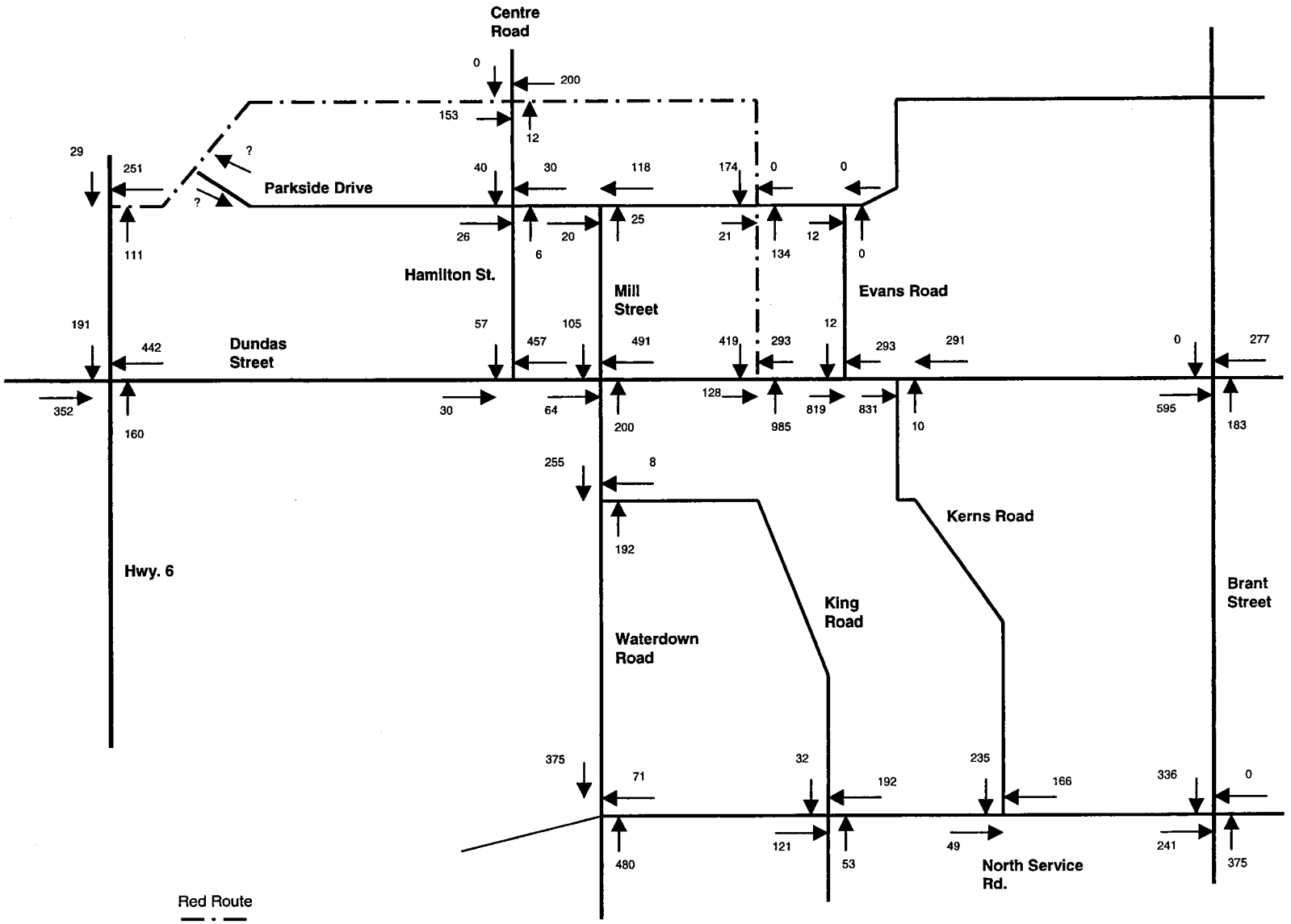


EXHIBIT A3.6 – ASSIGNMENT OPA 28 (50%) + ALDERSHOT – (AM pk hr with red network)

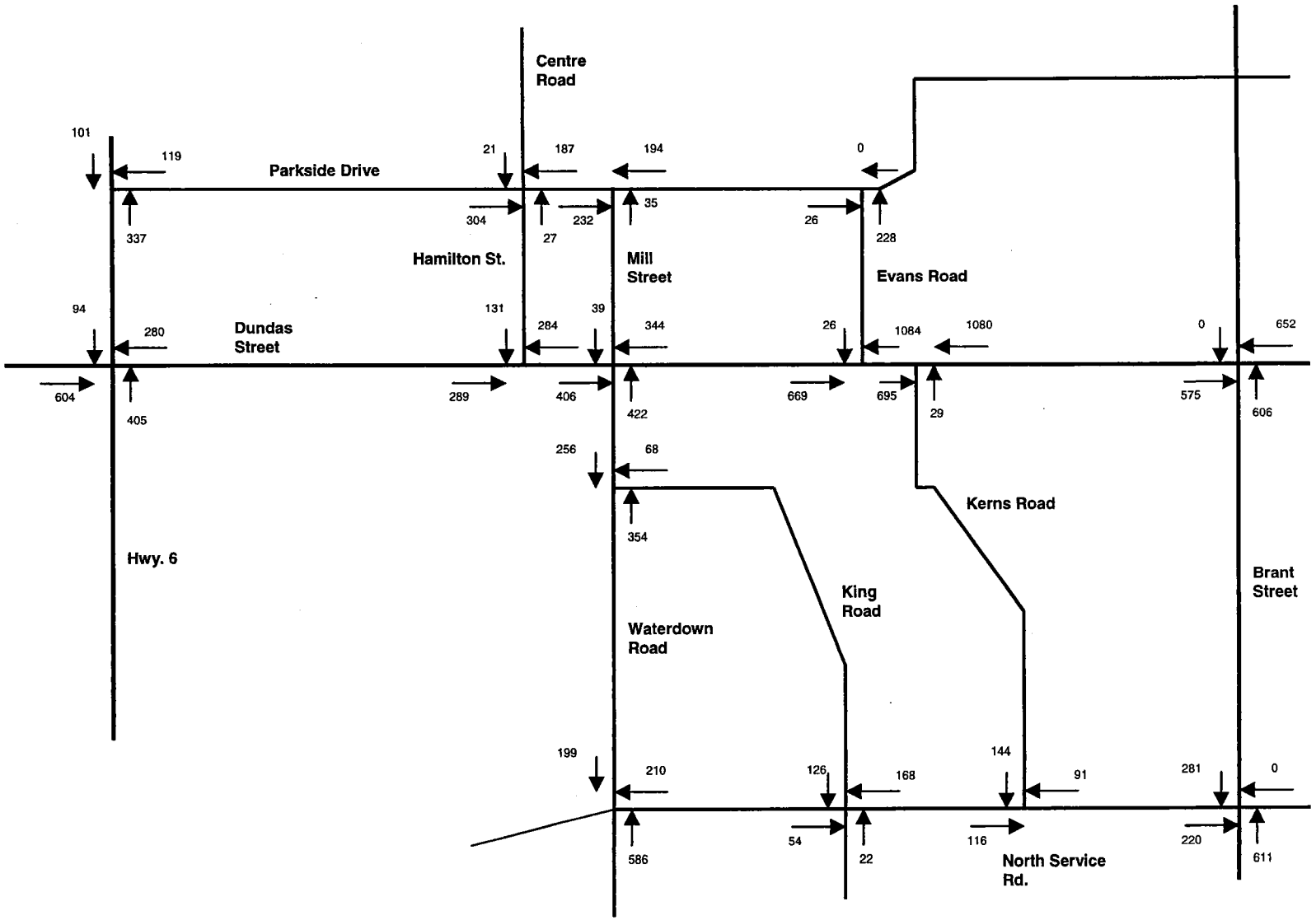


EXHIBIT A3.7 – ASSIGNMENT OPA 28 (50%) + ALDERSHOT – (PM pk hr, with base network)

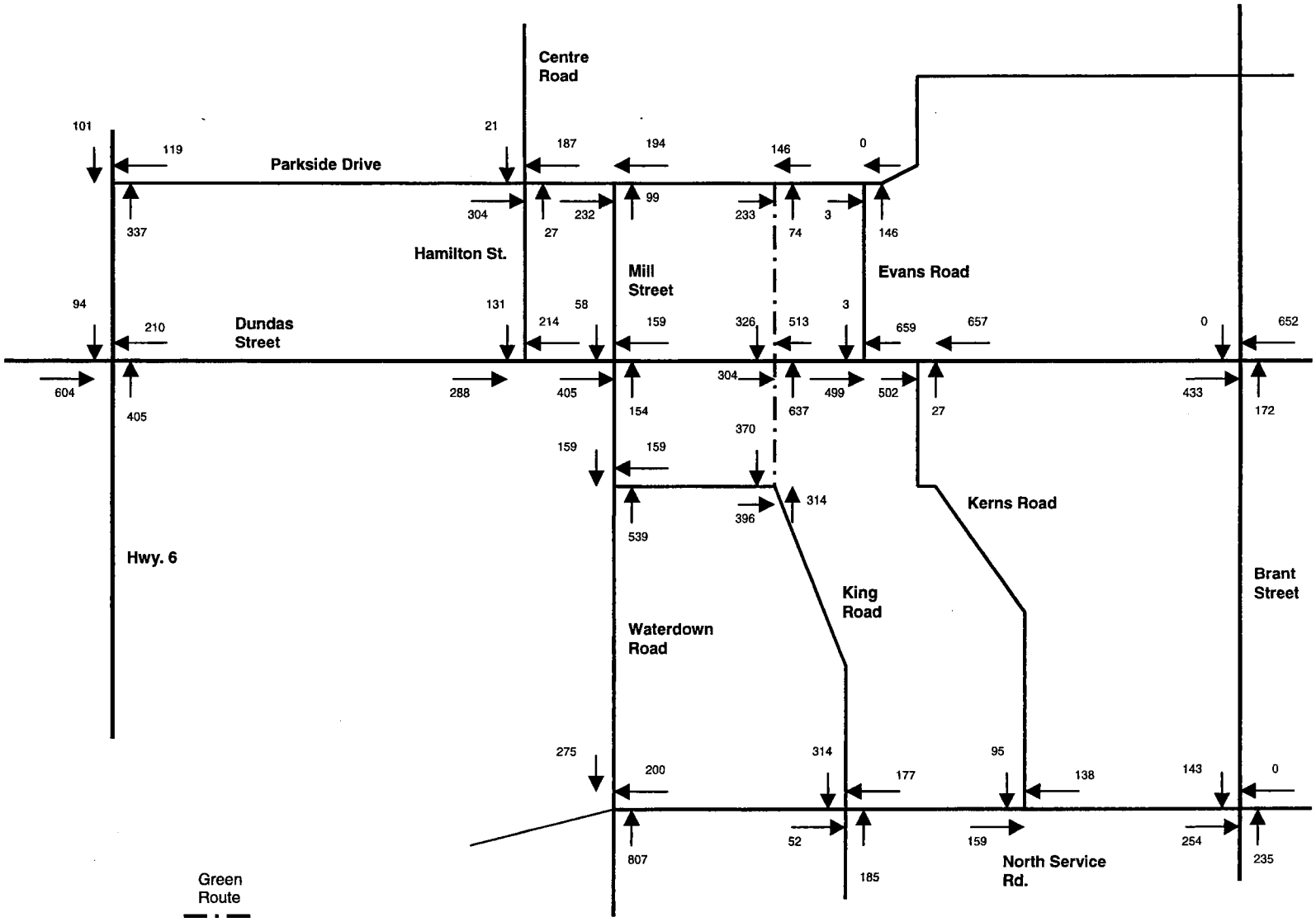


EXHIBIT A3.8 – ASSIGNMENT OPA 28 (50%) + ALDERSHOT – (PM pk hr, with green network)

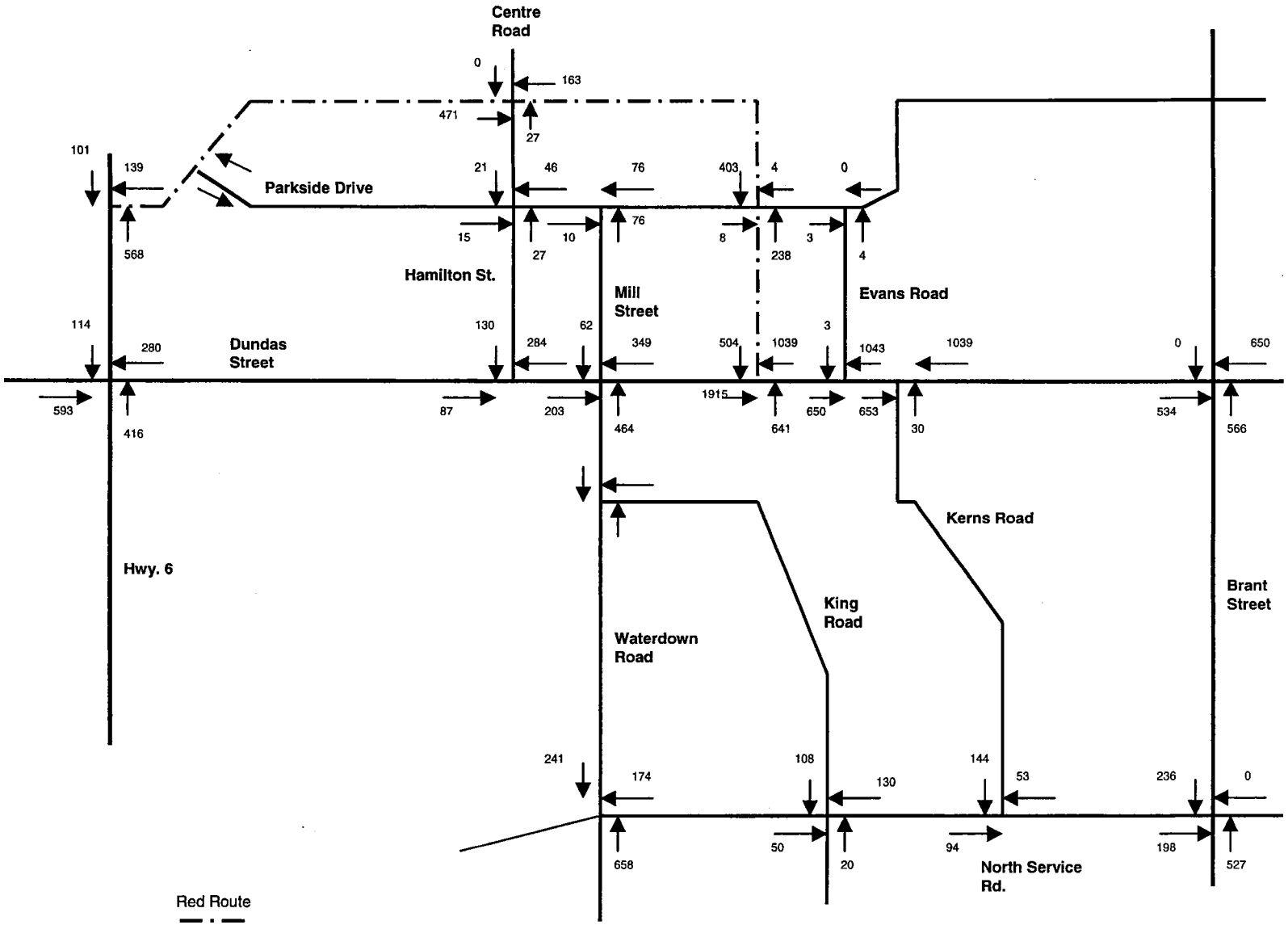


EXHIBIT A3.9 – ASSIGNMENT OPA 28 (50%) + ALDERSHOT – (PM pk hr, with red network)

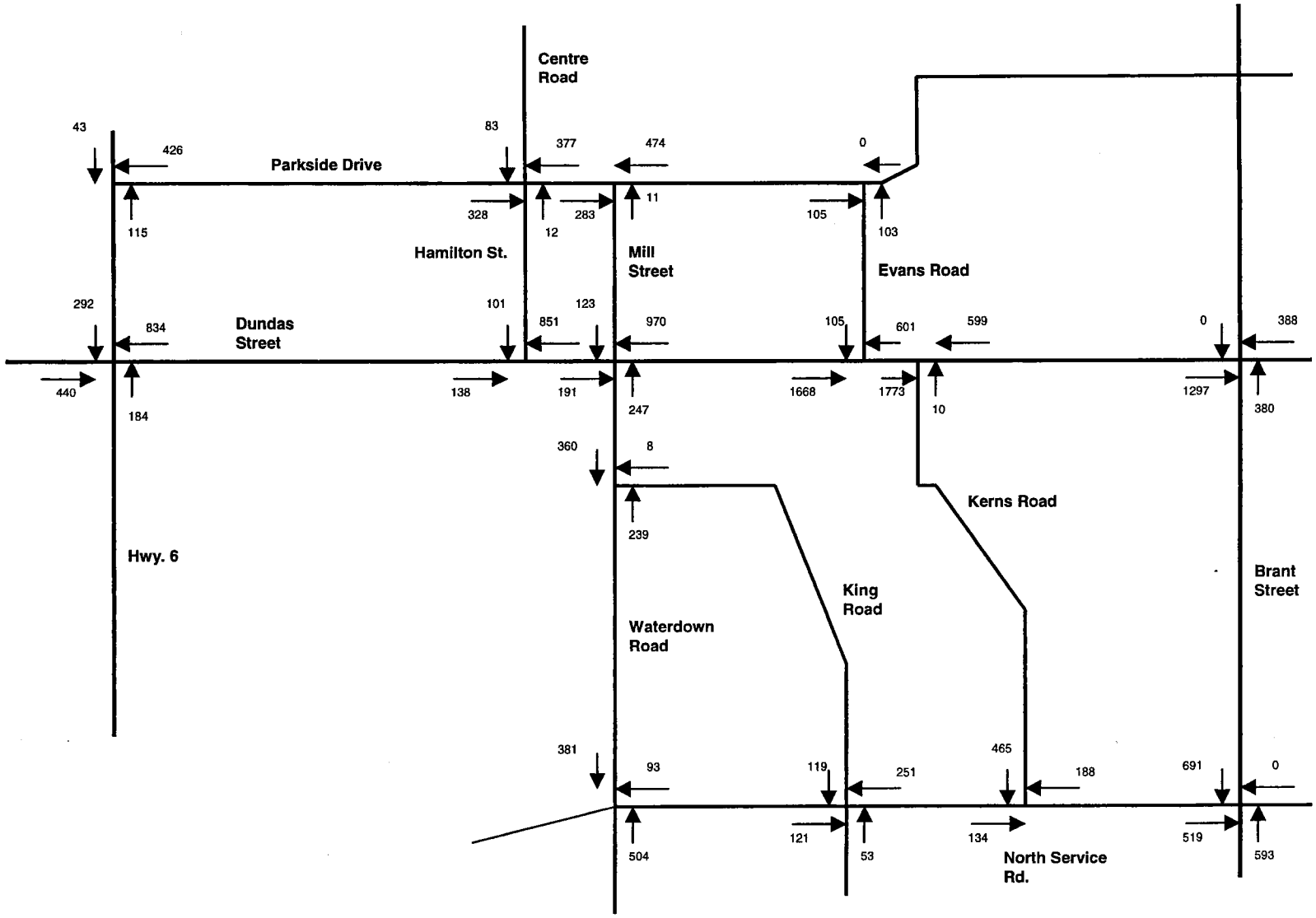


EXHIBIT A3.10 – ASSIGNMENT OPA 28 (100%) + ALDERSHOT – (AM pk hr, with base network)

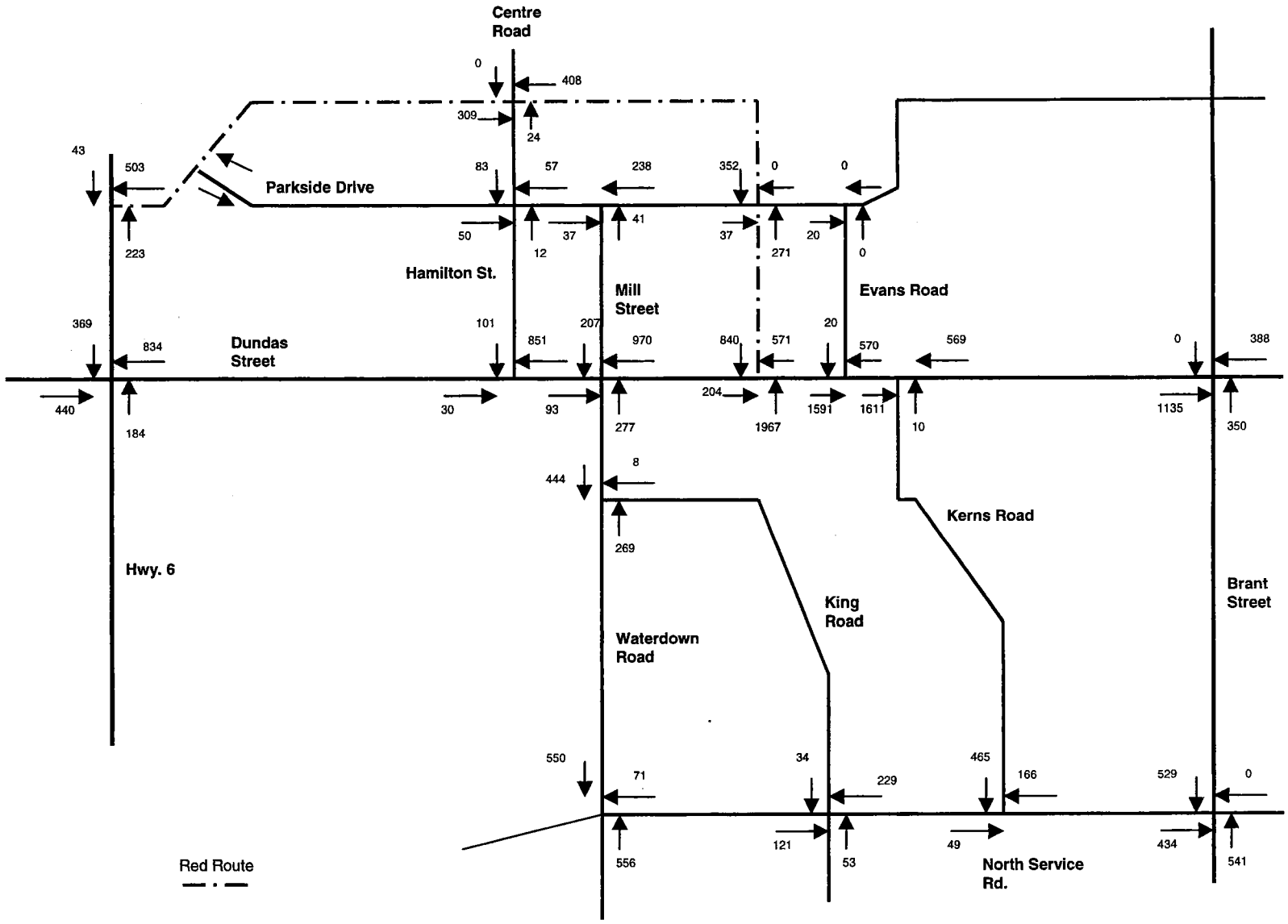


EXHIBIT A3.11 – ASSIGNMENT OPA 28 (100%) + ALDERSHOT – (AM pk hr, with red network)

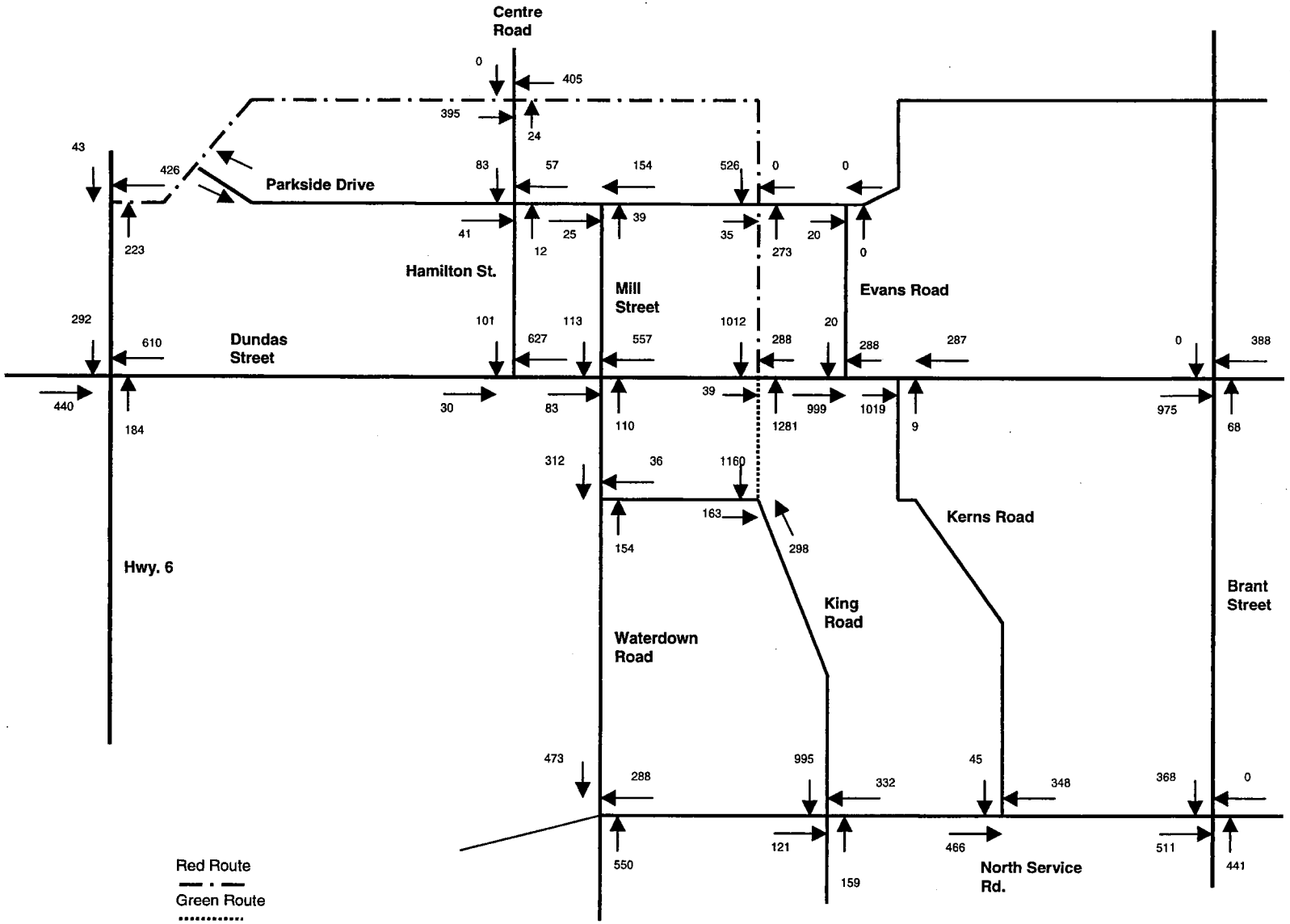


EXHIBIT A3.12 – ASSIGNMENT OPA 28 (100%) + ALDERSHOT – (AM pk hr, with red & green network)

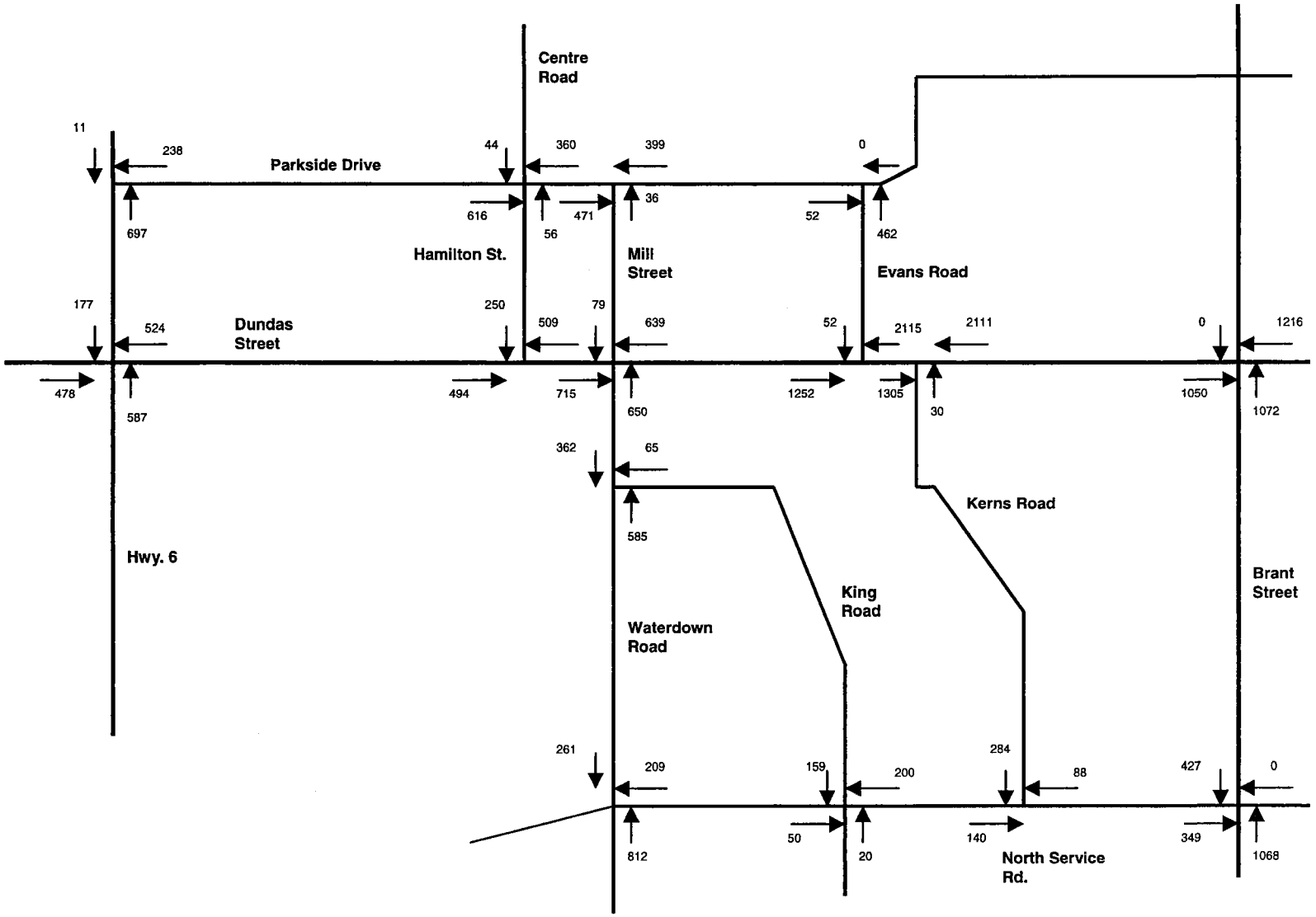


EXHIBIT A3.13 – ASSIGNMENT OPA 28 (100%) + ALDERSHOT – (PM pk hr, with base network)

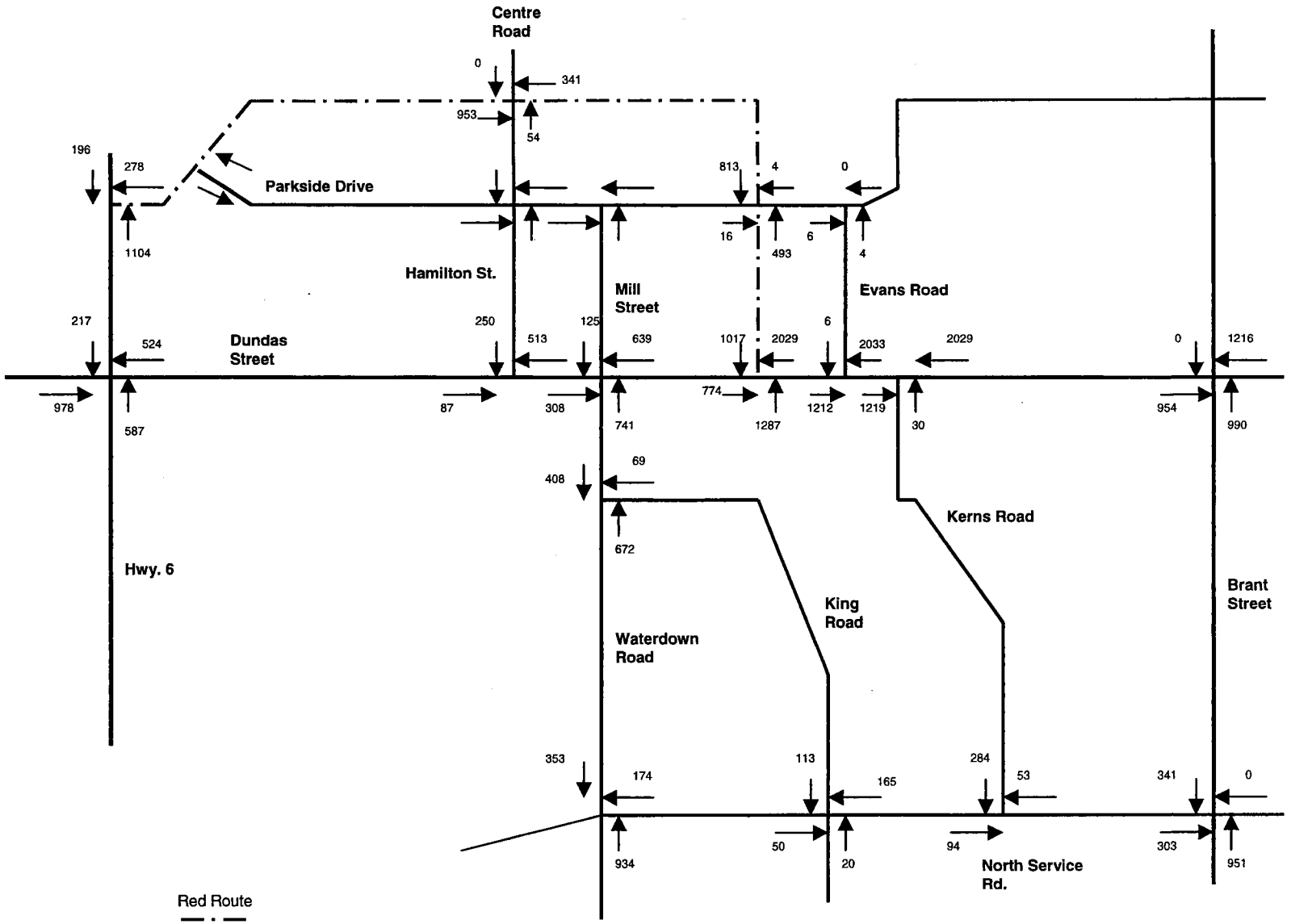


EXHIBIT A3.14 – ASSIGNMENT OPA 28 (100%) + ALDERSHOT – (PM pk hr, with red network)

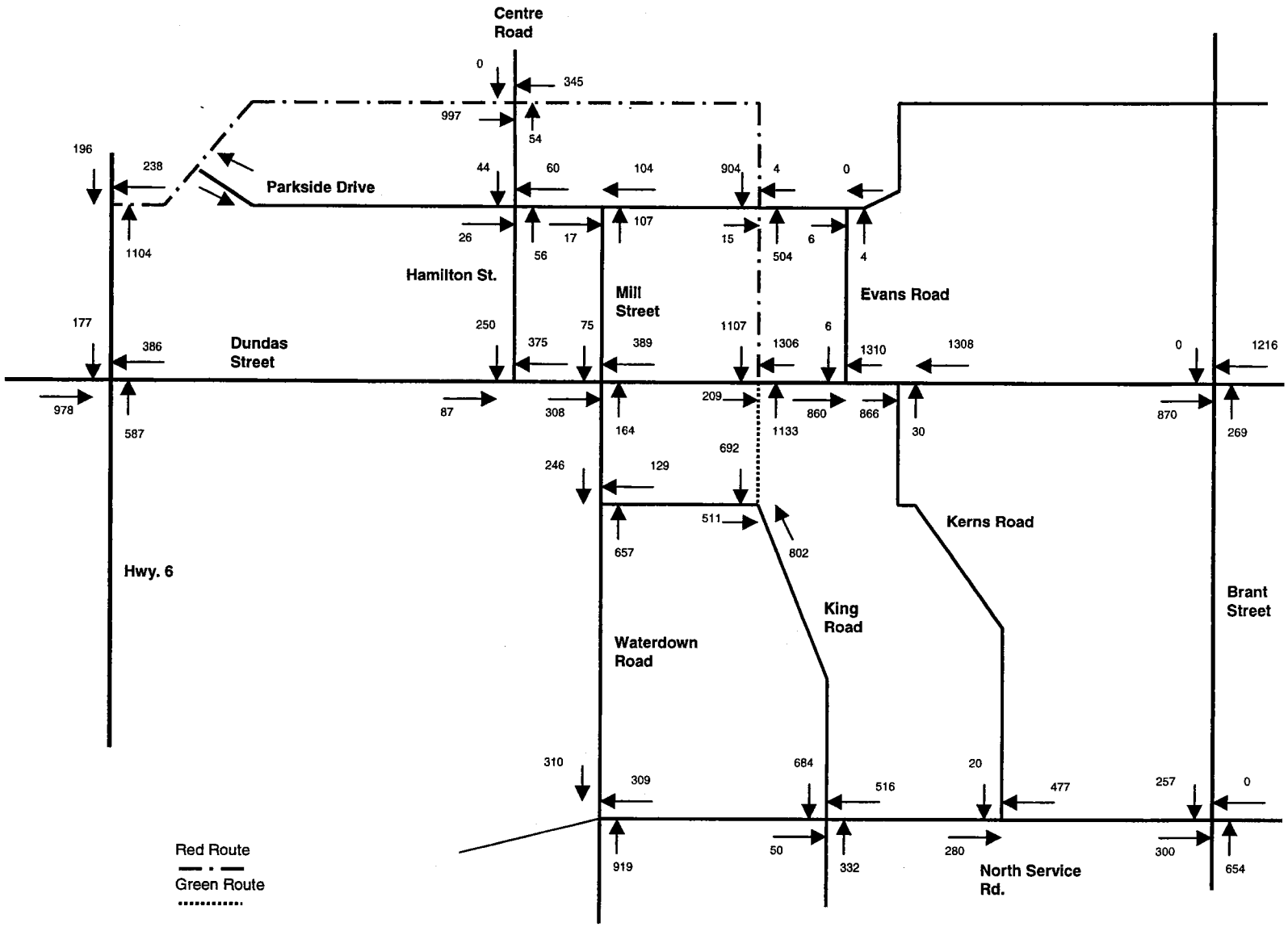


EXHIBIT A3.15 – ASSIGNMENT OPA 28 (100%) + ALDERSHOT – (PM pk hr), with red & green network)

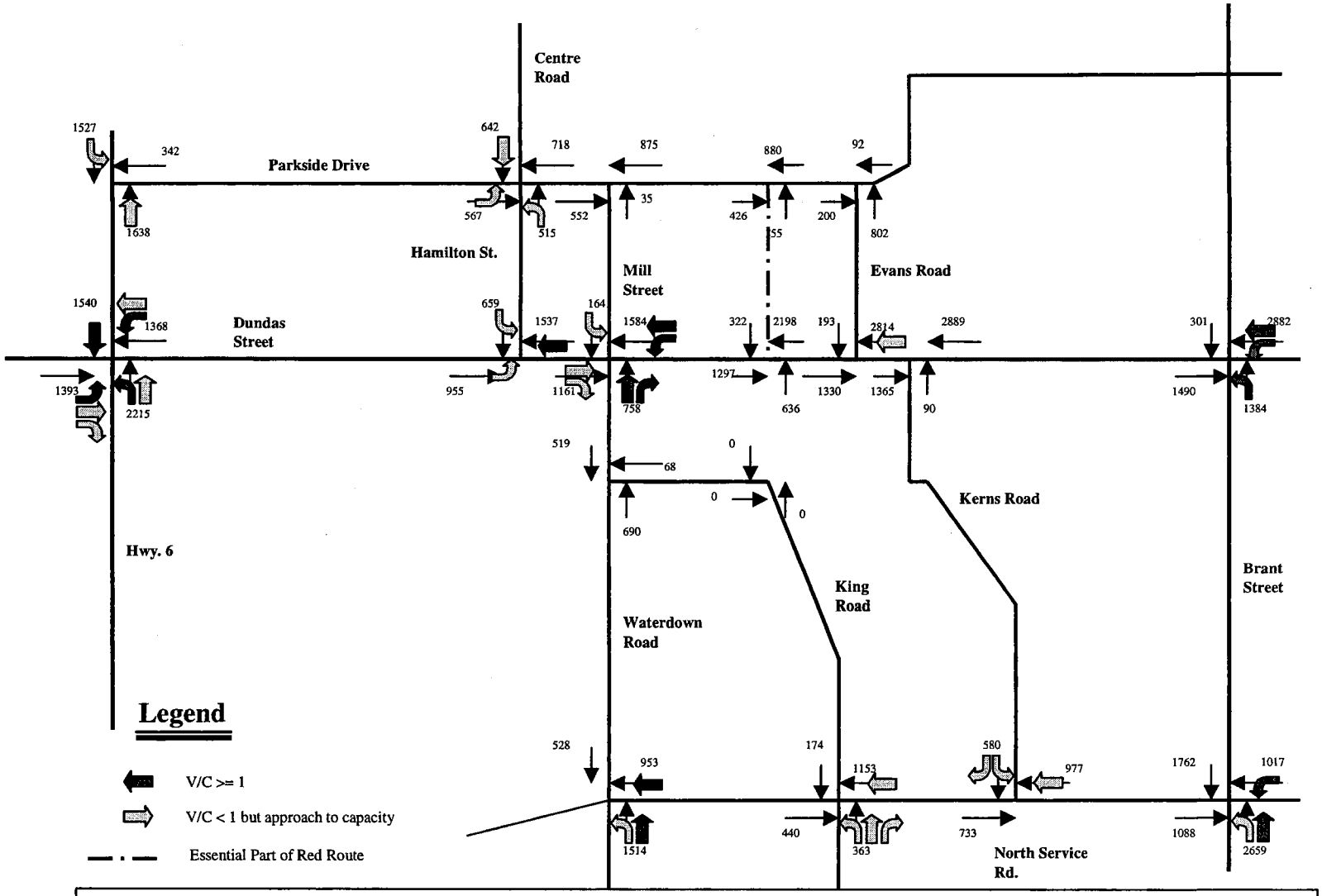


EXHIBIT A3.16 - TOTAL TRAFFIC: EXISTING + BACKGROUND GROWTH + HALF OPA28 (PM pk hr - base network)

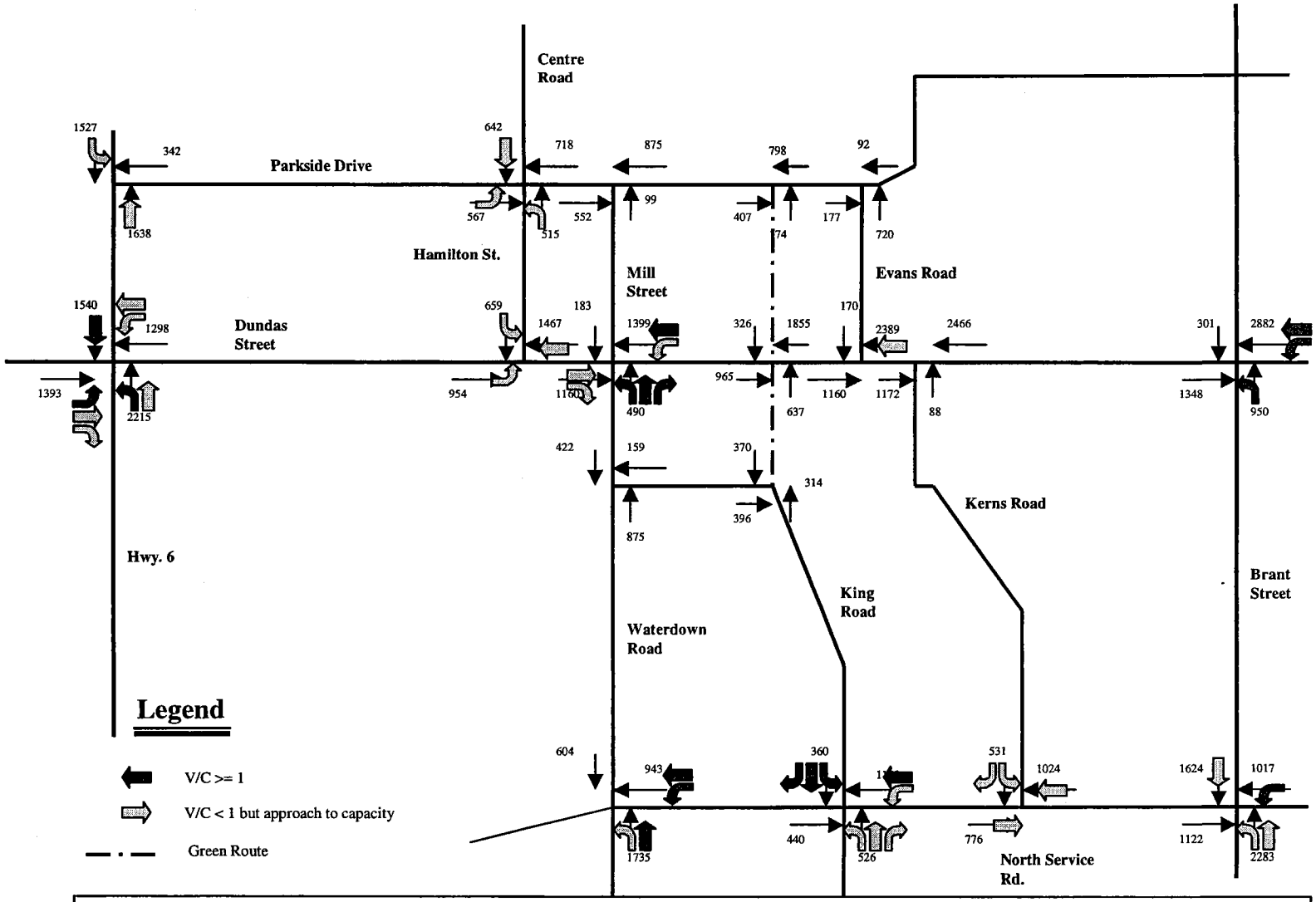


EXHIBIT A3.17 – TOTAL TRAFFIC: EXISTING + BACKGROUND GROWTH + HALF OPA28 (PM pk, with green route)

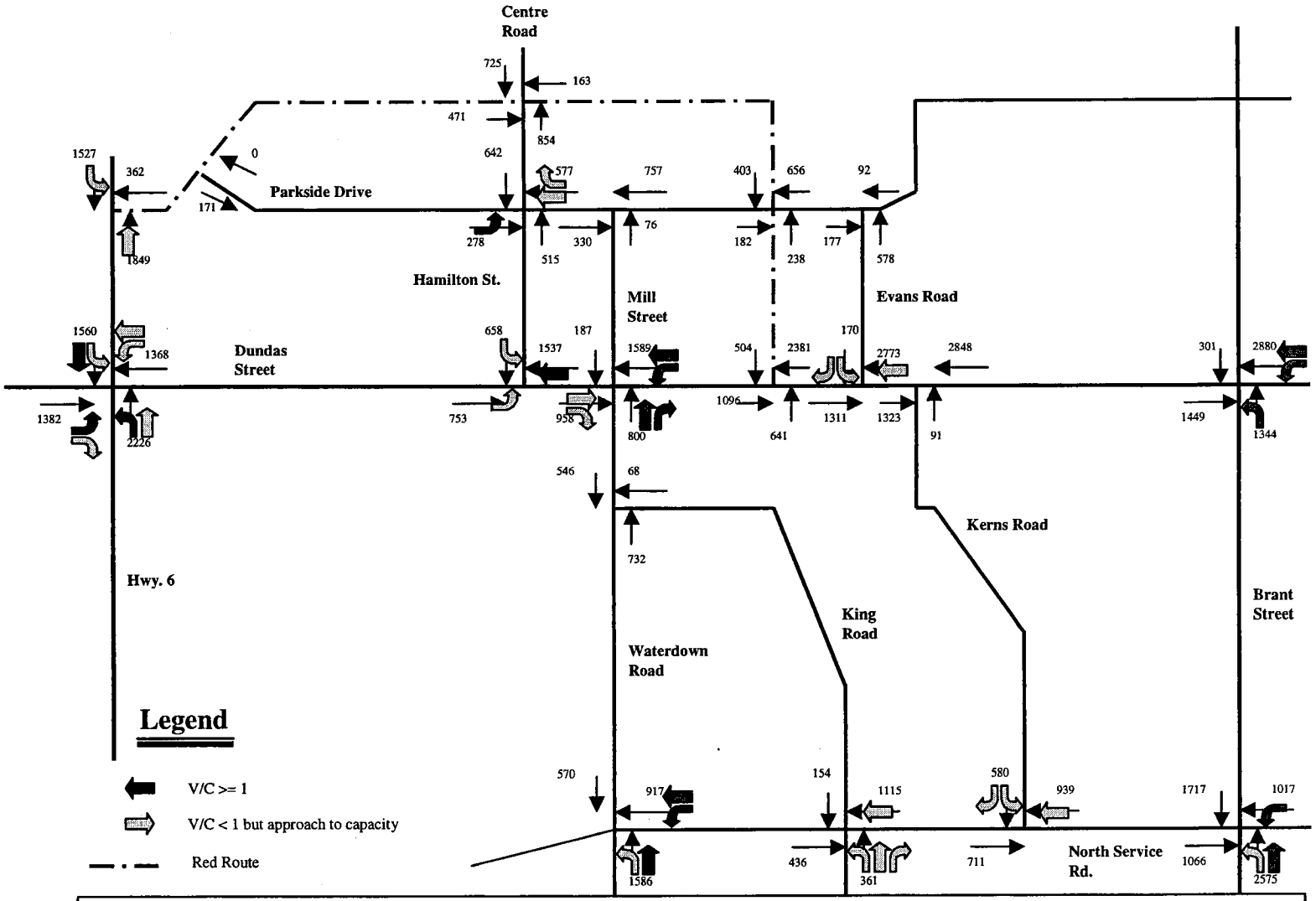


EXHIBIT A3.18 TOTAL TRAFFIC: EXISTING + BACKGROUND GROWTH + HALF OPA28 (PM pk, with red route)

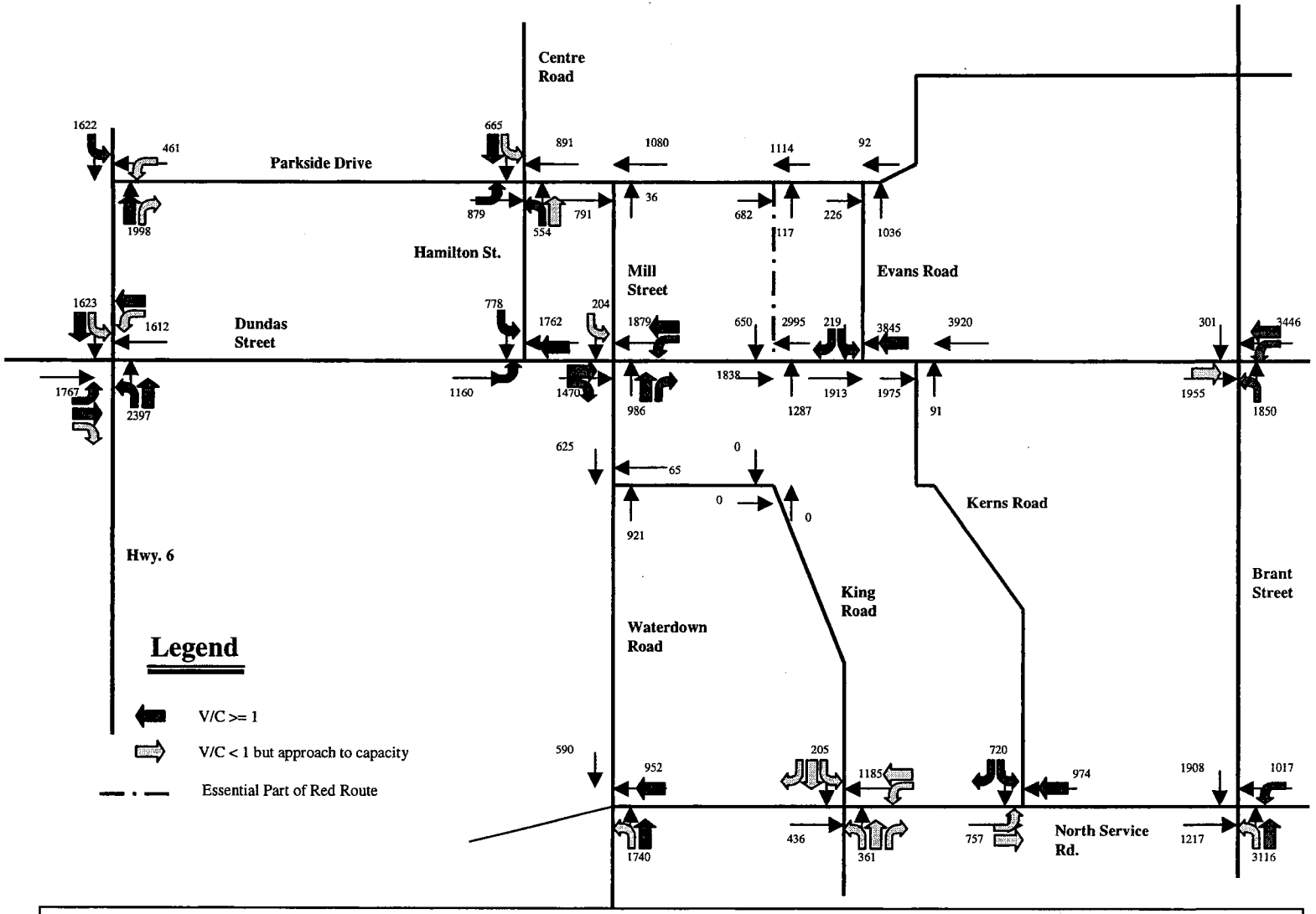


EXHIBIT A3.19 – TOTAL TRAFFIC: EXISTING + BACKGROUND GROWTH + FULL OPA28 (PM pk, with base network only)

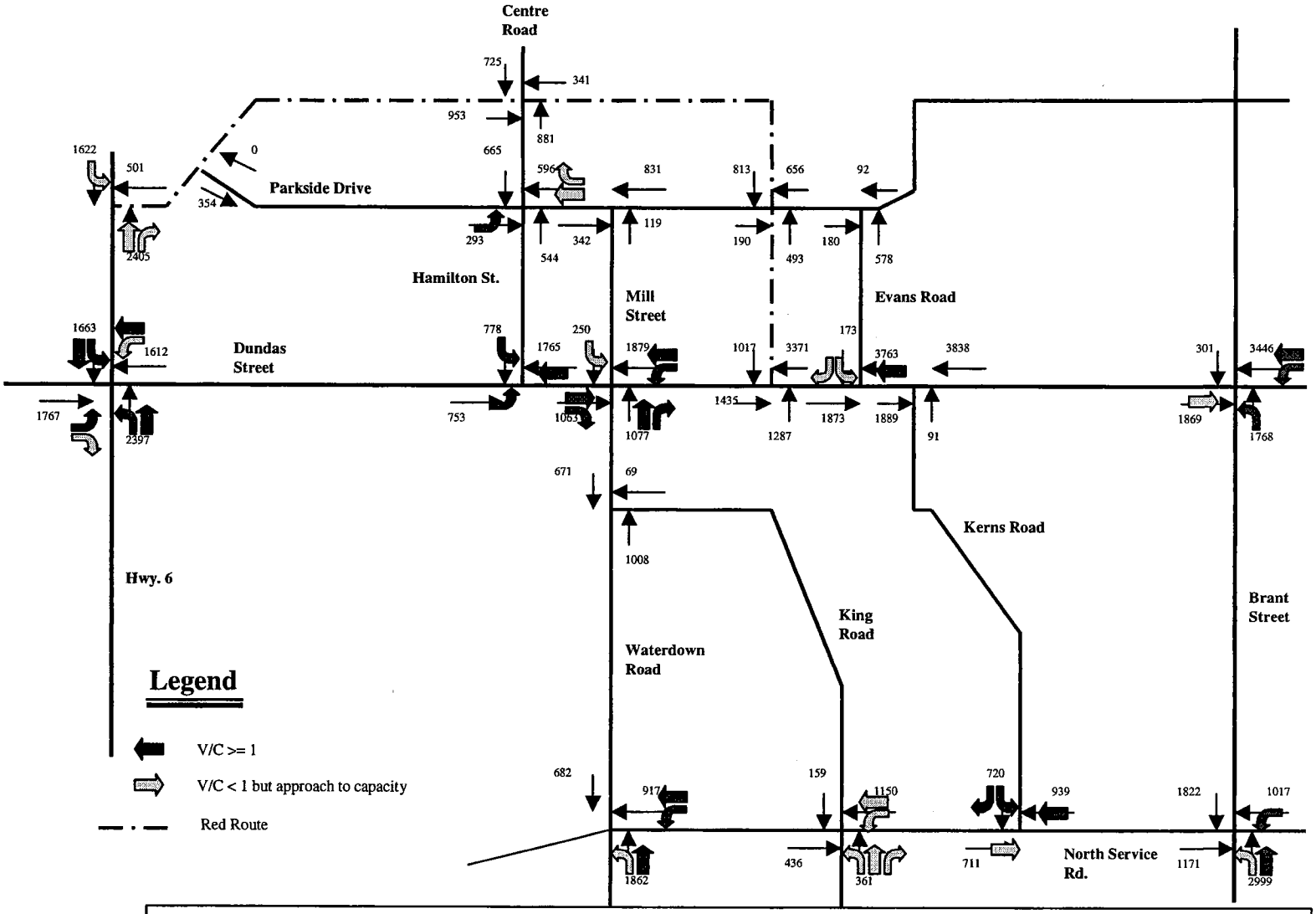


EXHIBIT A3.20 – TOTAL TRAFFIC: EXISTING + BACKGROUND GROWTH + FULL OPA28 (PM pk, with reds route)

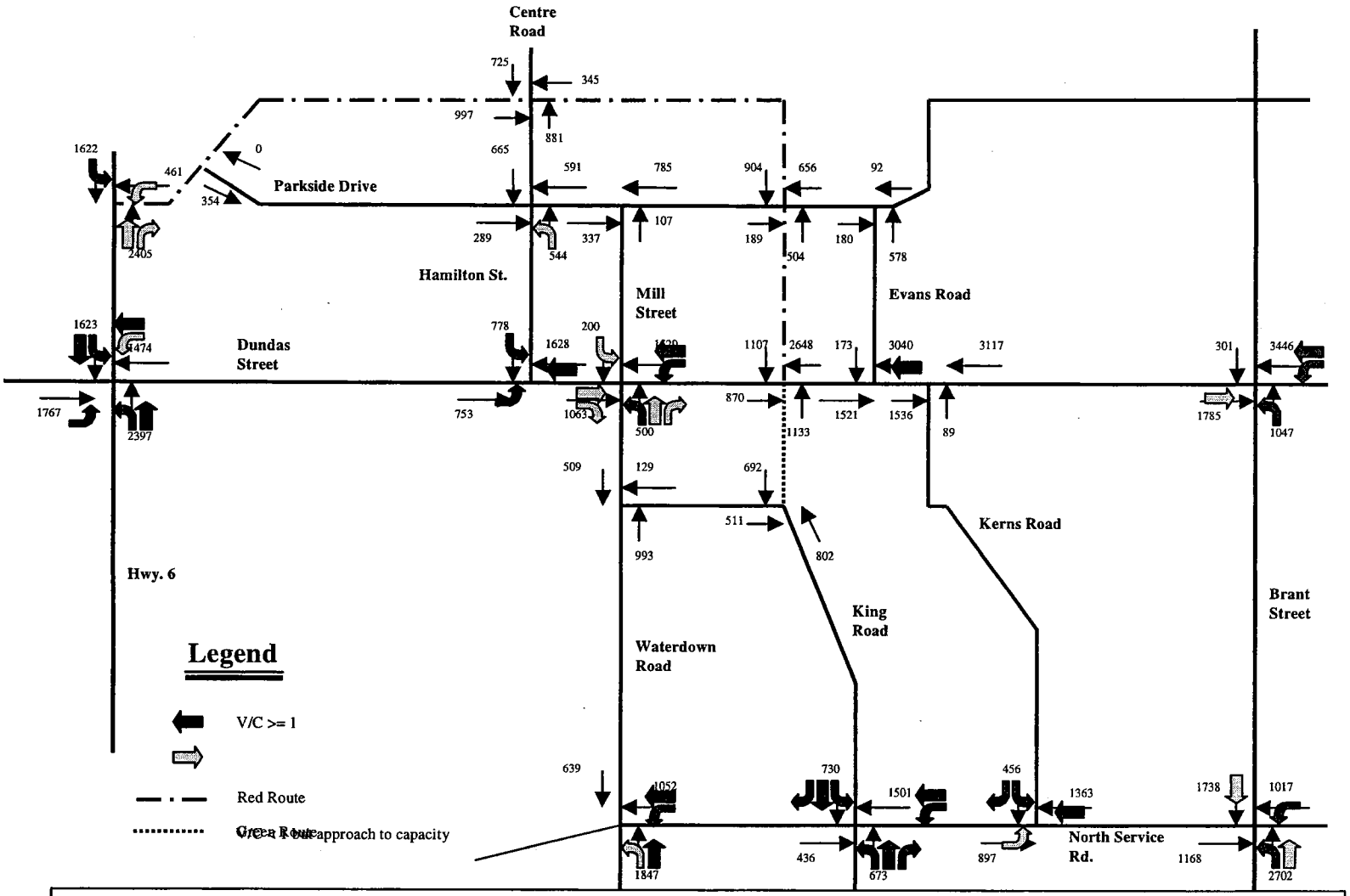


EXHIBIT A3.21 – TOTAL TRAFFIC: EXISTING + BACKGROUND GROWTH + FULL OPA28 (PM pk with red & geen routes)

APPENDIX B

STRATEGIC MODELLING

APPENDIX B - STRATEGIC MODELLING

The purpose of the strategic modelling component of the study is to assess the implications of the various Niagara-GTA Corridor options on the need for arterial road improvements in the study area.

The Niagara-GTA Corridor is a proposed new facility that would stretch from the QEW, in the Niagara Falls/Fort Erie area, through the Niagara Peninsula to connect to the existing freeway network in the GTA. The need for the facility and a number of alternative alignments has been documented in prior studies. A number of potential alignments pass near to the study area, with some having greater impacts on the road network in the Waterdown/Aldershot Study Area than others. The location of the potential corridors being reviewed are shown in **Exhibit 6.1** of the main body of this report.

The following sections describe the methodology and results from the strategic modelling process.

B.1 Methodology

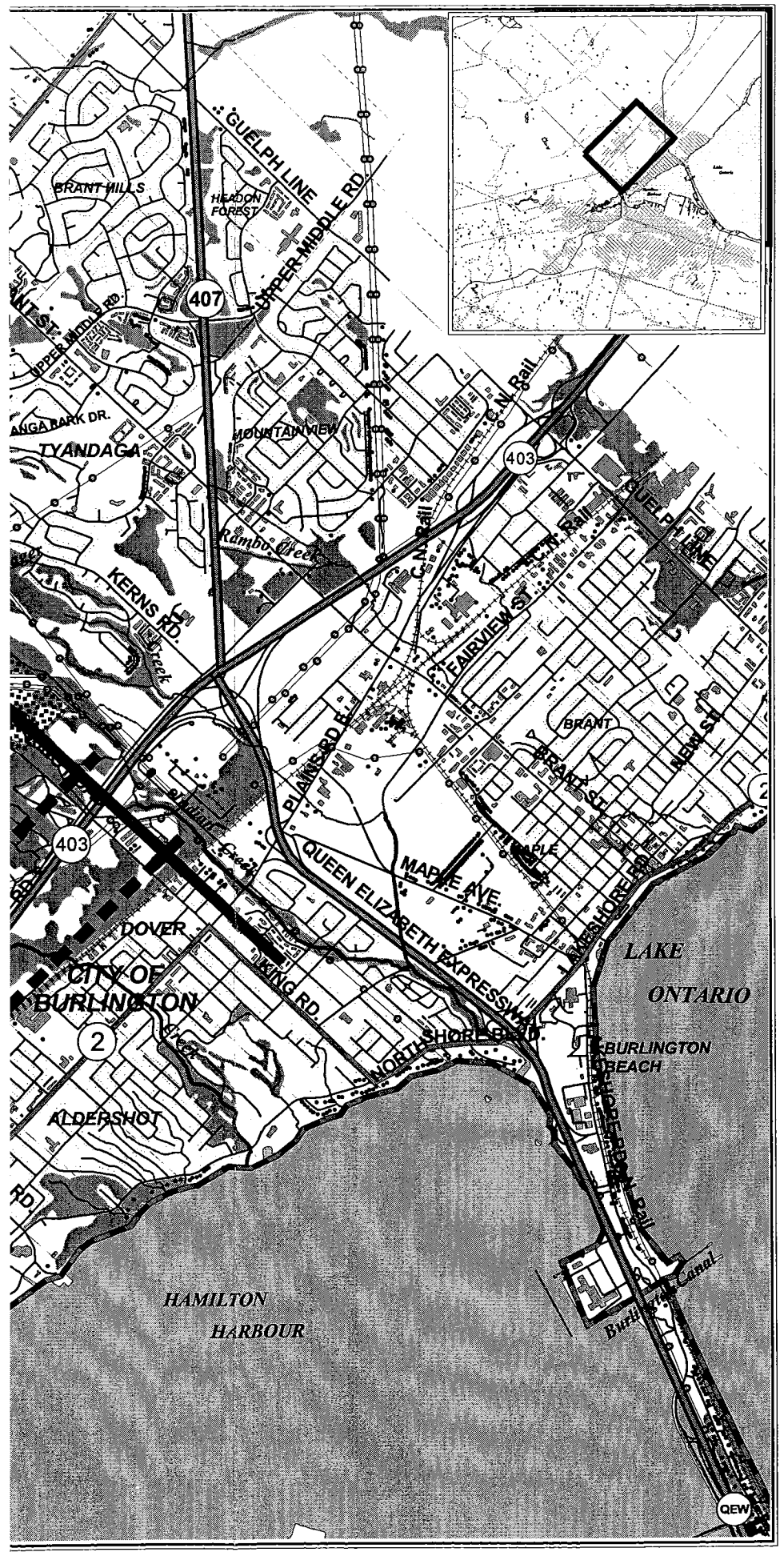
Strategic forecasting was undertaken for this study using the City of Hamilton's EMME/2 demand forecasting tool. Assumptions built into the model forecasts related to municipal and study area land use (population and employment) and transportation infrastructure (road network) were confirmed and modified to reflect current expectations related to the development area for the base and 2021 horizon years. Model derived AM peak hour forecasts were converted to PM peak hour conditions to reflect the critical time period in the study area. A screenline analysis was then conducted to assess existing conditions, and to strategically assess any deficiencies in the future road networks.

B.2 Land Use

For the modelling work undertaken, population and employment forecasts from the City of Hamilton Official Plan were used along with latest figures from the City of Burlington. Updates to the model to represent the most recent land use expectations of the City were performed. These updates included land use assumptions for:

- ROPA 9 in Glanbrook;
- Stoney Creek Urban Boundary Expansion;
- Setting Sail (downtown Hamilton population and employment review); and
- 1999 Waterdown Master Plan.

The population and employment forecasts assumed for this exercise are shown in **Exhibit B.1.**


GUELPH LINE
BRANT HILLS
HEADON FOREST
UPPER MIDDLE RD.
407
TYANDAGA
MOUNTAIN VIEW
C.N. Rail
403
Rambo Creek
KERNS RD.
FAIRVIEW ST.
BRANT
QUEEN ELIZABETH EXPRESSWAY
MAPLE AVE.
DOVER
CITY OF BURLINGTON
KING RD.
LAKE ONTARIO
BURLINGTON BEACH
NORTH SHORE BLVD.
ALDERSHOT
HAMILTON HARBOUR
Burlington Canal
QEW

SUMMARY OF GOVERNMENT AGENCY/UTILITIES COMMMENTS AND CONCERNS

	AGENCY	CONTACT/RESPONDENT	COMMENT/CONCERN
			corridor should be reassessed in light of the City of Burlington's tentatively preferred interchange location at Waterdown Road. Does not express support for any north-south corridor improvements based on concerns over potential impacts on Sassafras Woods ESA, ANSI and Carolinian Canada Site. • 1999 comments and Board of Directors' resolution remain valid. • In summary, the Authority does not support the preferred east-west alignment identified in 1999 and the Recommended Alternative needs to be revisited based on the directions and results of pending studies by other jurisdictions.
			• August 8, 2003 letter • provide fisheries information compiled since 1999. • Questioned whether 1999 report incorporated findings of the Grindstone Creek Watershed Study (CH, 1998). • Recommended that terrestrial assessments completed by the City of Burlington for the Waterdown Road Interchange EA be incorporated in the Aldershot/Waterdown update. • Advised that CH has completed little in the way of terrestrial updates north of Highway 403. Will forward tree inventory work when it becomes available. • Halton Natural Areas Inventory Project began field work in Summer 2003 and will provide to Aldershot/Waterdown team on request, when it becomes available.
13.	Enbridge Pipelines Inc. 801 Upper Canada Drive P.O. Box 128 Sarnia, Ontario N7T 7H8	Ms. Ann Newman, CET Crossings Co-ordinator, Eastern Region	• July 8, 2003 letter. • Operates up to three pipelines in Burlington/Flamborough area. • No objections at this time but would like the opportunity to review any proposed work on or near the Enbridge right-of-way. • Provided guidelines for development around their right-of-way and contacts for locates/site meetings.
14.	Environment Canada	Mr. Mike Shaw EA Projects Officer	• No response to date.
15.	Fisheries & Oceans Canada Habitat Mgmt. & Enhancement Division 3027 Harvester Rd., Suite 302 Burlington, Ontario L7N 3G7	NA	• No response to date.

SUMMARY OF GOVERNMENT AGENCY/UTILITIES COMMMENTS AND CONCERNS

	AGENCY	CONTACT/RESPONDENT	COMMENT/CONCERN
16.	Fisheries & Oceans Canada Navigation Protection Program 3027 Harvester Rd., Suite 302 Burlington, Ontario L7N 3G7	NA	• No response to date.
17.	Halton Region 1151 Bronte Road Oakville, Ontario L6M 3L1	Municipal Clerk	• No response to date.
18.	Hamilton Conservation Authority P.O. Box 7099 838 Mineral Springs Road Ancaster, Ontario L9G 3L3	Ms. Janet Wong Environmental Planner	• July 15, 2003 letter. • Their jurisdiction is west of Centre Road. • No changes in Provincial Policy Statement that may affect project. • Provided information on woodlots north of Borer's Creek identified as Parkside Drive Woodlot Environmentally Significant Area in City of Hamilton updated Natural Areas Inventory (2002) – woodlots meet Ecological and Hydrological Function, as well as site specific criteria. This designation has been put on hold pending the results of a consultant study commissioned by area land owners. • Provided recommendations from Borer's Creek Subwatershed Plan (2000). • Borer's Creek considered to be warmwater to coolwater fish habitat (Fisheries Management Plan for entire jurisdiction is being completed). • Provided a copy of the Authority's September 7, 1999 comments. • Do not support an alignment north of Borer's Creek.
19.	Hamilton-Wentworth District Catholic School Board 90 Mulberry Street, P.O. Box 2012 Hamilton, Ontario L8N 3R9	Mr. Michael Costelloe Acting Controller of Plant	• July 10, 2003 letter. • Since 1999, the Board has opened Guardian Angels Catholic Elementary School, located approximately 1 km north of Parkside Drive on the west side of Centre Road (705 Centre Road). • Recommends that the bypass route be located north of the school in order that the school and adjacent church property can be included in the future Waterdown urban area and be serviced by municipal water and sewer. • Also some suggestion that the bypass may create a barrier to student pedestrian travel along Centre Road (70% of student population resides in Waterdown and uses sidewalk constructed between Parkside Drive and the school as a condition of approval).

SUMMARY OF GOVERNMENT AGENCY/UTILITIES COMMMENTS AND CONCERNS

	AGENCY	CONTACT/RESPONDENT	COMMENT/CONCERN
20.	Hamilton District School Board P.O. Box 2558 100 Main St. W. Hamilton, Ontario L8N 3L1	Dr. J. Murray	• No response to date.
21.	Hamilton Emergency Services 55 King William Street Hamilton, Ontario L8R 1A2	Mr. Glen Peace General Manger, Emergency Services	• No response to date.
22.	Hamilton Police Services 155 King William St., Box 1060, LCD1 Hamilton, Ontario L8N 4C1	Mr. Kenneth Robertson Chief of Police	• No response to date.
23.	Hamilton Utilities Corporation Box 2249, Stn. LCD1 Hamilton, Ontario L8N 3E4	Mr. Art Leitch President & CEO	• July 9, 2003 letter. • No concerns at this time. • Expect that issues regarding any required relocation of existing distribution plant will be addressed at the design stage. • Comments provided by M. Cananzi, President, Hamilton Hydro Inc.
24.	Hydro One 40 Olympic Drive Dundas, Ontario L9H 7P5	Ms. Carol Christie	• No response to date.
25.	Imperial Oil Products & Chemical Division 100 - 5th Concession Rd. E. Waterdown, Ontario L0R 2H1	Ms. Colleen Mitchell Right-of-Way Co-ordinator	• July 7, 2003 letter. • Imperial Oil does have a system of oil product pipelines in the area. • The route of the Sarnia Products Line has not been modified since 1999 and the company has no plans to alter it. • Please maintain contact on this project in order to facilitate control of activities in pipeline corridor and prevent damage or interference.
26.	Ministry of Agriculture & Food Wellington Place RR#1, Fergus, Ontario N1M 2W3	Ms. Carol Neumann Rural Planner	• July 9, 2003 letter. • April 24, 1998 comments remain unchanged. • In principle, not opposed to project, based on public benefits and the understanding that: - any impact on prime agricultural lands will be avoided or, if unavoidable, minimized to the greatest extent possible; and - any impacts on agriculturally related infrastructure such as tile drains, drainage outlets and field entrances will be avoided or, if unavoidable, minimized to the greatest extent possible.

SUMMARY OF GOVERNMENT AGENCY/UTILITIES COMMMENTS AND CONCERNS

	AGENCY	CONTACT/RESPONDENT	COMMENT/CONCERN
			• If establishing a detour route, the needs of the local farm community should be considered. • Offered soils, soils capability, land use and drainage mapping. • Requested to be kept informed of study progress.
27.	Ministry of Culture 119 King St. W., 14th Floor Hamilton, Ontario L8P 4Y7	Ms. Karen Daniels,Consultant Hamilton District Office, Central Area	• July 17, 2003 letter. • No comments to make at this time but may wish to provide comment on any report on heritage resources. • For this review and comment, contact Mr. Michael Johnson (see contact below).
28.	Ministry of the Environment West Central Region Hamilton District Office 9th Floor, Ellen Fairclough Building Hamilton, Ontario L8P 4Y7	Ms. Barbara Ryter Environmental Assessment and Planning Coordinator Air Pesticides and Environmental Planning	• August 5, 2003 letter • Reviewed Volume 1 of 1999 Stantec Report. • There have been no changes in pertinent MOE policies, plans, actions or initiatives that would have a bearing on the recommendations made in the Master Plan report. • Expects that Class EA process will be adhered to throughout all phases of planning and evaluation of the undertaking. • Also expect incorporation of best management practices into the design to minimize environmental impacts. • There did not appear to be any outstanding concerns or issues expressed in Volume 1 of the report.
29.	Ministry of Municipal Affairs & Housing 777 Bay St., 7th Floor Toronto, Ontario M5G 2E5	NA	• No response to date.
30.	Ministry of Natural Resources Guelph District Office 1 Stone Rd. W. Guelph, Ontario N1G 4Y2	Mr. Craig Selby District Manager	• No response to date.
31.	Ministry of Tourisim, and Recreation 400 University Ave., 4th Floor Toronto, Ontario M7A 2R9	Mr. Michael Johnston Manager	• No response to date.

SUMMARY OF GOVERNMENT AGENCY/UTILITIES COMMMENTS AND CONCERNS

	AGENCY	CONTACT/RESPONDENT	COMMENT/CONCERN
32.	Ministry of Transportation 1201 Wilson Ave., Bldg. D., 4th Floor Downsview, Ontario M4V 1L5	Ms. Pauline Van Roon, P.Eng. Highway Engineering Hamilton	• July 2, 2003 letter. • Concerns remain with the proposed routes that will affect the Ministry's highway system. Impacts, with and without the route in place, should be determined for all provincial highways in the vicinity (Highways 5, 6 and 403). • MTO input to the City of Burlington's Highway 403/Waterdown Road Interchange study should be included. • The Ministry will be very concerned if an additional interchange is proposed on Highway 403 to accommodate the north-south leg of the bypass route. • It will be necessary for MTO to review all proposed crossings of the Highway 403 corridor.
33.	National Heritage Information Centre 300 Water Street, P.O. Box 7000 2nd Floor, North Tower Peterborough, Ontario K9J 8M5	NA	
34.	Niagara Escarpment Commission 232A Guelph Street Georgetown, Ontario L7G 4B1	Ms. Marion Plaunt Senior Strategic Advisor	• July 2, 2003 letter • Comments made in the context of road network improvements made or proposed since 1999 (Highway 407, Highway 5, Highway 6, Mid-Peninsula Corridor). Effects of new improvements should be monitored in terms of impacts on both north-south and east-west routes, with a view to revisiting the need and justification for an improved north-south crossing of the Niagara Escarpment. Until this justification is confirmed, it is premature to consider the details of improvements to the King Road corridor • August 19, 1999 comments remain valid and will have to be addressed (directing traffic to Highway 6 and Brant Street; creating an attractive transit-based alternative, including enhanced connections to Waterdown GO Station). • Consider directing traffic from lands south of Highway 5 to the Highway 5 corridor for connection to Highways 6, 407,401 and QEW by reconfiguring major collector road links (internal subdivision roads, Mountain Brow Road). • March 1, 2004 letter • Further to our meeting: "there appears to be suffucuent rationale to expect a need to improve transportation infrasturctre within the study area".

SUMMARY OF GOVERNMENT AGENCY/UTILITIES COMMMENTS AND CONCERNS

	AGENCY	CONTACT/RESPONDENT	COMMENT/CONCERN
			• More work will be done to clarify the level of improvements required for North/South improvements. • Next phase of the Master Transportation Study will identify the opportunities and options (including transit) to address the identified needs. • Opportunities that minimize impacts on natural and visual Escarpment environment will be addressed through the next phase.
35.	Ontario Provincial Police Burlington Detachment 1160 North Shore Boulevard East P.O. Box 5021, Station A Burlington, Ontario L7R 3	Staff Sgt. J. R. Weekes, Detachment Cdr.	• No response to date.
36.	Royal Botanical Gardens 680 Plains Rd. W. Burlington, Ontario L7T 4H4	Mr. Tys Theysmeyer	• No response to date.
37.	Sun Canadian Pipeline P.O. Box 470 830 Highway 6 North Waterdown, Ontario L0R 2H0	Mr. Paul Lane	• No response to date.
38.	Union Gas Box 10, 360 Strathearne Ave. N. Hamilton, Ontario L8N 3A5	Mr. Enzo Greco Mapping Supervisor	• No response to date.

Parkside Drive Woodlot (FLAM 128) - Ward 15

Site Summary

Parkside Drive Woodlot consists of seven distinct vegetation communities along the headwaters of Borer's Creek. The site is important because of the diversity of communities present, including upland mixed forests, a conifer plantation, deciduous swamp, and meadow marsh. The site is found along Parkside Drive, north of Waterdown in Flamborough. The water table throughout the site is high, indicating that this is a significant groundwater recharge area. This large site (94 hectares) also contains a small amount of interior forest habitat, which is particularly important because it is adjacent to the Waterdown urban area.

ESA Criteria

- Significant Ecological Function
  - the woodlot provides a forested riparian corridor, connecting Millgrove South Woodlot ESA (FLAM 45) to Waterdown North Wetlands ESA (FLAM 47). The site is linked to neighbouring greenspaces by hedgerows.
  - there is also interior forest habitat (100-200 meters from edge) present
  - it provides habitat for two plants that are rare in the City of Hamilton (see Species List below).
  - the site exhibits a high diversity of biotic features (at least 7 different Ecological Land Classification plant community types) relative to its size. In this report, a site that contains 4 or more ELC plant community types is considered to have high diversity.

- Significant Hydrological Function
  - The site contributes to improved water quality and flood attenuation. The high water table (Ecologistics Ltd. 1976) and underlying and surrounding rapidly draining soils (Grimsby sand loam) indicate that this area could be sensitive to groundwater contamination. The vegetation of the woodlot serves an important hydrological function by filtering water seeping through underlying soils and protecting groundwater quality.

Significant Site Criteria

- The site is locally significant, as a remnant natural area in an intensively urban and agricultural landscape.

Species List

COMMON NAME	SCIENTIFIC NAME	HAM RANK	SRANK (PROV)	GRANK (CAN)
Hairy Woodpecker	*Picoides villosus*	uncommon	S5	G5
Great Horned Owl	*Bubo virginianus*	uncommon	S5	G5
Common Sedge	*Carex communis*	uncommon	S5	G5
Finger Sedge	*Carex digitalis*	uncommon	S4S5	G5
Cyperus-like Sedge	*Carex pseudo-cyperus*	uncommon		
Meadow Horsetail	*Equisetum pratense*	rare	S5	G5

COMMON NAME	SCIENTIFIC NAME	HAM RANK	SRANK (PROV)	GRANK (CAN)
Woodland Horsetail	*Equisetum sylvaticum*	uncommon	S5	G5
Ground-pine	*Lycopodium obscurum*	rare	S4	G5
Canada Gooseberry	*Ribes hirtellum*	uncommon	S5	G5

Map of Site
Refer to Figure 2.

Recommendation
Parkside Drive Woodlot is recommended as an ESA for inclusion in the Regional Official Plan because it fulfills two of the ESA criteria.

This site has potential for restoration to increase interior forest habitat (fill in jagged edges) and enhance linkages to adjacent habitat.

Figure 2.

N
Centre Road
Concession 5 East
Parkside Drive
Highway No. 6

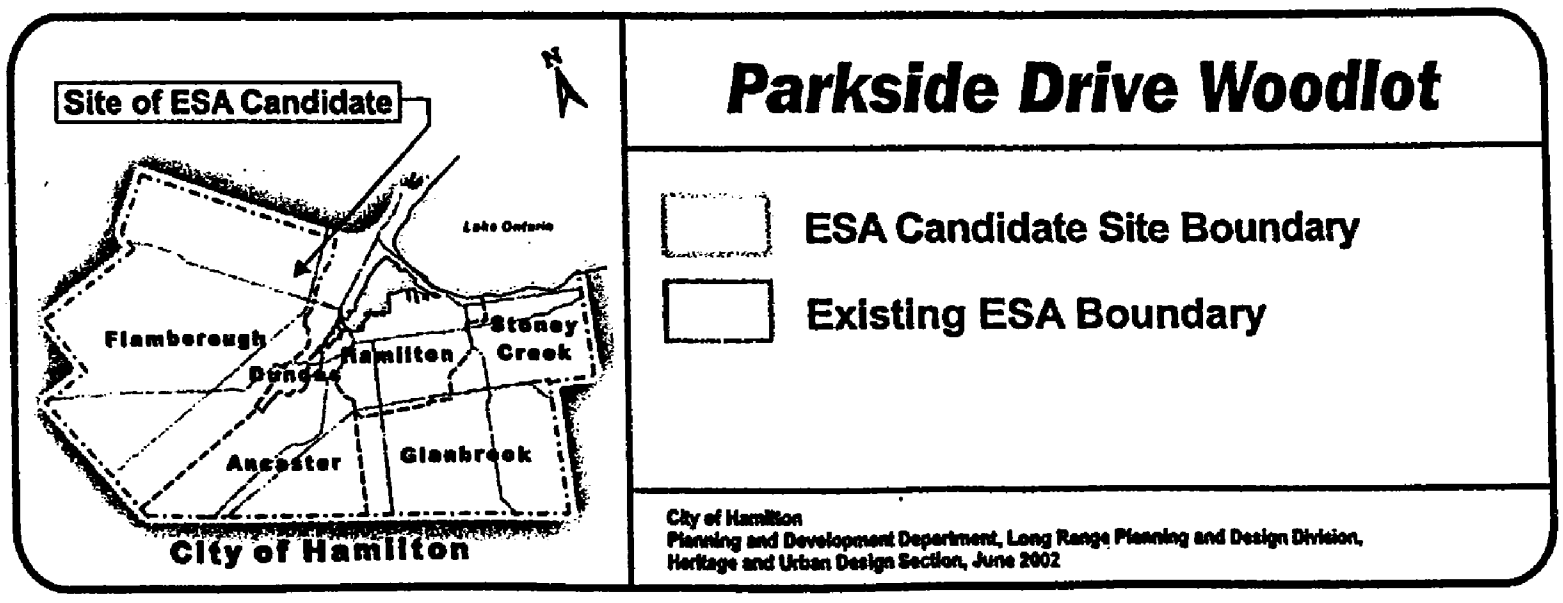
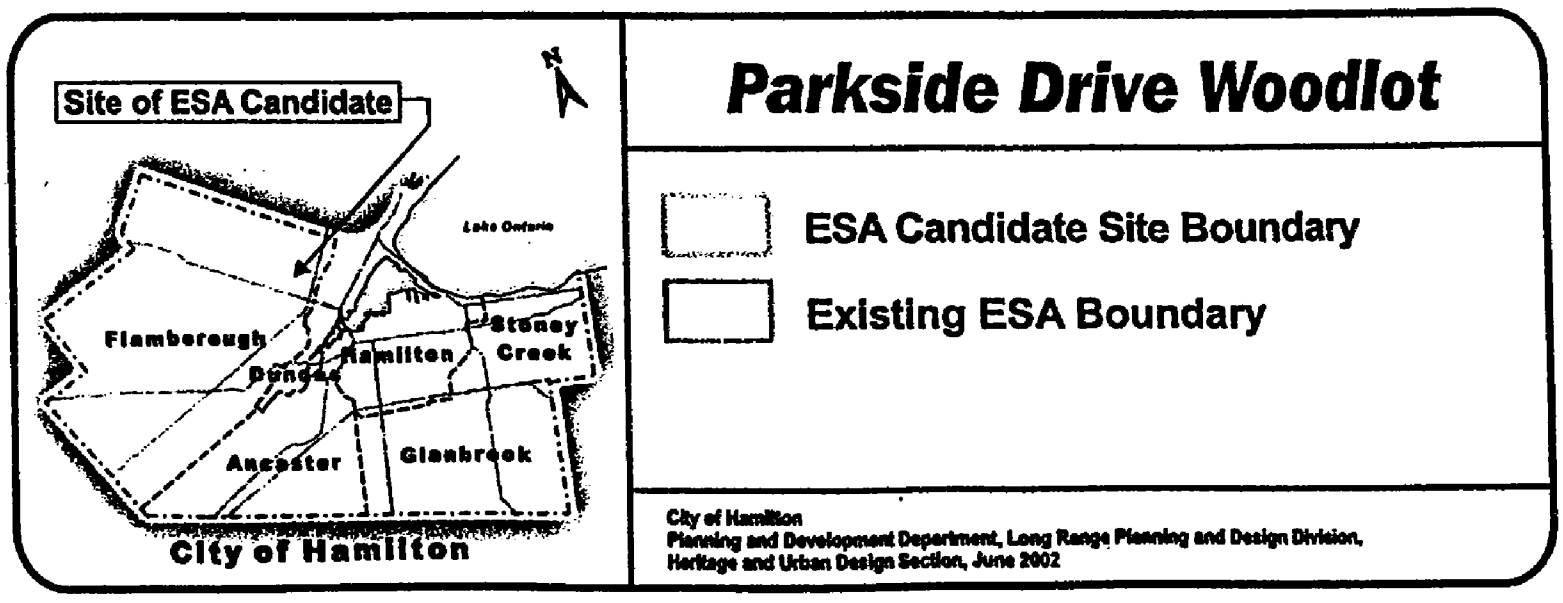

Site of ESA Candidate
N
Lake Ontario
Flamborough
Dundas
Hamilton
Stoney Creek
Ancaster
Glanbrook
City of Hamilton
Parkside Drive Woodlot
ESA Candidate Site Boundary
Existing ESA Boundary
City of Hamilton
Planning and Development Department, Long Range Planning and Design Division,
Heritage and Urban Design Section, June 2002

Figure 2.

N
Centre Road
Concession 5 East
Parkside Drive
Highway No. 6


Site of ESA Candidate
N
Lake Ontario
Flamborough
Dundas
Hamilton
Stoney Creek
Ancaster
Glanbrook
City of Hamilton
Parkside Drive Woodlot
ESA Candidate Site Boundary
Existing ESA Boundary
City of Hamilton
Planning and Development Department, Long Range Planning and Design Division,
Heritage and Urban Design Section, June 2002