



CITY OF VANCOUVER  
ENGINEERING SERVICES  
T.R. Timm, P.Eng., General Manager

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## MEMORANDUM

June 5, 2006

TO: Mayor & Council

CC: Judy Rogers, City Manager  
Syd Baxter, City Clerk

FROM: Tom Timm, General Manager of Engineering Services

SUBJECT: Additional Information Regarding Gateway Program

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Attached is a technical memorandum from the Gateway Program that staff received late last week. The memorandum provides an analysis of the potential impact of the Gateway Program on Vancouver arterial roads.

Tom Timm, P.Eng  
General Manger/City Engineer

JWD/spg

Attachment

## TECHNICAL MEMORANDUM

Date: May 30, 2006

Subject: Analysis of Potential Impact of Gateway Program on Vancouver Arterial Roads

### Introduction

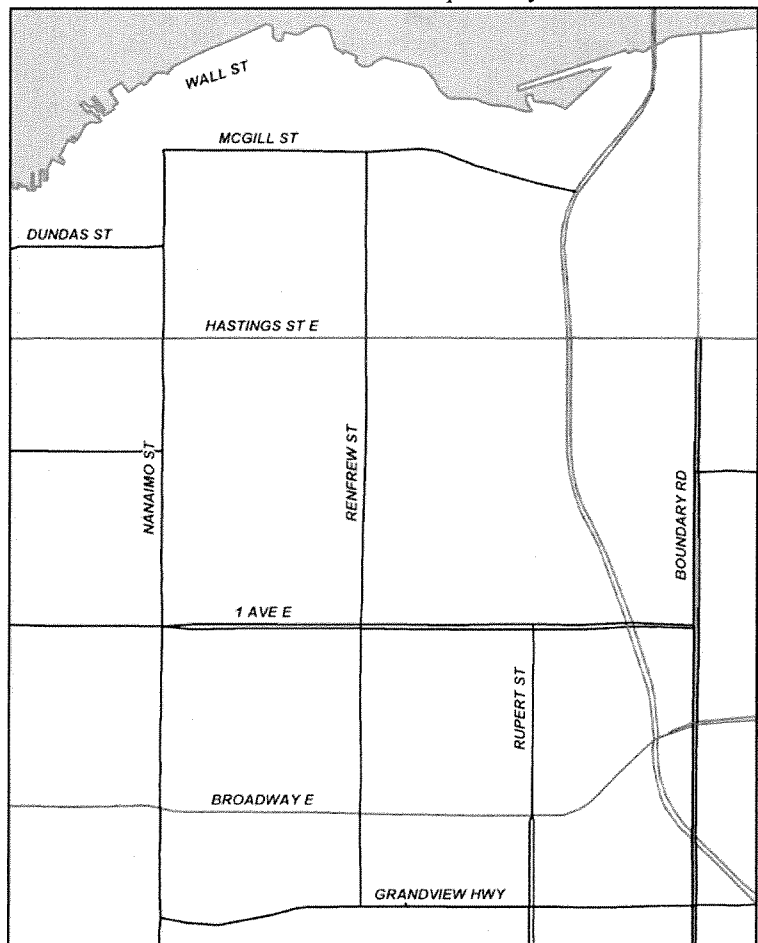
The purpose of this technical memorandum is to review and describe the potential impact of the Gateway Program infrastructure investments on specific east-west arterial roads in Vancouver that act as connectors between Highway 1 and the core areas of Vancouver. The primary arterial roads include:

- McGill Street / Dundas Street
- Hastings Street
- 1<sup>st</sup> Avenue
- Broadway
- Grandview Highway

### Summary of Conclusions

The analysis suggests that relative to the base case, the potential impact of the Gateway Program on traffic volumes in the morning peak hour for all of the above streets combined is as follows:

- A 2-3% increase in westbound volumes on opening day
- A 4-6% increase in westbound volumes by 2031
- A 1-2% increase in eastbound volumes on opening day
- A 1-3% increase in eastbound volumes by 2031.
- These increases are projected to be about 150 to 300 vehicles per hour combined over all of the arterials in the westbound direction when the Gateway Program is implemented and about 500 vehicles per hour combined over all of the arterials by 2031. Corresponding projected increases in the eastbound direction combined over all arterials are 100 and 300 vehicles per hour for opening day and 2031 respectively.



### ***Methodology***

The analysis summarizes each of the arterial roads in terms of their current traffic volumes (2003) during the AM peak hour, and projected volumes based on the Gateway sub-area travel demand forecasting model both at opening day (model results from 2011) and in the long term (model results from 2031).

The opening day volumes are based on a reassignment of projected traffic demand to a regional road network that includes the Gateway Program as well as other transportation projects that are planned or underway in the region (e.g. Canada Line and Evergreen Line rapid transit and the Golden Ears Bridge). The long range forecasts are based on 2031 model runs using GSAM State 3. In order to determine the maximum potential impact on the arterial roads during the AM peak hour, model runs with no tolls in place were used.

In addition to tabulating modeled traffic volumes, recent traffic count data are also presented where available.

It is noted that the 2003 model estimates, particularly in the eastbound direction, differ from actual count data at some locations. Significant differences tend to occur west of Renfrew, away from the Highway 1 corridor. These differences reflect the impact of Vancouver's grid network on the traffic assignment component of the GSAM model. Model results are more accurate when examined over screen lines across parallel roads.

### ***Detailed Model Results, by Screen Line***

#### **1. South Screen Line**

The south screen line is defined to include 1<sup>st</sup> Avenue, Broadway, and Grandview Highway. The projected impact of the Gateway program on each of those roads is discussed below.

##### **1<sup>st</sup> Avenue**

As shown in the table below, the highest westbound volumes on 1<sup>st</sup> Avenue during the AM peak hour occur between Nanaimo Street and Renfrew Street (both in the model and based on recent intersection counts). Since 1<sup>st</sup> Avenue is near capacity at this point, very little growth is anticipated, either with or without the Gateway Program. This cap on potential growth is consistent with historic trends given that westbound volumes were 2150 vehicles per hour west of Renfrew both in 1995 and 2003. Based on current model results, the impact of the Gateway Program will be an increase in peak hour/peak direction volumes by 2% - 3% (35 to 60 vehicles) over the projected volumes without the Gateway Program. The estimated impact of the Gateway Program will be marginally higher on those segments of 1<sup>st</sup> Avenue closer to Highway 1; however, east of Highway 1, westbound volumes drop substantially. The drop in volumes east of Highway 1 illustrates that many vehicles that were previously using the municipal arterial road network to access Vancouver will divert to Highway 1 and then revert back to arterial roads for the final leg of their journey. These trips add to projected highway volumes but have no net impact on the arterial roads in Vancouver west of Highway 1.

Eastbound, traffic volumes on 1<sup>st</sup> Avenue are projected to decline over most sections as some traffic is attracted to other routes.

## Analysis of Potential Impact of Gateway Program on Vancouver Arterial Roads

1st Avenue	Westbound volumes west of					Eastbound volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
Count Data	2077	2149	1719	1574	1056	1575	2114	1597	2035	1040
Model Estimates										
2003 Base	1490	1925	1740	1530	1115	430	1410	1375	2275	1100
2011 Base	1525	1940	1760	1540	1155	475	1420	1385	2310	1105
2011 Gateway	1560	1975	1800	1660	940	465	1405	1415	2250	1140
2031 Base	1545	1970	1740	1560	1185	670	1480	1440	2440	1200
2031 Gateway	1595	2030	1840	1740	1050	650	1495	1475	2415	1265
Absolute Difference										
Gateway vs Base - 2011	35	35	40	120	-215	-10	-15	30	-60	35
Gateway vs Base - 2031	50	60	100	180	-135	-20	15	35	-25	65
Percent Difference										
Gateway vs Base - 2011	2%	2%	2%	8%	-19%	-2%	-1%	2%	-3%	3%
Gateway vs Base - 2031	3%	3%	6%	12%	-11%	-3%	1%	2%	-1%	5%

### Broadway

Broadway, a designated truck route, connects to Lougheed Highway in Burnaby and does not provide direct access to Highway 1. The following table summarizes the projected impacts of the Gateway Program on this route.

The highest westbound volumes during the AM peak hour on this portion of Broadway occur west of Nanaimo. At this point, the projected impact of the Gateway Program will be an increase in peak hour/peak direction volumes by 2-3% (50-70 vehicles) over the projected volumes without the Gateway Program. The projected impact on other segments is somewhat higher; however, volumes are projected to change marginally where Broadway travels under Highway 1. In the eastbound direction traffic volumes are projected to drop at the eastern end and increase slightly in the west.

Broadway	Westbound volumes west of					Eastbound volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
Count Data	1969	1601	1904	1642	1642	1020	1046	1119	1212	1212
Model Estimates										
2003 Base	2365	1870	2030	1755	1755	1415	1530	1830	1630	1630
2011 Base	2430	1930	2120	1815	1815	1425	1580	1895	1670	1670
2011 Gateway	2480	2015	2255	1785	1785	1460	1645	1915	1555	1555
2031 Base	2465	1955	2170	1840	1840	1575	1845	2140	1865	1865
2031 Gateway	2535	2045	2370	1865	1865	1595	1900	2195	1725	1725
Absolute Difference										
Gateway vs Base - 2011	50	85	135	-30	-30	35	65	20	-115	-115
Gateway vs Base - 2031	70	90	200	25	25	20	55	55	-140	-140
Percent Difference										
Gateway vs Base - 2011	2%	4%	6%	-2%	-2%	2%	4%	1%	-7%	-7%
Gateway vs Base - 2031	3%	5%	9%	1%	1%	1%	3%	3%	-8%	-8%

### Grandview Highway

The anticipated impacts on Grandview Highway in the westbound direction during the AM peak hour are similar to 1<sup>st</sup> Avenue with increases in traffic volumes of 2% to 5% (45 to 100 vehicles) between Nanaimo and Renfrew. The increase in traffic volumes goes up on the segments closer to Highway 1 in 2031 (about 150 vehicles per hour in 2031). The impact on eastbound volumes is mixed with little or no change on most segments (1%-3%) and higher increases (12% to 14%) to the east, adjacent to Boundary Road.

## Analysis of Potential Impact of Gateway Program on Vancouver Arterial Roads

Grandview Hwy	Westbound volumes west of				Eastbound volumes west of			
	Nanaimo	Renfrew	Rupert	Hwy 1/Boundary	Nanaimo	Renfrew	Rupert	Hwy 1/Boundary
Count Data	1718	1466	1674	1566	1725	1557	1475	1420
Model Estimates								
2003 Base	1445	1800	1565	1725	1035	1245	1395	1635
2011 Base	1495	1870	1620	1765	1045	1290	1450	1700
2011 Gateway	1515	1915	1715	1845	1055	1320	1465	1910
2031 Base	1505	1930	1655	1780	1180	1445	1680	2005
2031 Gateway	1565	2030	1790	1945	1180	1480	1725	2280
Absolute Difference								
Gateway vs Base - 2011	20	45	95	80	10	30	15	210
Gateway vs Base - 2031	60	100	135	165	0	35	45	275
Percent Difference								
Gateway vs Base - 2011	1%	2%	6%	5%	1%	2%	1%	12%
Gateway vs Base - 2031	4%	5%	8%	9%	0%	2%	3%	14%

### Combined Impact – South Screen Line

The impacts of the Gateway Program on the three arterials combined are presented in the following table. The increase in westbound traffic volumes during the AM peak hour is projected to be 3% in the short term (165 vehicles per hour) over the segment with the highest modeled volumes (Nanaimo to Renfrew), increasing to 4% relative to projected base volumes in 2031 (250 vehicles). Projected increases are higher at locations closer to Highway 1, ranging up to 5% to 8% (2011 and 2031 respectively) over the segment between Rupert and Renfrew. The combined impact in the eastbound direction is a slight increase in traffic volumes east (1% - 3%). Volumes decrease east of the Highway 1 screenline in both directions.

South Screen Line	Westbound volumes west of					Eastbound volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
Count Data	5764	5216	5297	4782	2698	4320	4717	4191	4667	2252
Model Estimates										
2003 Base	5300	5595	5335	5010	2870	2880	4185	4600	5540	2730
2011 Base	5450	5740	5500	5120	2970	2945	4290	4730	5680	2775
2011 Gateway	5555	5905	5770	5290	2725	2980	4370	4795	5715	2695
2031 Base	5515	5855	5565	5180	3025	3425	4770	5260	6310	3065
2031 Gateway	5695	6105	6000	5550	2915	3425	4875	5395	6420	2990
Absolute Difference										
Gateway vs Base - 2011	105	165	270	170	-245	35	80	65	35	-80
Gateway vs Base - 2031	180	250	435	370	-110	0	105	135	110	-75
Percent Difference										
Gateway vs Base - 2011	2%	3%	5%	3%	-8%	1%	2%	1%	1%	-3%
Gateway vs Base - 2031	3%	4%	8%	7%	-4%	0%	2%	3%	2%	-2%

## 2. North Screen Line

The north screen line is defined to include Dundas / McGill Streets, and Hastings Street. The projected impact of the Gateway program on each of those roads is discussed below.

### Dundas / McGill Street

The anticipated impacts on McGill Street in the westbound direction during the AM peak are not significant (2%) just west of Highway 1 since much of this traffic originates from the North Shore and is not directly affected by the Gateway Program. By 2031, projected increases are higher (7-

## Analysis of Potential Impact of Gateway Program on Vancouver Arterial Roads

8%) near Nanaimo and Renfrew resulting in about 100 additional vehicles per hour. Traffic growth is projected to be more significant in the eastbound direction (14%) near Highway 1. This is a result of the improved level of service on eastbound Highway 1, which makes it more attractive for Vancouver residents to access the highway via McGill than via the other routes.

Dundas / McGill Street	Westbound volumes west of					Eastbound volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
Count Data	2001	1599		2198		755	808		1143	
Model Estimates										
2003 Base	1760	1335		2195		495	860		1065	
2011 Base	1770	1315		2180		515	875		1095	
2011 Gateway	1795	1380		2230		510	870		1095	
2031 Base	1750	1355		2335		630	920		1220	
2031 Gateway	1865	1465		2365		660	925		1390	
Absolute Difference										
Gateway vs Base - 2011	25	65		50		-5	-5		0	
Gateway vs Base - 2031	115	110		30		30	5		170	
Percent Difference										
Gateway vs Base - 2011	1%	5%		2%		-1%	-1%		0%	
Gateway vs Base - 2031	7%	8%		1%		5%	1%		14%	

## Hastings Street

The anticipated impacts on Hastings Street in the westbound direction during the AM peak are relatively small (1%) in the short term west of Nanaimo (the segment with the highest volumes west of Highway 1). In the long term, an increase of 2% (50 vehicles per hour) relative to the base case is projected on this segment. The increase in volumes just west of Highway 1 is projected to be 4% - 6% or 80 to 130 vehicles. East of Highway 1, volumes on Hastings are projected to decrease by about 10%. Eastbound volumes are projected to increase by about 2% - 6%; however, due to the low base volumes, this translates to only 20 to 60 vehicles per hour.

Hastings Street	Westbound volumes west of					Eastbound volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
Count Data	2224	2074		2126	2380	731	648		774	824
Model Estimates										
2003 Base	2170	1670		2025	2295	1020	875		890	1100
2011 Base	2235	1710		2010	2355	1135	990		950	1145
2011 Gateway	2250	1785		2090	2030	1180	1035		1010	1035
2031 Base	2275	1710		2030	2510	1310	1195		1115	1355
2031 Gateway	2325	1795		2160	2300	1360	1220		1135	1235
Absolute Difference										
Gateway vs Base - 2011	15	75		80	-325	45	45		60	-110
Gateway vs Base - 2031	50	85		130	-210	50	25		20	-120
Percent Difference										
Gateway vs Base - 2011	1%	4%		4%	-14%	4%	5%		6%	-10%
Gateway vs Base - 2031	2%	5%		6%	-8%	4%	2%		2%	-9%

## Combined Impact – North Screen Line

The impacts of the Gateway Program on traffic crossing the two preceding arterials combined with volumes on Dundas and Wall Street are presented in the following table. The increase in westbound traffic volumes during the AM peak hour is projected to be 3% (130 vehicles per hour)

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over the segment with the highest modeled volumes (west of Highway 1) in 2011, increasing to 4% (160 vehicles) in 2031 relative to projected base volumes. Projected increases are somewhat higher at other locations. The combined impact in the eastbound direction is an increase in traffic volumes in the range of 2% to 8%.

North Screen Line	Westbound volumes west of					Eastbound volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
Count Data	4225	3673		4324	2380	1486	1456		1917	824
Model Estimates										
2003 Base	3930	3005		4220	2295	1515	1735		1955	1100
2011 Base	4005	3025		4190	2355	1650	1865		2045	1145
2011 Gateway	4045	3165		4320	2030	1690	1905		2105	1035
2031 Base	4025	3065		4365	2510	1940	2115		2335	1355
2031 Gateway	4190	3260		4525	2300	2020	2145		2525	1235
Absolute Difference										
Gateway vs Base - 2011	40	140		130	-325	40	40		60	-110
Gateway vs Base - 2031	165	195		160	-210	80	30		190	-120
Percent Difference										
Gateway vs Base - 2011	1%	5%		3%	-14%	2%	2%		3%	-10%
Gateway vs Base - 2031	4%	6%		4%	-8%	4%	1%		8%	-9%

### 3. Combined Impact – Both Screen Lines

The impacts of the Gateway Program on the five arterials combined are presented in the following table. The increase in westbound traffic volumes over the Nanaimo to Highway 1 segments during the AM peak hour is projected to be about 300 vehicles per hour in 2011, increasing to about 450 to 530 vehicles per hour in 2031, or increases of 3% to 6% relative to projected base volumes. The combined impact in the eastbound direction over the same segments is a maximum increase in traffic volumes of 120 in 2011 to 300 in 2031 or 2% to 3% relative to the base case. Traffic volumes are projected to decrease in both directions and for both horizon years east of Highway 1 illustrating the shift of traffic from the Burnaby arterial network to Highway 1 associated with the Gateway Program.

Combined Screen Line	Westbound volumes west of					Eastbound volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
Count Data	9989	8889		9106	5078	5806	6173		6584	3076
Model Estimates										
2003 Base	9230	8600		9230	5165	4395	5920		7495	3830
2011 Base	9455	8765		9310	5325	4595	6155		7725	3920
2011 Gateway	9600	9070		9610	4755	4670	6275		7820	3730
2031 Base	9540	8920		9545	5535	5365	6885		8645	4420
2031 Gateway	9885	9365		10075	5215	5445	7020		8945	4225
Absolute Difference										
Gateway vs Base - 2011	145	305		300	-570	75	120		95	-190
Gateway vs Base - 2031	345	445		530	-320	80	135		300	-195
Percent Difference										
Gateway vs Base - 2011	2%	3%		3%	-11%	2%	2%		1%	-5%
Gateway vs Base - 2031	4%	5%		6%	-6%	1%	2%		3%	-4%

### 4. Analysis of Potential Impact of Port Mann Bridge Traffic on Vancouver Arterial Roads

## Analysis of Potential Impact of Gateway Program on Vancouver Arterial Roads

Although the Port Mann Bridge primarily serves trips between Surrey and the Langleys to the south and Burnaby, New Westminster, and the Northeast Sector to the north, about 25% of the current westbound volume on the bridge during the AM peak period uses at least a portion of the major east-west arterial roads in Vancouver west of Highway 1. The table below presents projected Port Mann Bridge vehicle volumes during the AM peak hour across the following arterial roads combined:

- McGill Street / Dundas Street
- Hastings Street
- 1st Avenue
- Broadway
- Grandview Highway

Combined Screen Line	Westbound Port Mann volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
<b>Model Estimates</b>					
2003 Base	1050	1070		1255	30
2011 Base	1010	1035		1210	10
2011 Gateway	1080	1130		1315	25
<b>Absolute Difference</b>					
Gateway vs Base - 2011	70	95		105	15
<b>Percent Difference</b>					
Gateway vs Base - 2011	7%	9%		9%	150%
<b>Percent of Total Volumes</b>					
2003 Base	11.4%	12.4%		13.6%	0.6%
2011 Base	10.7%	11.7%		13.0%	0.2%
2011 Gateway	11.2%	12.4%		13.7%	0.5%

In Vancouver just west of Highway 1, Port Mann Bridge users currently account for about 14% of the total westbound arterial traffic volumes. This drops to about 11% west of Nanaimo. Based on the “opening day” model run for the Gateway Program, these percentages will remain unchanged relative to current values. The impact of the Gateway Program on the volume of the arterial traffic using the Port Mann Bridge is about 100 vehicles per hour over all of the five arterials combined west of Renfrew when compared with 2011 projected volumes without the Gateway Program.



**1st Avenue**

As shown in the table below, the proportion of the traffic on 1st Avenue that also uses Highway 1 and the Port Mann Bridge is about 30%, noticeably higher than for the combined screen line. Model projections suggest that the number of Port Mann Bridge/1st Avenue users will actually decrease relative to both the 2011 base case and current estimates, to about 22% to 26% of 1st Avenue traffic. The reason for this decrease is that the model re-assigns westbound traffic to Hastings and McGill Streets to take advantage of the improved level of service on Highway 1. The reduction in volumes on 1st Avenue by Port Mann Bridge users is offset by an increase in users from other origins (e.g. Burnaby, the Northeast sector, and the North Shore) resulting in the overall increases on 1st Avenue described earlier in this memo.

1st Avenue	Westbound Port Mann volumes west of				
	Nanaimo	Renfrew	Rupert	Hwy 1	Boundary
Model Estimates					
2003 Base	450	490	520	530	
2011 Base	510	540	565	570	
2011 Gateway	395	425	430	440	
Absolute Difference					
Gateway vs Base - 2011	-115	-115	-135	-130	
Percent Difference					
Gateway vs Base - 2011	-23%	-21%	-24%	-23%	
Percent of Total Volumes					
2003 Base	30%	25%	30%	35%	
2011 Base	33%	28%	32%	37%	
2011 Gateway	26%	22%	24%	26%	

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