

▪ report

Hutt Corridor Study Stage 3

report

Hutt Corridor Study Stage 3

Prepared for
Wellington Regional Council

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September 2002

Table of Contents

1	<i>Introduction</i>	1
2	<i>Modelling Process</i>	1
3	<i>Stage III Transport Scenarios</i>	2
	3.2 Option S4.....	3
	3.3 Option S5.....	6
	3.4 Option S6.....	8
4	<i>Results of Assessment for Stage III Options</i>	12
5	<i>Conclusion.....</i>	13

1 Introduction

The Regional Land Transport Committee through the Wellington Regional Council have commissioned the evaluation of a revenue maximising toll on the link road between the Hutt and Porirua for Stage 2 Options S4, S5 and S6. The performance of each of these options has been illustrated using the same AM and Inter peak indicators and the Planning Balance sheet as in Stage 2. The revenue maximising toll and annual toll revenue for the Hutt-Porirua link has been calculated along with the annual toll revenue from the HOT lane with and without the Hutt-Porirua link roads being tolled.

2 Modelling Process

To determine the revenue-maximising toll on the Hutt-Porirua links we testing different toll values.

The proposed methodology was to run each option with a time penalty placed on the link to determine the optimum revenue-maximising toll. The toll in minutes has then been converted to a dollar value.

To calculate the revenue-maximising toll for the link for each option we use the vehicle demand matrices previously calculated in Stage 2 for each option. These included the induced traffic caused by the link itself, without a toll on it. We then applied the different tolls as a value of time by running the assignment model. This only took account of redistribution of traffic to State Highway 58, State Highway 1 and the HOT lane.

The 'optimised' toll of 8 minutes on the HOT lane was retained for all tests.

The following time penalties were proposed:

- 0 minutes
- 2.15 minutes
- 4.29 minutes
- 6.44 minutes
- 8.58 minutes

At \$14/hour, these equate to \$0, \$0.5, \$1, \$1.5 and \$2.

The following modelling process was applied:

1. Set the 8 minute toll on the HOT lane with no toll on the Hutt-Porirua links;
2. Run the assignment model and extract the flows on the Hutt-Porirua link and on the HOT lane;
3. Set the toll on the Hutt-Porirua link to 2.15 minutes (and keep 8 minutes on HOT);
4. Run the assignment model and extract the flows on the Hutt-Porirua link and on the HOT lane;

5. Repeat steps 3 and 4 for other tolls; and
6. Enter data in a spreadsheet (see attached example) to estimate daily revenues under different tolls.

3 Stage III Transport Scenarios

Based on the Stage II evaluation of the transport packages the strategy Options S4, S5 and S6 have been further evaluated.

A graphical description of each option is provided in Appendix A.

The improved Wairarapa rail service has not been modelled as the current model will not reflect the benefits of this improvement. However, the improved rail service should be included in the improved passenger transport strategy.

Appendix B presents the performance indicator test results for each Stage 2 option. Appendix C presented Rough order of cost, indicative benefits and Benefits Cost Ratio (BCR) for each Stage 2 option.

3.1.1 Option S4

Option S4 includes the following improvements:

- Hutt Expressway High Occupancy Toll (HOT) Lane
- Melling Grade Separated Interchange
- Silverstream Bridge Upgrade to 4 lanes
- Haywards Bus Services
- Double rail frequency and increase speed by 10%
- New rail stations at Timberlea and Cruickshank Road and Heavy Rail Services
- Superbus network (Upper Hutt, Stokes Valley and Wainuiomata services only)
- Petone-Grenada Link
- Esplanade Upgrade

3.1.2 Option S5

Option S5 includes the following improvements:

- Hutt Expressway High Occupancy Toll (HOT) Lane
- Melling Grade Separated Interchange
- Silverstream Bridge Upgrade to 4 lane
- Haywards Bus Services
- Double rail frequency and speed increase of 10%
- New rail stations at Timberlea and Cruickshank Road and Heavy Rail Services
- Superbus network (Upper Hutt, Stokes Valley and Wainuiomata services only)

- Melling – Porirua Link Road
- East-West Connector Link:
 - Whites Line West to Wakefield Street
 - 4 lane road from Randwick Road to Dowse SH 2

3.1.3 Option S6

Option S6 includes the following improvements:

- Hutt Expressway High Occupancy Toll (HOT) Lane
- Melling Grade Separated Interchange
- Silverstream Bridge Upgrade to 4 lanes
- Haywards Bus Services
- Double rail frequency and speed increase of 10%
- New rail stations at Timberlea and Cruickshank Road and Heavy Rail Services
- Superbus network (Upper Hutt, Stokes Valley and Wainuiomata services only)
- Petone-Grenada Link
- East-West Connector Link:
 - Whites Line West to Wakefield Street;
 - 4 lane road from Randwick Road to Dowse SH 2
- Extend Melling Line across river to CBD

3.2 Option S4

This option is based on an optional tolling scenario for the Hutt Expressway High Occupancy Toll (HOT) Lane, significantly improved Rail and Bus services plus the Petone to Grenada Link to improve the connection between Hutt City and Porirua.

A summary of the key performance indicators is provided in Table 3.1. In addition, Table 3.2 provides a comparison of the vehicle and passenger transport flows through the Petone to Ngauranga corridor.

Table 3.1
Summary of Key AM Peak Indicator for Option S4

<i>Key Indicator</i>	<i>Base</i>	<i>Option S4</i>	<i>Percentage Difference</i>
Total Motor Vehicle Travel Time (hrs)	29697	28742	-3.2%
Travel Time from Upper Hutt to Airport (mins)	52.1	45.5	-12.7%
Total Passenger Travel Time (hrs)	12216	12574	3.1%
Estimated Cost (\$)		\$122M	
BCR		1.5	
Total Number of Vehicle Trips	141127	141076	-0%
Total number of Passenger Transport Trips	50330	50410	0.1%
Cost of Congestion (\$)	78924	68867	-12.7%

Table 3.1 shows that the travel time between Upper Hutt railway station and the Wellington Airport is 12.7% faster with the HOT lane and the cost of congestion over the regional network has reduced by 12.7%.

If only the AM benefits for the HOT lane were considered, the preliminary BCR reduces from 1.5 to 1.3.

Table 3.2
AM 2-Hour Peak Southbound Trip Distribution through Petone – Ngauranga Corridor

<i>Mode</i>	<i>Base</i>	<i>Option S4</i>	<i>Percentage Difference</i>
State Highway 2 (Vehicles)	8086	7430	5.3%
HOT Lane (Vehicles)	-	1086	
Vehicle Passengers	3557	3348	7.9%
HOT Lane (Vehicle Passengers)	-	490	
Bus (Passengers)	141	559	1022.0%
HOT Lane (Bus Passengers)	-	1023	
Train (Passengers)	5998	5396	-10.0%
Total	17782	19332	8.7%

Table 3.2 shows that there is 5.3% increase in vehicle flow between Petone and Ngauranga, with 7.9% increase in vehicle passengers (i.e. occupancy has increased). Train passenger flow has reduced by 10%. The increased number of bus services and bus speed between Petone and Ngauranga has encouraged a 1022% increase in bus passengers. This option would increase the people travelling southbound in the morning two hour period by 8.7%.

Table 3.3 details the vehicle flow using the Petone to Grenada Link Road.

Table 3.3**AM Peak Two Hour and Inter peak Seven Hour Traffic Flows on the Petone to Grenada Link Road**

<i>Direction</i>	<i>Vehicles</i>		<i>Car Passengers</i>	
	AM	Inter Peak	AM	Inter Peak
Eastbound – Porirua to Hutt	2085	1496	571	274
Westbound – Hutt to Porirua	1936	2640	464	514

The number of vehicles using the Petone to Grenada link has reduced by some 1,820 (sum of both direction) vehicles in the AM peak two hour period and some 7,700 vehicles in the Inter Peak seven hour period as part of this tolled strategy as compared to when modelled without a toll in Stage II.

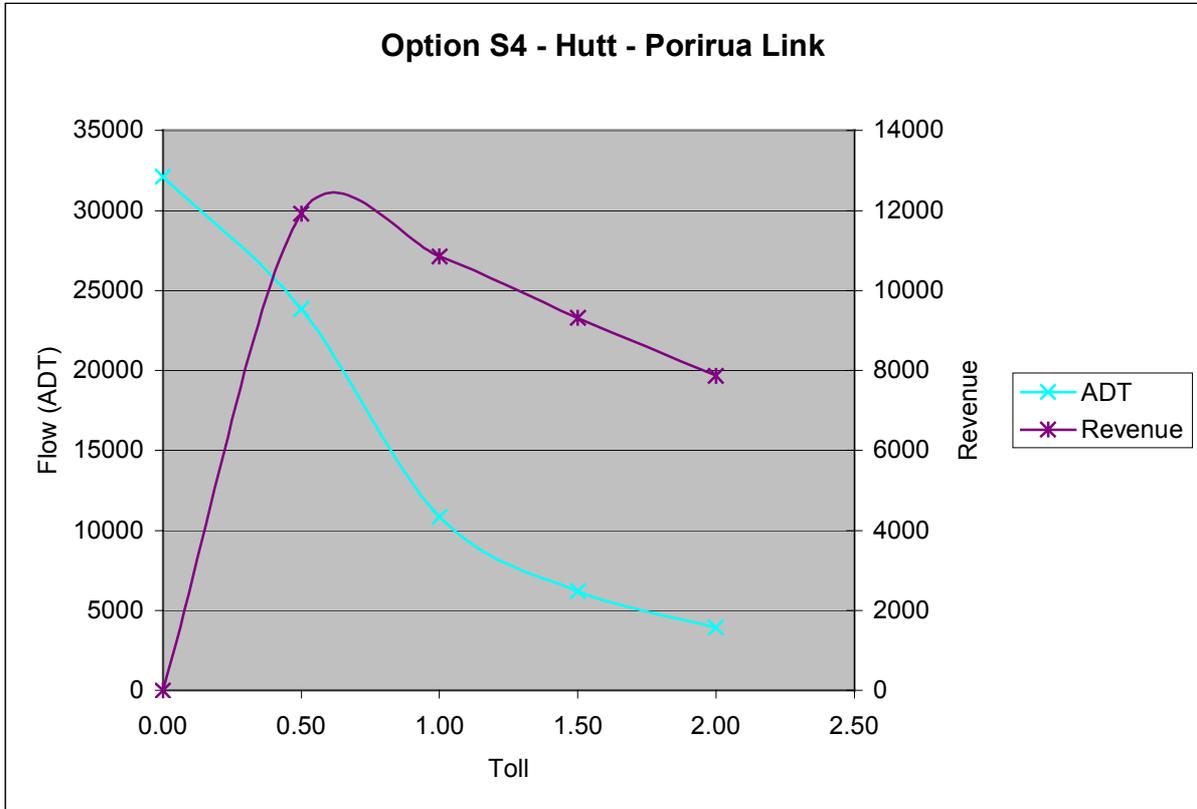
Base on and average value of time of \$14.00 for all vehicle types and trip purposes the HOT lane would have a revenue maximising toll of approximately \$1.90 and the Hutt – Porirua link a toll of \$0.75. Figure 3.1 graphically shows the tolls evaluated to determine the revenue maximising toll based on the AM peak model. Table 3.4 provides a summary of the Stage II and Stage III toll arrangements.

Table 3.4**Toll Revenue**

Option	Toll Link	Toll (\$)	Revenue (\$)				
			AM	IP	PM	Daily	Annual
Stage II-S4	Total Toll Revenue		1,140	0	0	1,140	279,293
	HOT Lane	1.87	1,140	0	0	1,140	279,293
	Petone-Grenada Link	-	-	-	-	-	-
Stage III-S4	Total Toll Revenue		5,020	3,098	2,992	13,154	3,839,952
	HOT Lane	1.87	2,028	0	0	2,028	496,828
	Petone-Grenada Link	0.75	2,992	3,098	2,992	11,126	3,343,124

Figure 3.1

Revenue Maximising Tolls based on the AM peak



3.3 Option S5

A summary of the key performance indicators is provided in Table 3.5. Table 3.6 provides a comparison of the vehicle and passenger transport flow through the Petone to Ngauranga corridor.

Table 3.5

Summary of Key AM Peak Indicator for Option S5

Key Indicator	Base	Option S5	Percentage Difference
Total Motor Vehicle Travel Time (hrs)	29697	28758	-3.2%
Travel Time from Upper Hutt to Airport (hrs)	52.1	45.0	-13.5%
Total Passenger Travel Time (hrs)	12216	12519	2.5%
Estimated Cost		\$179M	
BCR		1.2	
Total Number of Vehicle Trips	141127	141105	-0%
Total number of Passenger Transport Trips	50330	50441	0.2%

<i>Key Indicator</i>	<i>Base</i>	<i>Option S5</i>	<i>Percentage Difference</i>
Cost of Congestion	78924	68621	-13.1%

Table 3.5 shows that the travel time between Upper Hutt railway station and the Wellington Airport is reduced by 13.5% faster using the HOT lane and the cost of congestion over the regional network has also reduced by 13.1%.

Table 3.6 shows that there is a 13.9% increase in vehicle flow between Petone and Ngauranga, with train passenger flow reducing by 11.8%. The increased number of bus services and bus speed between Petone and Ngauranga has encouraged a 1074% increase in bus passengers. This option increases the total southbound people flow between Petone and Ngauranga by 13.5%.

Table 3.6

AM 2-Hour Peak Southbound Trip Distribution through Petone - Ngauranga Corridor

<i>Mode</i>	<i>Base</i>	<i>Option S5</i>	<i>Percentage Difference</i>
State Highway 2 (Vehicles)	8086	7437	13.9%
HOT Lane (Vehicles)	-	1771	
Vehicle Passengers	3557	3262	13.6%
HOT Lane (Vehicle Passengers)	-	777	
Bus (Passengers)	141	573	1074.5%
HOT Lane (Bus Passengers)	-	1083	
Train (Passengers)	5998	5288	-11.8%
Total	17782	20191	13.5%

Table 3.7 details the vehicle flow using the Petone to Grenada Link Road.

Table 3.7

AM Peak Two Hour and Inter peak Seven Hour Traffic Flows on the Melling to Porirua Link Road

<i>Direction</i>	<i>Vehicles</i>		<i>Car Passengers</i>	
	AM	Inter Peak	AM	Inter Peak
Eastbound - Porirua to Hutt	1687	2074	499	461
Westbound - Hutt to Porirua	1212	2148	298	470

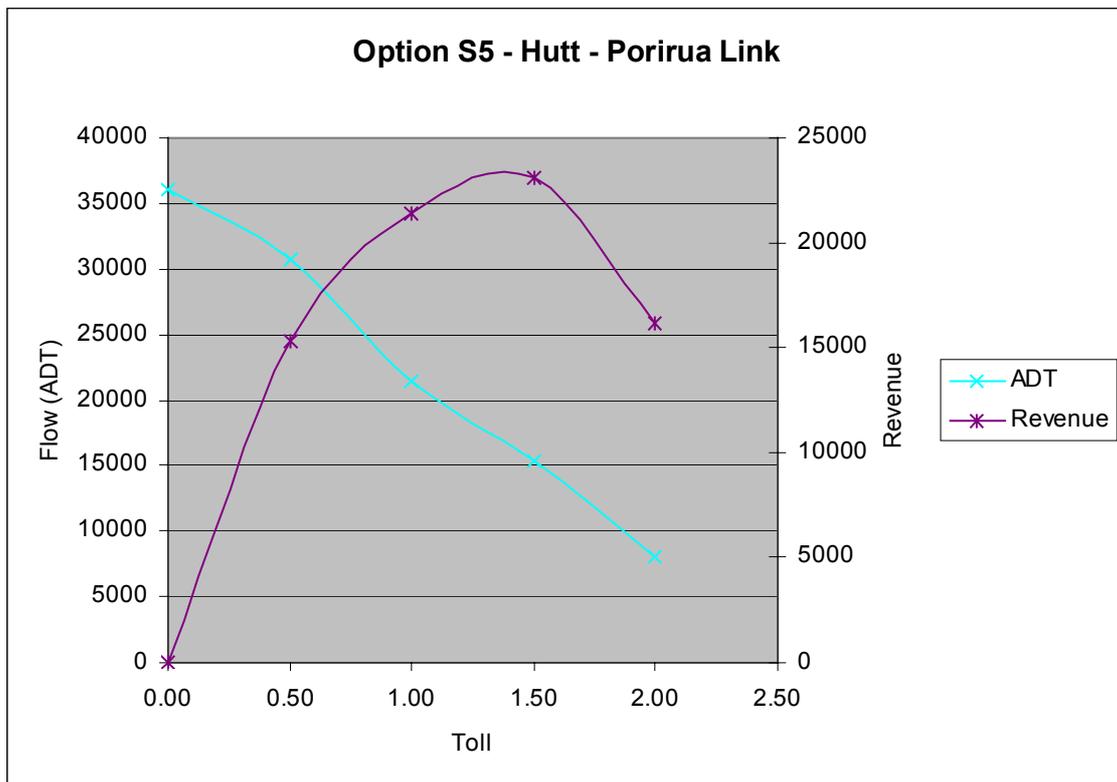
The number of vehicles using the Melling to Porirua link has reduced by some 3,323 vehicles in the AM peak two hour period and some 10,000 vehicles in the Inter peak seven hour period as part of this tolled strategy as compared to when modelled without a toll in Stage II.

Base on and average value of time of \$14.00 for all vehicle types and trip purposes the HOT lane would have a revenue maximising toll of approximately \$1.90 and the Hutt - Porirua link a toll of \$1.25. Figure 3.2 graphically shows the tolls evaluated to determine the revenue maximising toll based on the AM peak model. Table 3.8 provides a summary of the Stage II and Stage III toll arrangements.

Table 3.8
Toll Revenue

Option	Toll Link	Toll (\$)	Revenue (\$)				
			AM	IP	PM	Daily	Annual
Stage II-S5	Total Toll Revenue		2,644	0	0	2,644	647,801
	HOT Lane	1.87	2,644	0	0	2,644	647,801
	Melling-Porirua Link	-	-	-	-	-	-
Stage III-S5	Total Toll Revenue		6,931	5,280	3,625	19,321	5,785,516
	HOT Lane	1.87	3,306	0	0	3,306	809,903
	Melling-Porirua Link	1.25	3,625	5,280	3,625	16,016	4,975,613

Figure 3.2
Revenue Maximising Tolls based on the AM peak



3.4 Option S6

A summary of the key performance indicators is provided in Table 3.9. Table 3.10 provides a comparison of the vehicle and passenger transport flow through the Petone to Ngauranga corridor.

Table 3.9

Summary of Key AM Peak Indicator for Option S6

<i>Key Indicator</i>	<i>Base</i>	<i>Option S6</i>	<i>Percentage Difference</i>
Total Motor Vehicle Travel Time (hrs)	29697	28652	-3.5%
Travel Time from Upper Hutt to Airport (mins)	52.1	45.7	-12.3%
Total Passenger Travel Time (hrs)	12216	12667	3.7%
Estimated Cost		\$157.8M	
BCR		1.4	
Total Number of Vehicle Trips	141127	140917	-0.1%
Total number of Passenger Transport Trips	50330	50349	0%
Cost of Congestion	78924	68065	-13.8%

Table 3.9 shows that the travel time between Upper Hutt railway station and the Wellington Airport is reduced by 12.3% by using the HOT lane and the cost of congestion over the regional network has reduced by 13.8%. If only the AM peak period HOT Lane benefits are considered, the indicative BCR reduces from 1.4 to 1.3.

Table 3.10

AM 2-Hour Peak Southbound Trip Distribution through Petone - Ngauranga Corridor

<i>Mode</i>	<i>Base</i>	<i>Option S6</i>	<i>Percentage Difference</i>
State Highway 2 (Vehicles)	8086	7430	5.5%
HOT Lane (Vehicles)	-	1098	
Vehicle Passengers	3557	3327	7.4%
HOT Lane (Vehicle Passengers)	-	494	
Bus (Passengers)	141	566	994.3%
HOT Lane (Bus Passengers)	-	977	
Train (Passengers)	5998	5621	-6.3%
Total	17782	19513	9.7%

Table 3.10 shows that there is 5.5% increase in vehicle flow between Petone and Ngauranga, with vehicle passengers increase by 7.4%. Train patronage reduces by 6.3%. The increased number of bus services and reduced bus travel time between Petone and Ngauranga has encouraged a 994.3% increase in the number of bus passengers. This option increases the total southbound people flow during the AM Peak period by 9.7%.

Table 3.11 details the vehicle flow using the Petone to Grenada Link Road.

Table 3.11

AM Peak Two Hour and Inter peak Seven Hour Traffic Flows on the Petone to Grenada Link Road

<i>Direction</i>	<i>Vehicles</i>		<i>Car Passengers</i>	
	AM	Inter peak	AM	Inter peak
Eastbound - Porirua to Hutt	2000	1227	557	316
Westbound - Hutt to Porirua	1820	2634	438	520

The number of vehicles using the Petone to Grenada link has reduced by some 2,040 vehicle in the AM peak two hour period and some 7,800 vehicles in the Inter peak seven hour period as part of this tolled strategy as compared to when modelled without a toll in Stage II.

Base on and average value of time of \$14.00 for all vehicle types and trip purposes the HOT lane would have a revenue maximising toll of approximately \$1.90 and the Hutt - Porirua link a toll of \$0.75. Figure 3.3 graphically shows the tolls evaluated to determine the revenue maximising toll based on the AM peak model. Table 3.12 provides a summary of the Stage II and Stage III toll arrangements.

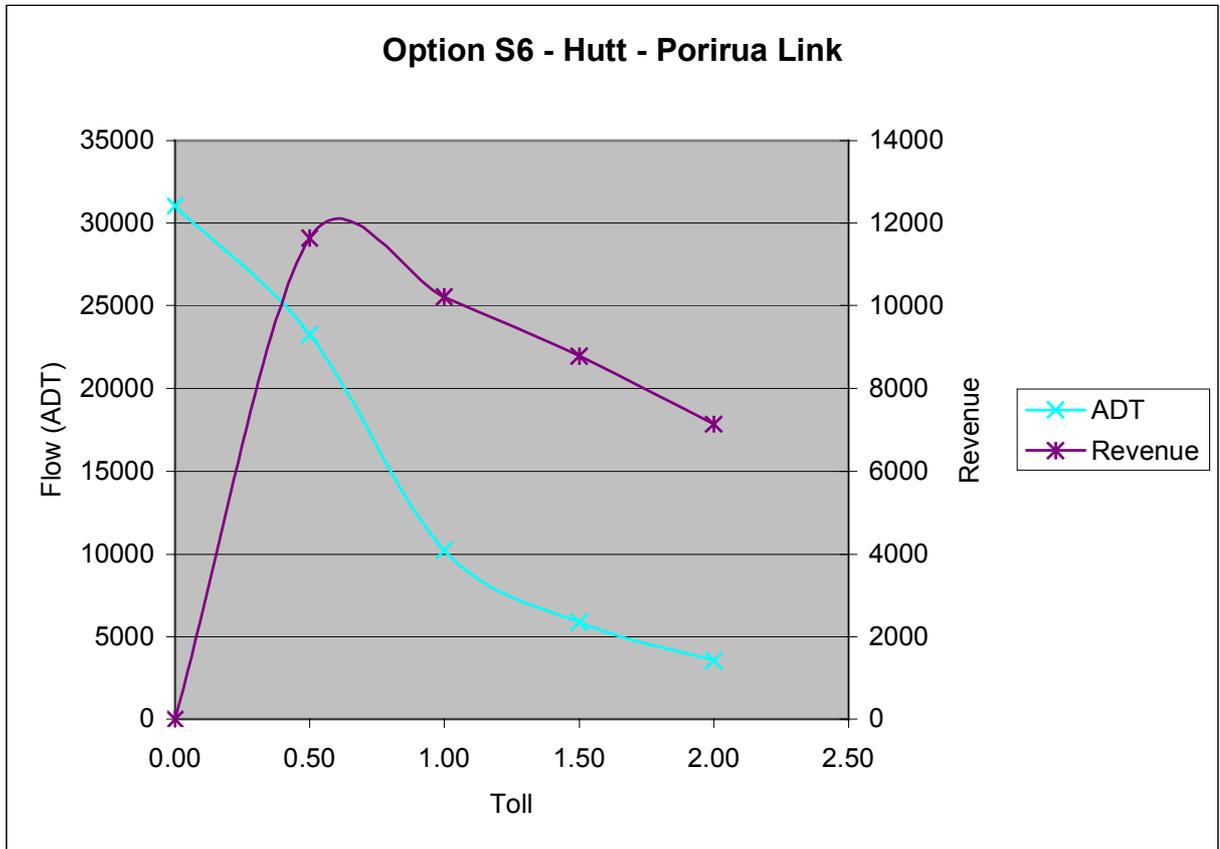
Table 3.12

Toll Revenue

Option	Toll Link	Toll (\$)	Revenue (\$)				
			AM	IP	PM	Daily	Annual
Stage II-S6	Total Toll Revenue		1,284	0	0	1,284	314,635
	HOT Lane	1.87	1,284	0	0	1,284	314,635
	Petone-Grenada Link	-	-	-	-	-	-
Stage III-S6	Total Toll Revenue		4,911	2,892	2,861	12,573	3,656,660
	HOT Lane	1.87	2,050	0	0	2050	502,232
	Petone-Grenada Link	0.75	2,861	2,892	2,861	10,524	3,154,428

Figure 3.3

Revenue Maximising Tolls based on the AM peak



4 Results of Assessment for Stage III Options

This section presents and comments on the results of the assessments of the Stage III options using the PBS methodology. Table 4.1 gives the results for all options and indicators.

Table 4.1

Planning Balance Sheet Scores for Stage 2 Options

Indicators	Options			
	Base	S1	S2	S3
1. Accessibility				
Motor Vehicle Statistics	0	+	+	+
Public Transport Statistics	0	++	+	++
Vehicle Travel times from Upper Hutt to Airport	0	++	++	++
Vehicle Travel times from Hutt to Porirua	0	++	++	++
2. Affordability				
5 year cost	0	-	--	--
3. Economic Efficiency				
Benefit Cost Ratio (BCR)	0	0	0	0
4. Sustainability				
Environment	0	0	-	0
Fuel	0	0	0	0
Safety	0	0	-	0
V/C Ratios	0	+	+	+
Subtotal				
Number of -ve	0	-1	-4	-2
Number of +ve	0	8	7	8
Combined Total	0	7	3	6

5 Conclusion

Base on and average value of time of \$14.00 for all vehicle types and trip purposes the HOT lane would have a revenue maximising toll of approximately \$1.90 and for Options S4, S5 and S6 Hutt - Porirua link a toll of \$0.75, \$1.25 and \$0.75 respectively.

Table 5.1 provides a summary of the Stage II and Stage III toll arrangements.

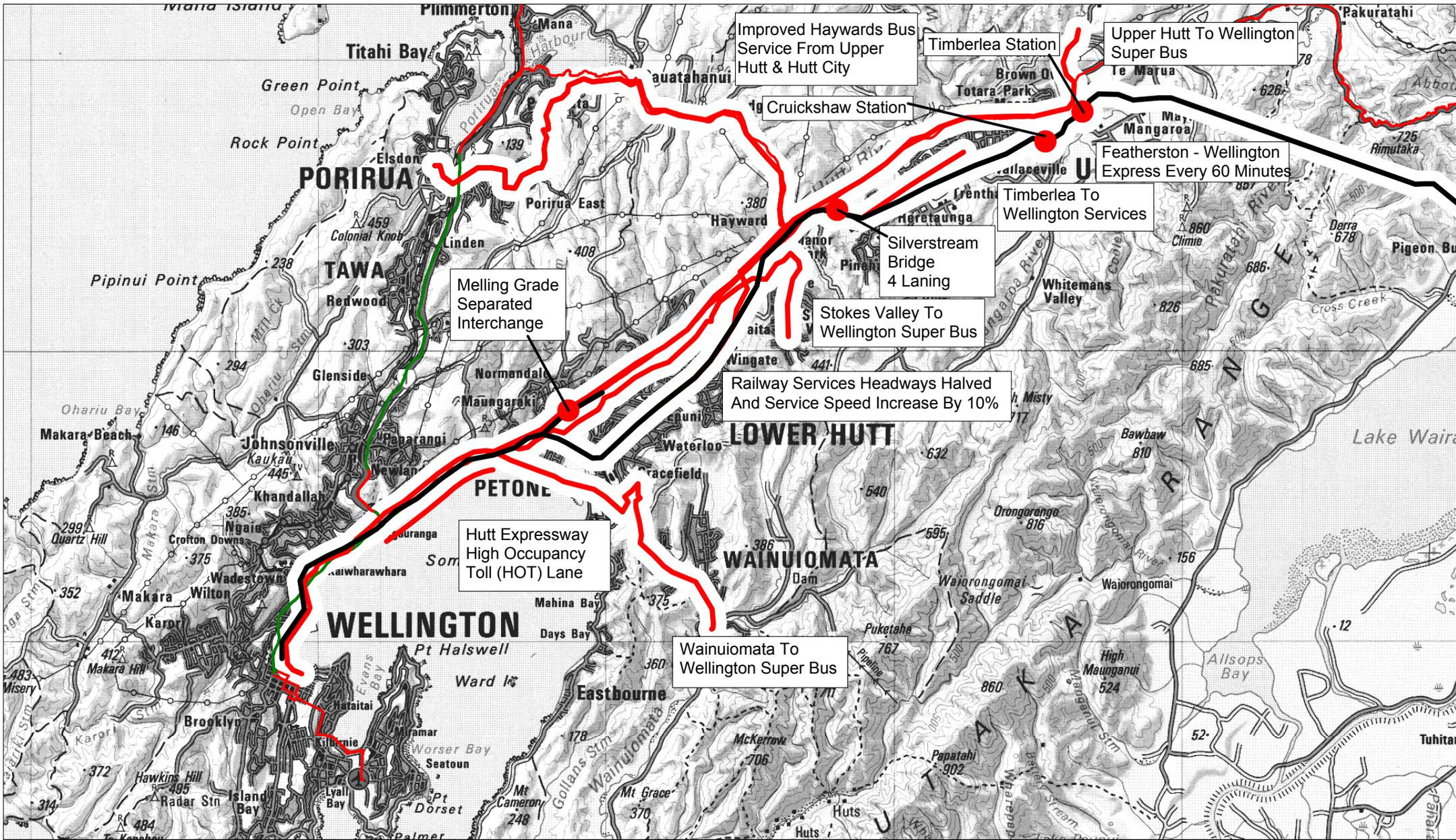
*Table 5.1
Toll Revenue*

Option	Toll Link	Toll (\$)	Revenue (\$)				
			AM	IP	PM	Daily	Annual
Stage II-S4	Total Toll Revenue		1140	0	0	1140	279,293
	HOT Lane	1.87	1140	0	0	1140	279,293
	Petone-Grenada Link	-	-	-	-	-	-
Stage III-S4	Total Toll Revenue		5020	3098	2992	13154	3,839,952
	HOT Lane	1.87	2028	0	0	2028	496,828
	Petone-Grenada Link	0.75	2992	3098	2992	11126	3,343,124
Stage II-S5	Total Toll Revenue		2644	0	0	2644	647,801
	HOT Lane	1.87	2644	0	0	2644	647,801
	Melling-Porirua Link	-	-	-	-	-	-
Stage III-S5	Total Toll Revenue		6931	5280	3625	19322	5,785,516
	HOT Lane	1.87	3306	0	0	3306	809,903
	Melling-Porirua Link	1.25	3625	5280	3625	16016	4,975,613
Stage II-S6	Total Toll Revenue		1284	0	0	1284	314,635
	HOT Lane	1.87	1284	0	0	1284	314,635
	Petone-Grenada Link	-	-	-	-	-	-
Stage III-S6	Total Toll Revenue		4911	2892	2861	12574	3,656,660
	HOT Lane	1.87	2050	0	0	2050	502,232
	Petone-Grenada Link	0.75	2861	2892	2861	10524	3,154,428

Due to the toll on the Hutt- Porirua link the inter peak seven hour traffic flow has decreased by 7,700, 10,000 and 7,800 vehicles for Option S4, S5 and S6 respectively.

Appendix A

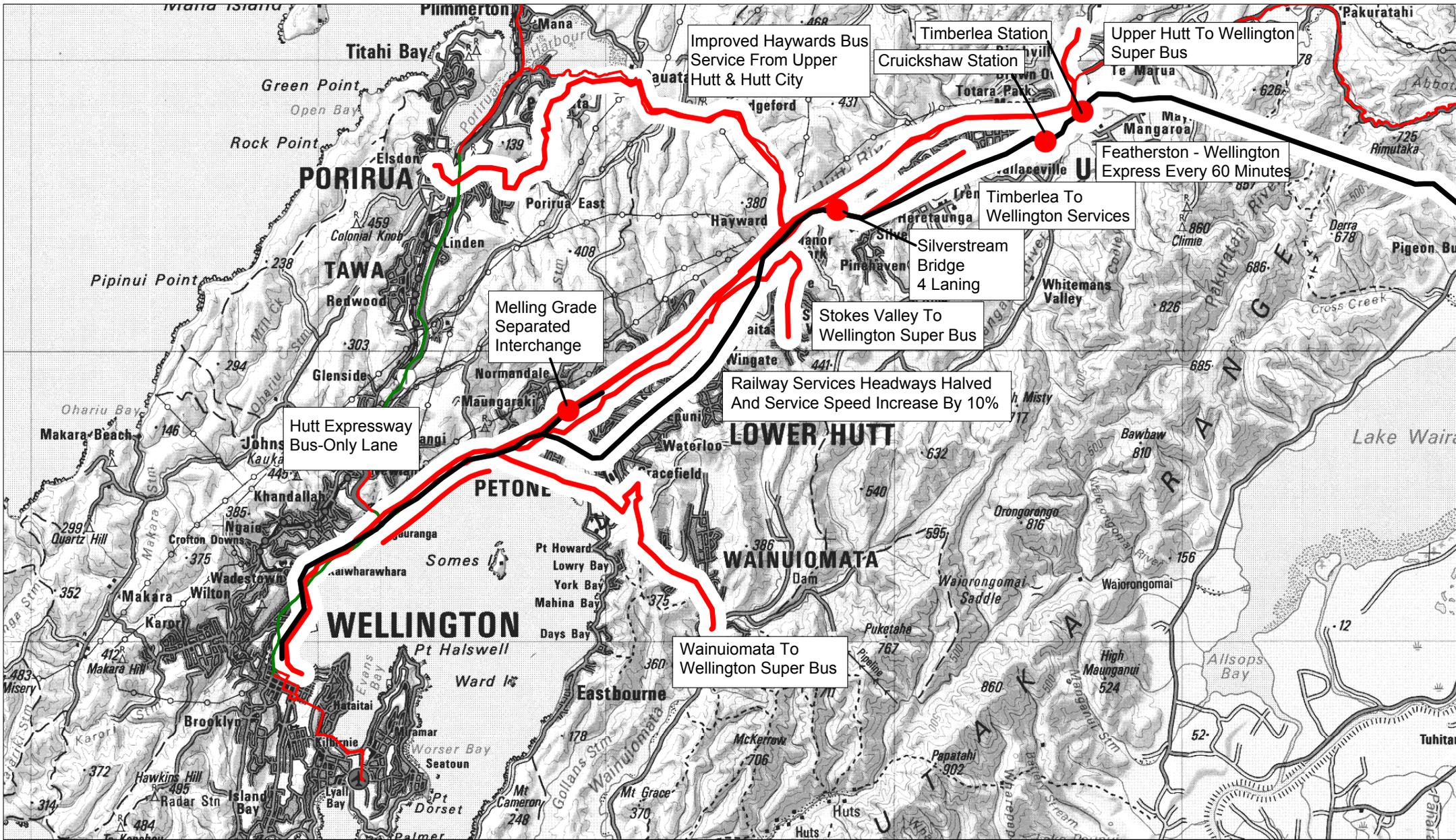
**Graphical description of
options tested**



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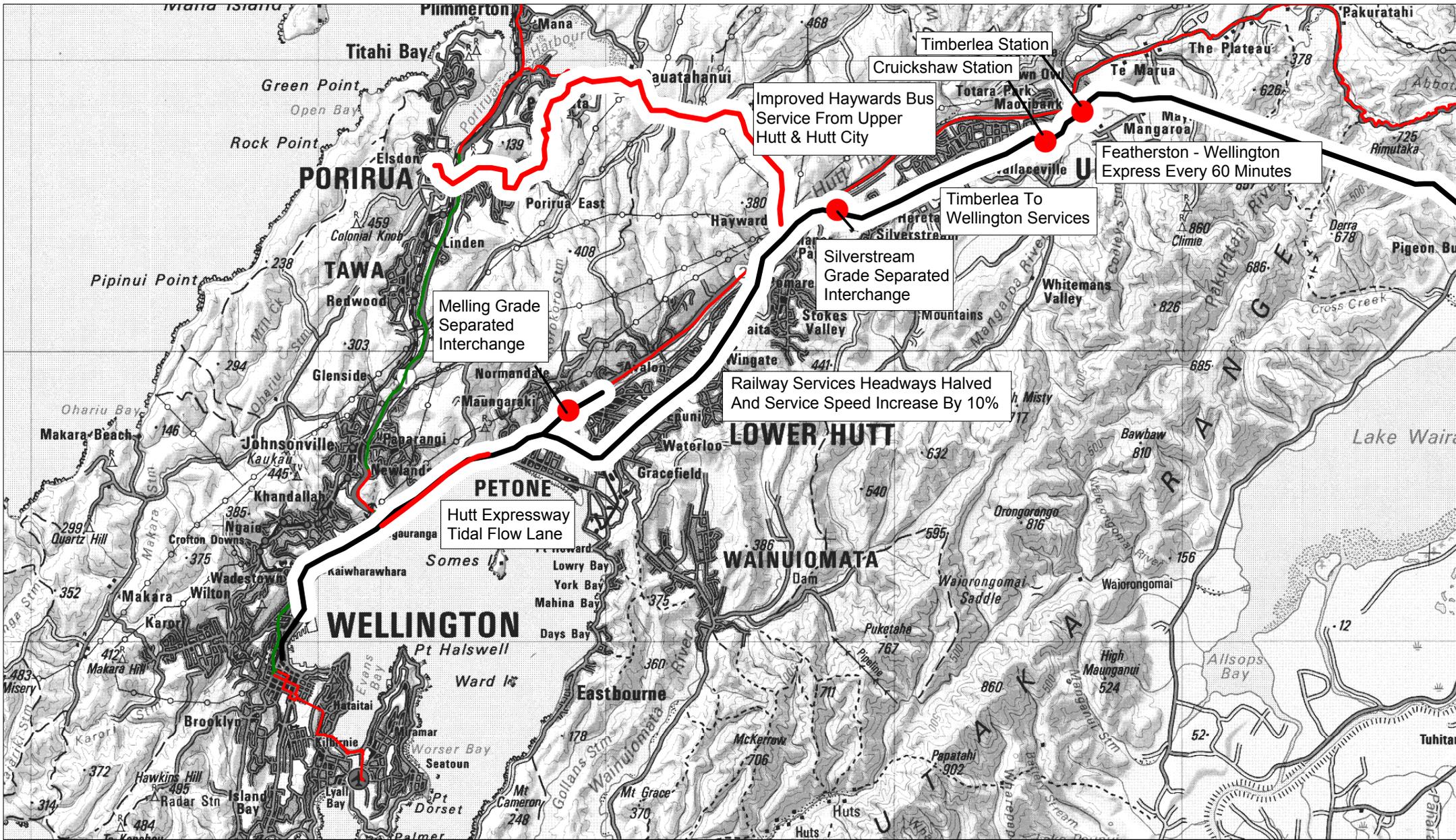
Hutt Corridor Stage 2 - Option S1



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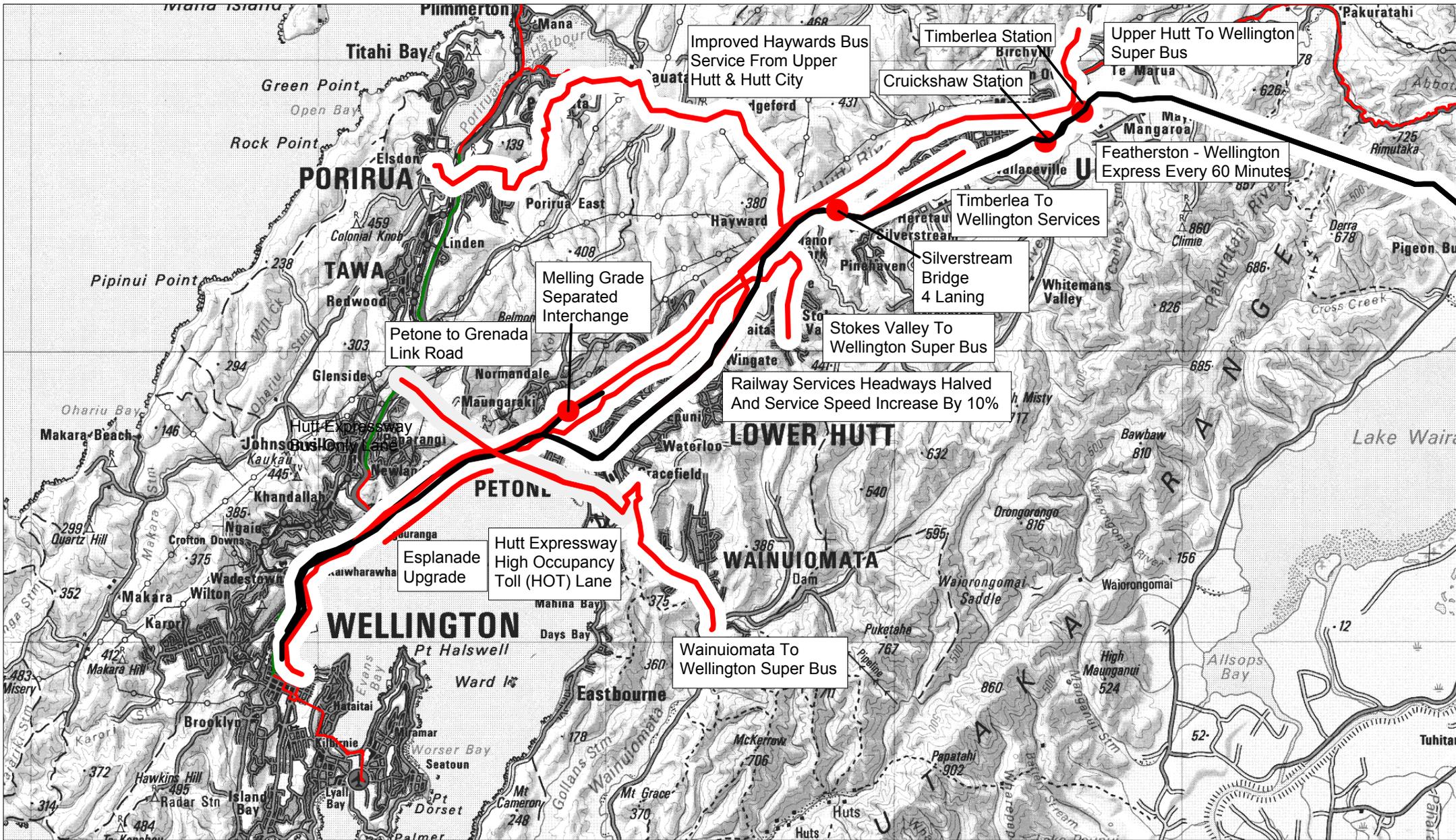
Hutt Corridor Stage 2 - Option S2



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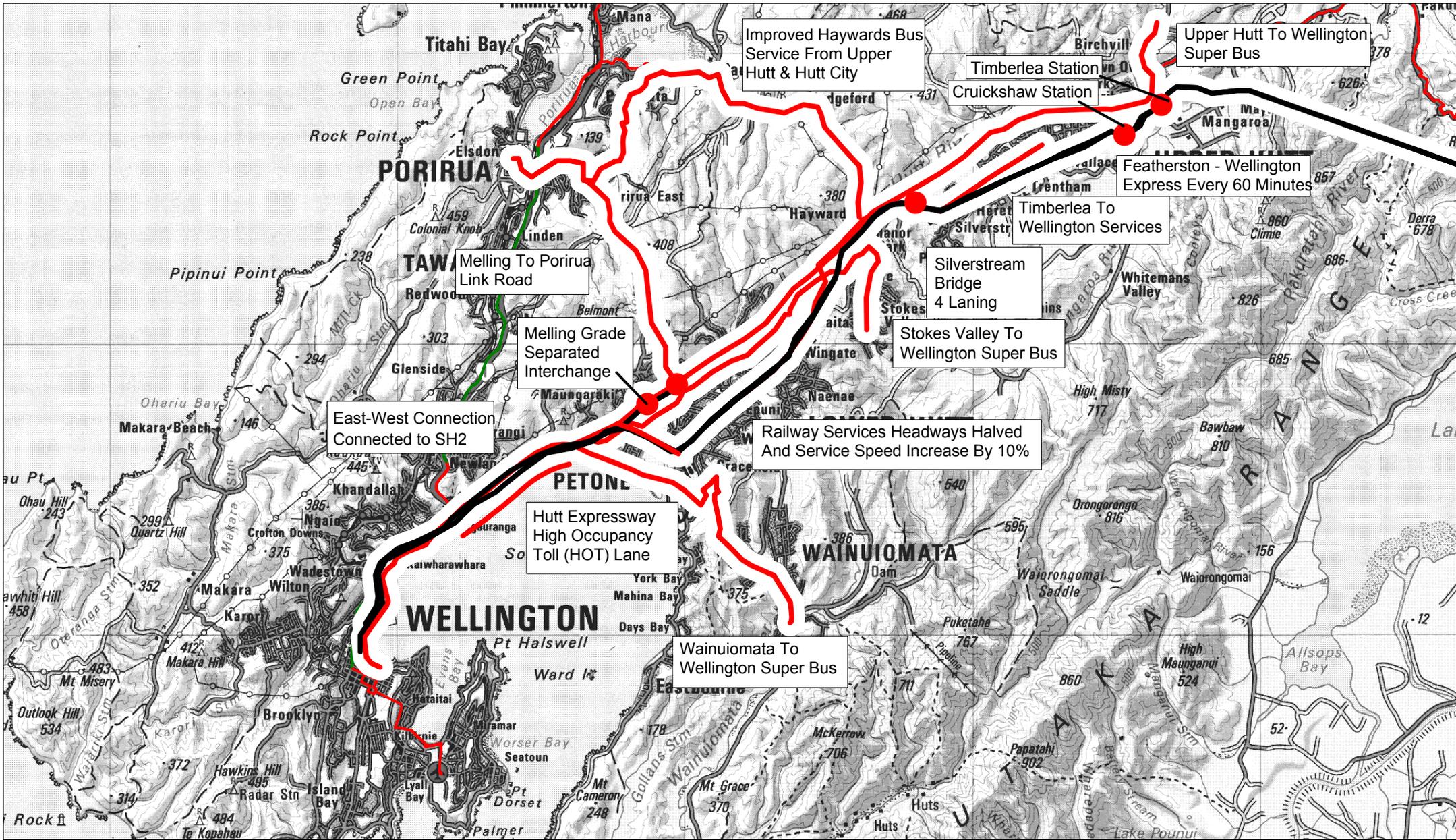
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Hutt Corridor Stage 2 - Option S4



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Hutt Corridor Stage 2 - Option S5

Appendix B

**Performance indicator
test results for each
Stage 3 option**

INDICATOR	Table 5.1 - AM Results (Note: Values are for the period 0700 to 0900)						
	Base	S4	S4T75	S5	S5T125	S6	S6T75
ACCESSIBILITY			\$0.75 toll on Petone-Grenada Link		\$1.25 toll on Melling-Porirua Link		\$0.75 toll on Petone-Grenada Link
Auto							
Total motor vehicle travel time (hrs)	29697	28965	28742	28854	28758	28837	28652
Total motor vehicle travel distance ('000km)	1487	1518	1512	1516	1501	1512	1506
Average vehicle network speed (km/hr)	50.1	52.4	52.6	52.5	52.2	52.4	52.6
Total auto trips spread from the peak	193	-355	-331	-315	-242	-322	-306
Total vehicle hours below service level D	8436	7665	7623	7136	7634	7533	7429
Auto Travel times to Airport (mins):							
CBD	9.9	9.9	9.9	9.9	9.9	9.9	9.9
Port	12.4	12.4	12.4	12.4	12.4	12.4	12.4
Johnsonville to Airport	25.2	23.7	24.0	24.1	24.6	23.5	23.8
Porirua to Airport	32.4	31.5	30.7	30.6	30.8	31.0	30.5
Plimerton to Airport	38.8	37.8	37.0	36.9	37.1	37.3	36.8
Paraparaumu to Airport	54.2	53.2	52.4	52.4	52.6	52.7	52.2
West External to Airport	72.7	71.7	71.0	70.9	71.1	71.3	70.8
Lower Hutt to Airport	38.8	32.5	32.6	32.4	32.2	33.0	32.8
Upper Hutt to Airport	52.1	45.4	45.5	44.9	45.0	45.9	45.7
East External to Airport	118.0	111.4	111.5	110.8	111.0	111.8	111.6
Auto Travel times from Lower Hutt to Porirua (mins):							
via SH1	33.4	18.4	18.1	17.7	17.7	18.0	17.8
via SH58	22.4	21.3	21.5	21.5	21.5	21.2	21.3
via Pentone - Grenada Link		15.4	15.0			15.5	15.1
via Melling - Porirua Link				12.2	11.8		
Transit							
Total passenger travel time (hrs)	12216	12590	12574	12471	12519	12679	12667
Total passenger travel distance ('000km)	424	450	448	440	441	455	454
Average passenger network speed (km/hr)	38.5	39.9	39.80289443	39.3	39.29843305	40.4	40.4
AFFORDABILITY							
Strategy Revenue (\$)							
Toll	0	1140	5020	2644	6931	1284	4911
Toll (HOT Lane)	0	1140	2028	2644	3306	1284	2050
Toll (Pentone-Grenada Link / Melling-Porirua Link)	0	0	2992	0	3625	0	2861
Fare	75353	80147	79966	79233	79441	80842	80740
Parking	114579	114275	114402	114648	114545	113790	113975
Total	189932	195090	200254	195431	202113	195385	200474
ECONOMIC EVALUATION							
Cross-valley-link-road user benefits	0	13833 47%	1208495% 44%	14291 43%	1242830% 43%	15186 47%	13837 46%
Porirua-Hutt-link-road user benefits	0	2761 9%	207055% 8%	5788 17%	356050% 12%	2722 8%	2055 7%
Non-link-road user benefits	0	12775 43%	1323450% 48%	13431 40%	1266020% 44%	14116 44%	14282 47%
Region-wide user benefits	0	29369	27390	33510	28649	32024	30173
SUSTAINABILITY							
Environment							
CO2 Emmissions (Tonnes)	379.3	379.8	377.0	378.9	376.8	378.2	376.1
CO Emmissions (Tonnes)	15.4	15.1	15.0	15.0	15.0	15.0	14.9
Fuel							
Fuel Consumption (Litres)	151706	151903	150809	151558	150711	151282	150441
Safety							
Total Accident Cost (\$)	45118	45226	44928	46298	45204	44892	44669
General Statistics							
Total Number of motor vehicle trips	141127	141188	141076	141365	141105	141009	140917
Total Number of passenger trips	50330	50365	50410	50463	50441	50304	50349
Total Number of slow trips	47568	46878	46920	46883	46971	46890	46925
Total Number of PT trips	49720	50719	50720	50435	50557	50897	50894
Average motor vehicle trip length (km)	10.5	10.8	10.7	10.7	10.6	10.7	10.7
Cost of Congestion (\$)	78924	69286	68867	68252	68621	68524	68065
V/C Ratios							
Melling Bridge (WB)	0.78	0.80	0.80	0.86	0.77	0.68	0.70
SH2 South of SH58 (SB)	0.60	0.58	0.60	0.48	0.57	0.57	0.60
Kenn Good Bridge (WB)	0.86	0.92	0.91	0.99	0.91	0.89	0.88
Randwick Rd (SB)	0.76	0.82	0.78	0.70	0.69	0.67	0.67
Petone Esplanade (WB)	0.81	0.58	0.53	0.70	0.72	0.85	0.79
Hutt Rd South of Wakefield (SB)	0.49	0.65	0.59	0.52	0.54	0.75	0.68
SH2 Dowse - Melling (NB)	0.36	0.32	0.30	0.29	0.28	0.36	0.33
SH2 Dowse - Melling (SB)	0.87	0.77	0.75	0.76	0.75	0.77	0.76
SH2 Dowse - Petone (NB)	0.54	0.48	0.45	0.43	0.44	0.54	0.52
SH2 Dowse - Petone (SB)	0.93	0.82	0.81	0.79	0.79	0.84	0.83
SH2 Petone - Ngauranga (SB)	1.19	1.09	1.09	1.09	1.09	1.09	1.09
SH1 Ngauranga - Aotea Quay (SB)	0.81	0.83	0.84	0.85	0.84	0.83	0.84
SH1 Aotea Quay - Ngauranga (NB)	0.75	0.79	0.79	0.78	0.79	0.79	0.79

INDICATOR	Table 5.2 - AM Results - % Difference						
	Base	S4	S4T75	S5	S5T125	S6	S6T75
ACCESSIBILITY							
Auto			\$0.75 toll on Petone-Grenada Link		\$1.25 toll on Melling-Porirua Link		\$0.75 toll on Petone-Grenada Link
Total motor vehicle travel time (hrs)	29697	-2.5%	-3.2%	-2.8%	-3.2%	-2.9%	-3.5%
Total motor vehicle travel distance ('000km)	1487	2.1%	1.6%	1.9%	0.9%	1.7%	1.3%
Average vehicle network speed (km/hr)	50.1	4.7%	5.0%	4.9%	4.2%	4.7%	5.0%
Total auto trips spread from the peak	193	-284.3%	-271.6%	-263.6%	-225.8%	-267.0%	-258.6%
Total vehicle hours below service level D	8436	-9.1%	-9.6%	-15.4%	-9.5%	-10.7%	-11.9%
Auto Travel times to Airport (mins):							
CBD	9.9	0.1%	0.1%	0.2%	0.1%	0.0%	0.0%
Port	12.4	0.2%	0.2%	0.3%	0.2%	0.0%	0.1%
Johnsonville to Airport	25.2	-5.9%	-5.0%	-4.2%	-2.6%	-6.8%	-5.5%
Porirua to Airport	32.4	-2.9%	-5.2%	-5.7%	-4.8%	-4.3%	-5.8%
Plimerton to Airport	38.8	-2.6%	-4.5%	-4.9%	-4.3%	-3.7%	-5.0%
Paraparaumu to Airport	54.2	-1.9%	-3.3%	-3.4%	-3.0%	-2.7%	-3.6%
West External to Airport	72.7	-1.4%	-2.4%	-2.5%	-2.2%	-2.0%	-2.7%
Lower Hutt to Airport	38.8	-16.3%	-16.0%	-16.6%	-17.2%	-15.0%	-15.7%
Upper Hutt to Airport	52.1	-12.7%	-12.5%	-13.8%	-13.5%	-11.8%	-12.3%
East External to Airport	118.0	-5.6%	-5.6%	-6.1%	-6.0%	-5.2%	-5.5%
Auto Travel times from Lower Hutt to Porirua (mins):							
via SH1	33.4	-45.0%	-45.7%	-47.2%	-47.1%	-46.2%	-46.6%
via SH58	22.4	-4.8%	-4.2%	-4.0%	-4.0%	-5.4%	-4.9%
via Pentone - Grenada Link							
via Melling - Porirua Link							
Transit							
Total passenger travel time (hrs)	12216	3.1%	2.9%	2.1%	2.5%	3.8%	3.7%
Total passenger travel distance ('000km)	424	6.0%	6.0%	5.7%	4.1%	7.3%	7.0%
Average passenger network speed (km/hr)	38.5	3.6%	3.5%	2.1%	2.2%	5.1%	4.9%
AFFORDABILITY							
Strategy Revenue (\$)							
Toll							
Toll (HOT Lane)							
Toll (Pentone-Grenada Link / Melling-Porirua Link)							
Fare	75353	6.4%	6.1%	5.1%	5.4%	7.3%	7.1%
Parking	114579	-0.3%	-0.2%	0.1%	0.0%	-0.7%	-0.5%
Total	189932	2.7%	5.4%	2.9%	6.4%	2.9%	5.6%
ECONOMIC EVALUATION							
Cross-valley-link-road user benefits							
Porirua-Hutt-link-road user benefits							
Non-link-road user benefits							
Region-wide user benefits							
SUSTAINABILITY							
Environment							
CO2 Emissions (Tonnes)	379	0.1%	-0.6%	-0.1%	-0.7%	-0.3%	-0.8%
CO Emissions (Tonnes)	15.4	-2.3%	-3.0%	-2.7%	-3.0%	-2.7%	-3.3%
Fuel							
Fuel Consumption (Litres)	151706	0.1%	-0.6%	-0.1%	-0.7%	-0.3%	-0.8%
Safety							
Total Accident Cost (\$)	45118	0.2%	-0.4%	2.6%	0.2%	-0.5%	-1.0%
General Statistics							
Total Number of motor vehicle trips	141127	0.0%	0.0%	0.2%	0.0%	-0.1%	-0.1%
Total Number of passenger trips	50330	0.1%	0.2%	0.3%	0.2%	-0.1%	0.0%
Total Number of slow trips	47568	-1.5%	-1.4%	-1.4%	-1.3%	-1.4%	-1.4%
Total Number of PT trips	49720	2.0%	2.0%	1.4%	1.7%	2.4%	2.4%
Average motor vehicle trip length (km)	10.5	2.0%	1.7%	1.7%	0.9%	1.7%	1.4%
Cost of Congestion (\$)	78924	-12.2%	-12.7%	-13.5%	-13.1%	-13.2%	-13.8%
V/C Ratios							
Melling Bridge (WB)	0.78	3.3%	3.7%	11.0%	-0.7%	-11.9%	-9.9%
SH2 South of SH58 (SB)	0.60	-3.7%	0.6%	-19.2%	-4.3%	-4.8%	-0.5%
Kenn Good Bridge (WB)	0.86	7.3%	6.4%	15.6%	6.8%	3.7%	2.8%
Randwick Rd (SB)	0.76	7.9%	2.0%	-7.6%	-9.5%	-12.5%	-12.0%
Petone Esplanade (WB)	0.81	-27.9%	-34.1%	-12.9%	-10.5%	4.5%	-2.9%
Hutt Rd South of Wakefield (SB)	0.49	33.1%	20.9%	6.2%	9.4%	51.9%	39.2%
SH2 Dowse - Melling (NB)	0.36	-10.0%	-16.8%	-20.2%	-20.9%	0.6%	-6.6%
SH2 Dowse - Melling (SB)	0.87	-11.4%	-13.8%	-12.5%	-14.3%	-11.4%	-12.7%
SH2 Dowse - Petone (NB)	0.54	-11.0%	-17.0%	-19.2%	-18.0%	1.3%	-4.0%
SH2 Dowse - Petone (SB)	0.93	-12.3%	-13.0%	-15.8%	-15.1%	-9.4%	-10.9%
SH2 Petone - Ngauranga (SB)	1.19	-8.1%	-8.1%	-8.1%	-8.0%	-8.1%	-8.1%
SH1 Ngauranga - Aotea Quay (SB)	0.81	2.4%	3.5%	3.8%	3.6%	2.4%	3.1%
SH1 Aotea Quay - Ngauranga (NB)	0.75	5.1%	5.3%	4.2%	4.9%	5.0%	5.4%

INDICATOR	Table 5.3 - AM Results - Actual Difference						
	Base	S4	S4T75	S5	S5T125	S6	S6T75
ACCESSIBILITY							
Auto			\$0.75 toll on Petone-Grenada Link		\$1.25 toll on Melling-Porirua Link		\$0.75 toll on Petone-Grenada Link
Total motor vehicle travel time (hrs)	29697	-732	-955	-843	-939	-860	-1045
Total motor vehicle travel distance ('000km)	1487	31	24	28	13	25	19
Average vehicle network speed (km/hr)	50.1	2.3	2.5	2.4	2.1	2.3	2.5
Total auto trips spread from the peak	193	-548	-523	-508	-435	-515	-498
Total vehicle hours below service level D	8436	-771	-813	-1300	-802	-903	-1007
Auto Travel times to Airport (mins):							
CBD	9.9	0.0	0.0	0.0	0.0	0.0	0.0
Port	12.4	0.0	0.0	0.0	0.0	0.0	0.0
Johnsonville to Airport	25.2	-1.5	-1.3	-1.1	-0.6	-1.7	-1.4
Porirua to Airport	32.4	-0.9	-1.7	-1.8	-1.6	-1.4	-1.9
Plimerton to Airport	38.8	-1.0	-1.7	-1.9	-1.7	-1.4	-1.9
Paraparaumu to Airport	54.2	-1.0	-1.8	-1.9	-1.6	-1.5	-2.0
West External to Airport	72.7	-1.0	-1.8	-1.8	-1.6	-1.5	-2.0
Lower Hutt to Airport	38.8	-6.3	-6.2	-6.5	-6.7	-5.8	-6.1
Upper Hutt to Airport	52.1	-6.6	-6.5	-7.2	-7.0	-6.1	-6.4
East External to Airport	118.0	-6.7	-6.6	-7.2	-7.1	-6.2	-6.5
Auto Travel times from Lower Hutt to Porirua (mins):							
via SH1	33.4	-15.0	-15.3	-15.8	-15.7	-15.5	-15.6
via SH58	22.4	-1.1	-0.9	-0.9	-0.9	-1.2	-1.1
via Pentone - Grenada Link							
via Melling - Porirua Link							
Transit							
Total passenger travel time (hrs)	12216	374	358	255	303	463	451
Total passenger travel distance ('000km)	424	26	24	16	17	31	30
Average passenger network speed (km/hr)	38.5	1.4	1.3	0.8	0.8	2.0	1.9
AFFORDABILITY							
Strategy Revenue (\$)							
Toll	0	1140	5020	2644	6931	1284	4911
Toll (HOT Lane)		1140	2028	2644	3306	1284	2050
Toll (Pentone-Grenada Link / Melling-Porirua Link)		0	2992	0	3625	0	2861
Fare	75353	4794	4614	3880	4088	5489	5387
Parking	114579	-304	-177	69	-34	-789	-604
Total	189932	5158	10322	5499	12182	5453	10542
ECONOMIC EVALUATION							
Cross-valley-link-road user benefits	0	13833	12085	14291	12428	15186	13837
Porirua-Hutt-link-road user benefits	0	2761	2071	5788	3561	2722	2055
Non-link-road user benefits	0	12775	13235	13431	12660	14116	14282
Region-wide user benefits	0	29369	27390	33510	28649	32024	30173
SUSTAINABILITY							
Environment							
CO2 Emissions (Tonnes)	379	0	-2	0	-2	-1	-3
CO Emissions (Tonnes)	15	0	0	0	0	0	-1
Fuel							
Fuel Consumption (Litres)	151706	198	-897	-148	-995	-423	-1264
Safety							
Total Accident Cost (\$)	45118	108	-190	1180	86	-226	-449
General Statistics							
Total Number of motor vehicle trips	141127	61	-51	238	-22	-118	-210
Total Number of passenger trips	50330	35	80	133	111	-26	19
Total Number of slow trips	47568	-690	-648	-685	-597	-678	-643
Total Number of PT trips	49720	999	1000	715	837	1177	1174
Average motor vehicle trip length (km)	10.5	0.2	0.2	0.2	0.1	0.2	0.1
Cost of Congestion (\$)	78924	-9638	-10057	-10672	-10303	-10400	-10859
V/C Ratios							
Melling Bridge (WB)	0.78	0.03	0.03	0.09	-0.01	-0.09	-0.08
SH2 South of SH58 (SB)	0.60	-0.02	0.00	-0.11	-0.03	-0.03	0.00
Kenn Good Bridge (WB)	0.86	0.06	0.06	0.13	0.06	0.03	0.02
Randwick Rd (SB)	0.76	0.06	0.02	-0.06	-0.07	-0.09	-0.09
Petone Esplanade (WB)	0.81	-0.23	-0.28	-0.10	-0.09	0.04	-0.02
Hutt Rd South of Wakefield (SB)	0.49	0.16	0.10	0.03	0.05	0.25	0.19
SH2 Dowse - Melling (NB)	0.36	-0.04	-0.06	-0.07	-0.07	0.00	-0.02
SH2 Dowse - Melling (SB)	0.87	-0.10	-0.12	-0.11	-0.12	-0.10	-0.11
SH2 Dowse - Petone (NB)	0.54	-0.06	-0.09	-0.10	-0.10	0.01	-0.02
SH2 Dowse - Petone (SB)	0.93	-0.12	-0.12	-0.15	-0.14	-0.09	-0.10
SH2 Petone - Ngauranga (SB)	1.19	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
SH1 Ngauranga - Aotea Quay (SB)	0.81	0.02	0.03	0.03	0.03	0.02	0.03
SH1 Aotea Quay - Ngauranga (NB)	0.75	0.04	0.04	0.03	0.04	0.04	0.04

INDICATOR	Table 5.4 - IP Results (Note: Values are for the period 0900 to 1600)						
	Base	S4	S4T75	S5	S5T125	S6	S6T75
ACCESSIBILITY							
Auto			\$0.75 toll on Petone-Grenada Link		\$1.25 toll on Melling-Porirua Link		\$0.75 toll on Petone-Grenada Link
Total motor vehicle travel time (hrs)	55362	56362	56366	28854	28758	56137	56190
Total motor vehicle travel distance ('000km)	3668	3730	3713	3732	3698	3726	3710
Average vehicle network speed (km/hr)	66.2	66.2	65.9	66.3	65.8	66.4	66.0
Total auto trips spread from the peak	207	-356	-334	-315	-244	-325	-306
Total vehicle hours below service level D	212	228	299	230	297	212	289
Auto Travel times to Airport (mins):							
CBD	8.3	8.3	8.2	8.3	8.3	8.3	8.3
Port	10.5	10.5	10.4	10.5	10.5	10.5	10.5
Johnsonville to Airport	15.6	15.5	15.6	15.6	15.6	15.5	15.6
Porirua to Airport	21.3	21.3	21.3	21.4	21.4	21.3	21.3
Plimerton to Airport	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Paraparaumu to Airport	42.0	42.0	41.9	42.0	42.0	42.0	42.0
West External to Airport	61.6	61.7	61.6	61.7	61.7	61.7	61.7
Lower Hutt to Airport	18.5	18.5	18.5	18.5	18.5	18.5	18.5
Upper Hutt to Airport	28.5	28.5	28.4	28.5	28.5	28.5	28.5
East External to Airport	94.6	94.6	94.5	94.5	94.6	94.6	94.6
Auto Travel times from Lower Hutt to Porirua (mins):							
via SH1	17.6	17.5	17.7	15.9	16.0	15.9	16.1
via SH58	20.9	20.8	20.9	20.7	20.8	20.8	20.8
via Pentone - Grenada Link		14.7	14.6			13.1	13.0
via Melling - Porirua Link				11.6	11.3		
Transit							
Total passenger travel time (hrs)	6531	6805	6812	6783	6788	6814	6824
Total passenger travel distance ('000km)	212	229	229	225	226	229	229
Average passenger network speed (km/hr)	35.0	36.6	36.6	36.1	36.2	36.6	36.6
AFFORDABILITY							
Strategy Revenue (\$)							
Toll	0	0	3098	0	5280	0	2892
Toll (HOT Lane)	0	0	0	0	0	0	0
Toll (Pentone-Grenada Link / Melling-Porirua Link)	0	0	3098	0	5280	0	2892
Fare	44626	47925	47919	47748	47777	47979	48002
Parking	203280	202599	202735	202745	202915	202561	202773
Total	247906	250524	254287	250493	256883	250540	254167
	0	0	0	0	0	0	0
ECONOMIC EVALUATION							
Cross-valley-link-road user benefits	0	4078	2186	8521	6133	8385	6483
Porirua-Hutt-link-road user benefits	0	4992	3855	9107	6025	5048	3907
Non-link-road user benefits	0	3299	2501	3899	2779	3347	2459
Region-wide user benefits	0	12369	8542	21527	14937	16780	12848
SUSTAINABILITY							
Environment							
CO2 Emmissions (Tonnes)	827.6	843.2	843.2	842.8	841.6	841.4	842.0
CO Emmissions (Tonnes)	29.2	29.7	29.7	29.7	29.6	29.6	29.6
Fuel							
Fuel Consumption (Litres)	331055	337262	337275	337124	336651	336567	336802
Safety							
Total Accident Cost (\$)	103523	103284	103142	106177	103935	103384	103297
General Statistics							
Total Number of motor vehicle trips	364827	364268	364054	364806	364440	364205	364015
Total Number of passenger trips	81541	81911	81839	82019	81888	81910	81844
Total Number of slow trips	128865	126899	127182	126613	127143	126949	127194
Total Number of PT trips	37779	38295	38344	38135	38242	38314	38364
Average motor vehicle trip length (km)	10.1	10.2	10.2	10.2	10.1	10.2	10.2
Cost of Congestion (\$)	10211	10420	12079	12000	12665	10583	12381
V/C Ratios							
Melling Bridge (WB)	0.67	0.71	0.71	0.80	0.70	0.65	0.64
SH2 South of SH58 (SB)	0.28	0.27	0.28	0.25	0.27	0.27	0.28
Kenn Good Bridge (WB)	0.55	0.57	0.57	0.58	0.57	0.58	0.58
Randwick Rd (SB)	0.44	0.41	0.41	0.42	0.39	0.38	0.39
Petone Esplanade (WB)	0.31	0.39	0.36	0.21	0.24	0.26	0.25
Hutt Rd South of Wakefield (SB)	0.27	0.40	0.37	0.29	0.32	0.39	0.36
SH2 Dowse - Melling (NB)	0.36	0.36	0.34	0.33	0.33	0.37	0.36
SH2 Dowse - Melling (SB)	0.87	0.38	0.36	0.38	0.34	0.38	0.36
SH2 Dowse - Petone (NB)	0.47	0.52	0.49	0.49	0.49	0.55	0.53
SH2 Dowse - Petone (SB)	0.93	0.44	0.42	0.36	0.38	0.48	0.45
SH2 Petone - Ngauranga (SB)	0.62	0.41	0.46	0.41	0.48	0.38	0.47
SH1 Ngauranga - Aotea Quay (SB)	0.35	0.36	0.36	0.36	0.36	0.36	0.36
SH1 Aotea Quay - Ngauranga (NB)	0.87	0.89	0.89	0.89	0.89	0.89	0.89

INDICATOR	Table 5.5 - IP Results - % Difference						
	Base	S4	S4T75	S5	S5T125	S6	S6T75
ACCESSIBILITY							
Auto			\$0.75 toll on Petone-Grenada Link		\$1.25 toll on Melling-Porirua Link		\$0.75 toll on Petone-Grenada Link
Total motor vehicle travel time (hrs)	55362	1.8%	1.8%	-47.9%	-48.1%	1.4%	1.5%
Total motor vehicle travel distance ('000km)	3668	1.7%	1.2%	1.7%	0.8%	1.6%	1.2%
Average vehicle network speed (km/hr)	66.2	-0.1%	-0.6%	0.1%	-0.6%	0.2%	-0.3%
Total auto trips spread from the peak	207	-272.2%	-261.5%	-252.3%	-218.2%	-257.2%	-248.2%
Total vehicle hours below service level D	212	7.2%	40.7%	8.3%	40.0%	-0.3%	36.2%
Auto Travel times to Airport (mins):							
CBD	8.3	0.0%	-0.5%	0.1%	0.0%	0.0%	-0.1%
Port	10.5	0.0%	-0.4%	0.1%	0.0%	0.0%	-0.1%
Johnsonville to Airport	15.6	-0.4%	0.3%	0.4%	0.3%	-0.5%	0.5%
Porirua to Airport	21.3	0.2%	-0.1%	0.3%	0.3%	0.1%	0.1%
Plimerton to Airport	27.1	0.1%	-0.1%	0.1%	0.2%	0.1%	0.0%
Paraparaumu to Airport	42.0	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%
West External to Airport	61.6	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
Lower Hutt to Airport	18.5	-0.2%	-0.4%	0.0%	-0.1%	-0.2%	-0.2%
Upper Hutt to Airport	28.5	-0.2%	-0.3%	-0.2%	-0.1%	-0.2%	-0.2%
East External to Airport	94.6	-0.1%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%
Auto Travel times from Lower Hutt to Porirua (mins):							
via SH1	17.6	-0.6%	0.8%	-9.8%	-8.9%	-9.7%	-8.2%
via SH58	20.9	-0.4%	0.0%	-0.9%	-0.5%	-0.8%	-0.5%
via Pentone - Grenada Link							
via Melling - Porirua Link							
Transit							
Total passenger travel time (hrs)	6531	4.2%	4.3%	3.9%	3.9%	4.3%	4.5%
Total passenger travel distance ('000km)	212	7.7%	7.7%	6.1%	6.3%	7.8%	7.9%
Average passenger network speed (km/hr)	35.0	4.5%	4.4%	3.2%	3.3%	4.5%	4.4%
AFFORDABILITY							
Strategy Revenue (\$)							
Toll							
Toll (HOT Lane)							
Toll (Pentone-Grenada Link / Melling-Porirua Link)							
Fare	44626	7.4%	7.4%	7.0%	7.1%	7.5%	7.6%
Parking	203280	-0.3%	-0.3%	-0.3%	-0.2%	-0.4%	-0.2%
Total	247906	1.1%	2.6%	1.0%	3.6%	1.1%	2.5%
ECONOMIC EVALUATION							
Cross-valley-link-road user benefits							
Porirua-Hutt-link-road user benefits							
Non-link-road user benefits							
Region-wide user benefits							
SUSTAINABILITY							
Environment							
CO2 Emmissions (Tonnes)	828	1.9%	1.9%	1.8%	1.7%	1.7%	1.7%
CO Emmissions (Tonnes)	29.2	1.8%	1.9%	1.7%	1.5%	1.5%	1.6%
Fuel							
Fuel Consumption (Litres)	331055	1.9%	1.9%	1.8%	1.7%	1.7%	1.7%
Safety							
Total Accident Cost (\$)	103523	-0.2%	-0.4%	2.6%	0.4%	-0.1%	-0.2%
General Statistics							
Total Number of motor vehicle trips	364827	-0.2%	-0.2%	0.0%	-0.1%	-0.2%	-0.2%
Total Number of passenger trips	81541	0.4%	0.4%	0.6%	0.4%	0.5%	0.4%
Total Number of slow trips	128865	-1.5%	-1.3%	-1.7%	-1.3%	-1.5%	-1.3%
Total Number of PT trips	37779	1.4%	1.5%	0.9%	1.2%	1.4%	1.5%
Average motor vehicle trip length (km)	10.1	1.9%	1.5%	1.8%	0.9%	1.7%	1.4%
Cost of Congestion (\$)	10211	2.0%	18.3%	17.5%	24.0%	3.6%	21.2%
V/C Ratios							
Melling Bridge (WB)	0.67	6.1%	5.5%	19.9%	3.7%	-3.8%	-4.4%
SH2 South of SH58 (SB)	0.28	-1.5%	2.4%	-10.7%	-0.9%	-1.2%	2.3%
Kenn Good Bridge (WB)	0.55	4.0%	2.9%	6.2%	4.3%	6.4%	5.3%
Randwick Rd (SB)	0.44	-8.0%	-6.5%	-5.6%	-11.0%	-13.6%	-12.3%
Petone Esplanade (WB)	0.31	25.8%	17.7%	-30.6%	-23.0%	-16.3%	-18.9%
Hutt Rd South of Wakefield (SB)	0.27	47.6%	37.4%	7.2%	18.0%	44.7%	34.4%
SH2 Dowse - Melling (NB)	0.36	0.2%	-4.4%	-6.8%	-6.8%	4.5%	-0.3%
SH2 Dowse - Melling (SB)	0.87	-56.9%	-59.0%	-56.9%	-60.5%	-56.6%	-59.0%
SH2 Dowse - Petone (NB)	0.47	8.5%	3.7%	2.8%	4.1%	16.6%	11.8%
SH2 Dowse - Petone (SB)	0.93	-52.5%	-55.2%	-60.9%	-58.8%	-48.9%	-51.9%
SH2 Petone - Ngauranga (SB)	0.62	-33.8%	-25.1%	-33.0%	-22.3%	-38.8%	-24.2%
SH1 Ngauranga - Aotea Quay (SB)	0.35	2.9%	3.3%	3.3%	3.5%	3.0%	3.6%
SH1 Aotea Quay - Ngauranga (NB)	0.87	2.3%	2.7%	2.6%	2.7%	2.3%	2.9%

INDICATOR	Table 5.6 - IP Results - Actual Difference						
	Base	S4	S4T75	S5	S5T125	S6	S6T75
ACCESSIBILITY							
Auto			\$0.75 toll on Petone-Grenada Link		\$1.25 toll on Melling-Porirua Link		\$0.75 toll on Petone-Grenada Link
Total motor vehicle travel time (hrs)	55362	1000	1004	-26508	-26604	775	828
Total motor vehicle travel distance ('000km)	3668	62	46	64	31	58	43
Average vehicle network speed (km/hr)	66.2	-0.1	-0.4	0.1	-0.4	0.1	-0.2
Total auto trips spread from the peak	207	-562	-540	-521	-451	-531	-513
Total vehicle hours below service level D	212	15	86	18	85	-1	77
Auto Travel times to Airport (mins):							
CBD	8.3	0.0	0.0	0.0	0.0	0.0	0.0
Port	10.5	0.0	0.0	0.0	0.0	0.0	0.0
Johnsonville to Airport	15.6	-0.1	0.0	0.1	0.1	-0.1	0.1
Porirua to Airport	21.3	0.0	0.0	0.1	0.1	0.0	0.0
Plimerton to Airport	27.1	0.0	0.0	0.0	0.0	0.0	0.0
Paraparaumu to Airport	42.0	0.0	0.0	0.0	0.0	0.0	0.0
West External to Airport	61.6	0.0	0.0	0.0	0.0	0.0	0.0
Lower Hutt to Airport	18.5	0.0	-0.1	0.0	0.0	0.0	0.0
Upper Hutt to Airport	28.5	-0.1	-0.1	-0.1	0.0	-0.1	-0.1
East External to Airport	94.6	-0.1	-0.1	-0.1	0.0	-0.1	-0.1
Auto Travel times from Lower Hutt to Porirua (mins):							
via SH1	17.6	-0.1	0.1	-1.7	-1.6	-1.7	-1.5
via SH58	20.9	-0.1	0.0	-0.2	-0.1	-0.2	-0.1
via Pentone - Grenada Link							
via Melling - Porirua Link							
Transit							
Total passenger travel time (hrs)	6531	275	281	253	257	283	293
Total passenger travel distance ('000km)	212	16	16	13	13	17	17
Average passenger network speed (km/hr)	35.0	1.6	1.5	1.1	1.1	1.6	1.5
AFFORDABILITY							
Strategy Revenue (\$)							
Toll	0	0	3098	0	5280	0	2892
Toll (HOT Lane)		0	0	0	0	0	0
Toll (Pentone-Grenada Link / Melling-Porirua Link)		0	3098	0	5280	0	2892
Fare	44626	3300	3293	3122	3151	3353	3377
Parking	203280	-681	-545	-535	-365	-719	-506
Total	247906	2618	6381	2588	8978	2634	6262
ECONOMIC EVALUATION							
Cross-valley-link-road user benefits	0	0	4078	2186	8521	6133	8385
Porirua-Hutt-link-road user benefits	0	0	4992	3855	9107	6025	5048
Non-link-road user benefits	0	0	3299	2501	3899	2779	3347
Region-wide user benefits	0	0	12369	8542	21527	14937	12848
SUSTAINABILITY							
Environment							
CO2 Emmissions (Tonnes)	828	16	16	15	14	14	14
CO Emmissions (Tonnes)	29	1	1	0	0	0	0
Fuel							
Fuel Consumption (Litres)	331055	6207	6219	6068	5596	5511	5746
Safety							
Total Accident Cost (\$)	103523	-239	-381	2654	412	-139	-225
General Statistics							
Total Number of motor vehicle trips	364827	-559	-773	-21	-387	-622	-812
Total Number of passenger trips	81541	370	298	478	347	369	303
Total Number of slow trips	128865	-1966	-1683	-2252	-1722	-1916	-1671
Total Number of PT trips	37779	516	565	356	463	535	585
Average motor vehicle trip length (km)	10.1	0.2	0.1	0.2	0.1	0.2	0.1
Cost of Congestion (\$)	10211	208	1867	1789	2453	371	2169
V/C Ratios							
Melling Bridge (WB)	0.67	0.04	0.04	0.13	0.03	-0.03	-0.03
SH2 South of SH58 (SB)	0.28	0.00	0.01	-0.03	0.00	0.00	0.01
Kenn Good Bridge (WB)	0.55	0.02	0.02	0.03	0.02	0.04	0.03
Randwick Rd (SB)	0.44	-0.04	-0.03	-0.02	-0.05	-0.06	-0.05
Petone Esplanade (WB)	0.31	0.08	0.05	-0.09	-0.07	-0.05	-0.06
Hutt Rd South of Wakefield (SB)	0.27	0.13	0.10	0.02	0.05	0.12	0.09
SH2 Dowse - Melling (NB)	0.36	0.00	-0.02	-0.02	-0.02	0.02	0.00
SH2 Dowse - Melling (SB)	0.87	-0.50	-0.51	-0.50	-0.53	-0.49	-0.51
SH2 Dowse - Petone (NB)	0.47	0.04	0.02	0.01	0.02	0.08	0.06
SH2 Dowse - Petone (SB)	0.93	-0.49	-0.51	-0.57	-0.55	-0.46	-0.48
SH2 Petone - Ngauranga (SB)	0.62	-0.21	-0.16	-0.20	-0.14	-0.24	-0.15
SH1 Ngauranga - Aotea Quay (SB)	0.35	0.01	0.01	0.01	0.01	0.01	0.01
SH1 Aotea Quay - Ngauranga (NB)	0.87	0.02	0.02	0.02	0.02	0.02	0.03

Table 5.7 Hutt Corridor - Benefit Cost Calculations (over 25 year evaluation period)

	Base	S4	S4T75	S5	S5T125	S6	S6T75
			\$0.75 toll on Petone-Grenada Link		\$1.25 toll on Melling-Porirua Link		\$0.75 toll on Petone-Grenada Link
Benefits							
AM Peak 2 hour User Benefits (\$)	\$0	\$29,369	\$27,390	\$33,510	\$28,649	\$32,024	\$30,173
Interpeak 7 hour User Benefits (\$)	\$0	\$12,369	\$8,542	\$21,527	\$14,937	\$16,780	\$12,848
Weekday Daily benefits	\$0	\$79,765	\$69,301	\$103,616	\$82,691	\$92,574	\$82,188
Weekend benefits	\$0	\$49,476	\$34,168	\$86,108	\$59,748	\$67,120	\$51,392
Annual benefits	\$0	\$22,112,232	\$18,682,416	\$30,034,296	\$23,430,696	\$26,244,960	\$22,808,544
25 Year benefits (Discounted 10%)	\$0	\$210,596,898	\$177,931,330	\$286,046,635	\$223,153,949	\$249,956,999	\$217,228,573
Costs							
Korokoro Dowse Grade Separation							
SH1 ATMS							
Minor Junction Upgrades (Removing Access)							
Minor Junction Upgrades (Signals)		\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000
Melling Full Separation							
Silverstream Bridge Upgrade		\$7,000,000	\$7,000,000	\$7,000,000	\$7,000,000	\$7,000,000	\$7,000,000
SH2 HOT Lane		\$13,000,000	\$13,000,000	\$13,000,000	\$13,000,000	\$13,000,000	\$13,000,000
Petone Curves Realignment							
Belmont Full Grade Separation							
Silverstream Full Grade Separation							
Moonshine Full Grade Separation							
Gibbons Full Grade Separation							
Totoro Park Full Grade Separation							
River Road Upgrade							
Major Junction Upgrades (Signals+Extral Lanes)							
SH2 Tidal 5th Lane							
Hutt Expressway (HOV) Lane							
Hutt Expressway Buslane							
Petone-Grenada		\$45,000,000	\$45,000,000			\$45,000,000	\$45,000,000
Esplanade Upgrade		\$22,000,000	\$22,000,000				
Cross Valley Link				\$45,000,000	\$45,000,000	\$45,000,000	\$45,000,000
Melling-Porirua				\$80,000,000	\$80,000,000		
Randwick Melling							
Belmont-Porirua							
Randwick -Cambridge-KGB							
Melling Loop LRT Line							
SH58							
Akatarawa Road							
Tolling Facilities							
Parking Infrastructure		\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000	\$10,000,000
Relocation of Melling Line						\$13,000,000	\$13,000,000
New Station at Timberlea		\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
New Station at Cruickshank		\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
New Buses		\$3,250,000	\$3,250,000	\$3,000,000	\$2,250,000	\$3,000,000	\$3,000,000
New Bus Services		\$38,478	\$38,698	\$27,851	\$26,712	\$35,239	\$35,415
New Trains		\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000
New Tains Services		\$75,729	\$75,729	\$75,729	\$75,729	\$75,729	\$75,729
New Ferry							
Superbus		\$11,993,573	\$11,993,573	\$11,993,573	\$11,993,573	\$11,993,573	\$11,993,573
Haywards bus		\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000
Ferry Service							
Stokes Valley LRT							
Electrification extened to Featherson							
Rail Hutt - Porirua							
25 Year Costs		\$122,007,780	\$122,008,000	\$179,747,153	\$178,996,014	\$157,754,541	\$157,754,717
BCR	N/A	1.7	1.5	1.6	1.2	1.6	1.4

Appendix C

**Rough order of cost,
indicative benefits and
Benefits Cost Ratio (BCR)
for each Stage 3 Options**

INDICATOR	Note: Values are for the period 0700 to 0900										
	Base	S1	S2	S3	S4	S4T75	S5	S5S1	S4T125	S6	S6T75
ACCESSIBILITY											
Auto	\$0.75 toll on Petone-Grenada Link										
Total motor vehicle travel time (hrs)	29697	28861	28889	29261	28965	28742	28854	28810	28758	28837	28652
Total motor vehicle travel distance ('000km)	1487	1496	1478	1520	1518	1512	1516	1496	1501	1512	1506
Average vehicle network speed (km/hr)	50.1	51.8	51.2	52.0	52.4	52.6	52.5	51.9	52.2	52.4	52.6
Total auto trips spread from the peak	193	-112	11	-262	-355	-331	-315	-122	-242	-322	-306
Total vehicle hours below service level D	8436	7706	8157	7946	7665	7623	7136	7766	7634	7533	7429
Auto Travel times to Airport (mins):	\$0.75 toll on Petone-Grenada Link										
CBD	9.9	9.9	9.9	10.0	9.9	9.9	9.9	9.9	9.9	9.9	9.9
Port	12.4	12.4	12.4	12.6	12.4	12.4	12.4	12.4	12.4	12.4	12.4
Johnsonville to Airport	25.2	24.9	24.8	25.1	23.7	24.0	24.1	24.9	24.6	23.5	23.8
Porirua to Airport	32.4	31.5	31.5	31.5	31.5	30.7	30.6	31.5	30.8	31.0	30.5
Plimerton to Airport	38.8	37.8	37.8	37.8	37.8	37.0	36.9	37.8	37.1	37.3	36.8
Paraparumu to Airport	54.2	53.2	53.3	53.3	53.2	52.4	52.4	53.2	52.6	52.7	52.2
West External to Airport	72.7	71.8	71.8	71.8	71.7	71.0	70.9	71.8	71.1	71.3	70.8
Lower Hutt to Airport	38.8	31.4	36.4	29.0	32.5	32.6	32.4	32.0	32.2	33.0	32.8
Upper Hutt to Airport	52.1	44.3	49.1	42.2	45.4	45.5	44.9	45.0	45.0	45.9	45.7
East External to Airport	118.0	110.2	115.0	108.2	111.4	111.5	110.8	110.9	111.0	111.8	111.6
Auto Travel times from Lower Hutt to Porirua (mins):	\$0.75 toll on Petone-Grenada Link										
via SH1	33.4	18.8	31.3	24.1	18.4	18.1	17.7	17.4	17.7	18.0	17.8
via SH58	22.4	21.8	21.9	21.7	21.3	21.5	21.5	21.7	21.5	21.2	21.3
via Pentone - Grenada Link					15.4	15.0				15.5	15.1
via Melling - Porirua Link							12.2		11.8		
Transit											
Total passenger travel time (hrs)	12216	12720	13074	12247	12590	12574	12471	12589	12519	12679	12667
Total passenger travel distance ('000km)	424	453	471	433	450	448	440	447	441	455	454
Average passenger network speed (km/hr)	38	40	41	40	40	40	39	40	39	40	40
AFFORDABILITY											
Strategy Revenue (\$)											
Toll	0	1860	0	0	1140	5020	2644	1972	6931	1284	4911
Toll (HOT Lane)	0	0	0	0	1140	2028	2644	0	3306	1284	2050
Toll (Pentone-Grenada Link / Melling-Porirua Link)	0	0	0	0	0	2992	0	0	3625	0	2861
Fare	75353	80734	83460	77462	80147	79966	79233	80312	79441	80842	80740
Parking	114579	113981	111589	117287	114275	114402	114648	114419	114545	113790	113975
Total	189932	196575	195048	194750	195090	200254	195431	196704	202113	195385	200474
ECONOMIC EVALUATION											
Cross-valley-link-road user benefits	0	7642 37%	6070 36%	8295 36%	13833 47%	12085 44%	14291 43%	10624 47%	12428 43%	15186 47%	13837 46%
Porirua-Hutt-link-road user benefits	0	361 2%	227 1%	316 1%	2761 9%	2071 8%	5788 17%	577 3%	3561 12%	2722 8%	2055 7%
Non-link-road user benefits	0	12707 61%	10447 62%	14499 63%	12775 43%	13235 48%	13431 40%	11534 51%	12660 44%	14116 44%	14282 47%
Region-wide user benefits	0	20709	16744	23109	29369	27390	33510	22734	28649	32024	30173
SUSTAINABILITY											
Environment											
CO2 Emmissions (Tonnes)	379	377	373	383	380	377	379	376	377	378	376
CO Emmissions (Tonnes)	15	15	15	15	15	15	15	15	15	15	15
Fuel											
Fuel Consumption (Litres)	151706	150602	149183	153183	151903	150809	151558	150531	150711	151282	150441
Safety											
Total Accident Cost (\$)	45118	44307	43687	44983	45226	44928	46298	44375	45204	44892	44669
General Statistics											
Total Number of motor vehicle trips	141127	140510	139870	141311	141188	141076	141365	140586	141105	141009	140917
Total Number of passenger trips	50330	50237	49870	50502	50365	50410	50463	50279	50441	50304	50349
Total Number of slow trips	47568	47069	47119	47066	46878	46920	46883	47099	46971	46890	46925
Total Number of PT trips	49720	51039	51836	50142	50719	50720	50435	50899	50557	50897	50894
Average motor vehicle trip length (km)	10.5	10.6	10.6	10.8	10.8	10.7	10.7	10.6	10.6	10.7	10.7
Cost of Congestion (\$)	78924	70134	72863	72215	69286	68867	68252	69829	68621	68524	68065
V/C Ratios											
Melling Bridge (WB)	0.8	0.8	0.7	0.9	0.8	0.8	0.9	0.7	0.8	0.7	0.7
SH2 South of SH58 (SB)	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6
Kenn Good Bridge (WB)	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9
Randwick Rd (SB)	0.8	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7	0.7	0.7
Petone Esplanade (WB)	0.8	0.8	0.8	0.9	0.6	0.5	0.7	0.7	0.7	0.8	0.8
Hutt Rd South of Wakefield (SB)	0.5	0.5	0.5	0.5	0.7	0.6	0.5	0.6	0.5	0.7	0.7
SH2 Dowse - Melling (NB)	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3
SH2 Dowse - Melling (SB)	0.9	0.7	0.6	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8
SH2 Dowse - Petone (NB)	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.5
SH2 Dowse - Petone (SB)	0.9	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
SH2 Petone - Ngauranga (SB)	1.2	1.1	1.2	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1
SH1 Ngauranga - Aotea Quay (SB)	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8
SH1 Aotea Quay - Ngauranga (NB)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

INDICATOR	Note: Values are for the period 0900 to 1600										
	Base	S1	S2	S3	S4	S4T75	S5	SSS1	54T125	S6	S6T75
ACCESSIBILITY						\$0.75 toll on Petone-Grenada Link			\$0.75 toll on Petone-Grenada Link		\$0.75 toll on Petone-Grenada Link
Auto											
Total motor vehicle travel time (hrs)	55362	55746	55377	55921	56362	56366	28854	28810	28758	56137	56190
Total motor vehicle travel distance ('000km)	3668	3688	3674	3699	3730	3713	3732	3687	3698	3726	3710
Average vehicle network speed (km/hr)	66.2	66.2	66.3	66.1	66.2	65.9	66.3	66.3	65.8	66.4	66.0
Total auto trips spread from the peak	207	-109	16	-262	-356	-334	-315	-115	-244	-325	-306
Total vehicle hours below service level D	212	287	211	293	228	299	230	284	297	212	289
Auto Travel times to Airport (mins):											
CBD	8.3	8.3	8.3	8.3	8.3	8.2	8.3	8.2	8.3	8.3	8.3
Port	10.5	10.5	10.5	10.5	10.5	10.4	10.5	10.4	10.5	10.5	10.5
Johnsonville to Airport	15.6	15.6	15.6	15.6	15.5	15.6	15.6	15.5	15.6	15.5	15.6
Porirua to Airport	21.3	21.3	21.3	21.3	21.3	21.3	21.4	21.3	21.3	21.3	21.3
Plimerton to Airport	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Paraparaumu to Airport	42.0	42.0	42.0	42.0	42.0	41.9	42.0	41.9	42.0	42.0	42.0
West External to Airport	61.6	61.7	61.7	61.7	61.7	61.6	61.7	61.6	61.7	61.7	61.7
Lower Hutt to Airport	18.5	18.5	18.6	18.5	18.5	18.5	18.5	18.4	18.5	18.5	18.5
Upper Hutt to Airport	28.5	28.5	28.5	28.5	28.5	28.4	28.5	28.4	28.5	28.5	28.5
East External to Airport	94.6	94.6	94.6	94.6	94.6	94.5	94.5	94.5	94.6	94.6	94.6
Auto Travel times from Lower Hutt to Porirua (mins):											
via SH1	17.6	17.6	17.6	17.6	17.5	17.7	15.9	16.0	16.0	15.9	16.1
via SH58	20.9	20.9	20.9	20.9	20.8	20.9	20.7	20.8	20.8	20.8	20.8
via Pentone - Grenada Link					14.7	14.6				13.1	13.0
via Melling - Porirua Link							11.6		11.3		
Transit											
Total passenger travel time (hrs)	6531	6810	6827	6838	6805	6812	6783	6797	6788	6814	6824
Total passenger travel distance ('000km)	212	229	229	230	229	229	225	230	226	229	229
Average passenger network speed (km/hr)	35.0	36.5	36.5	36.5	36.6	36.6	36.1	36.7	36.2	36.6	36.6
AFFORDABILITY											
Strategy Revenue (\$)											
Toll	0	0	0	0	0	3098	0	0	5280	0	2892
Toll (HOT Lane)	0	0	0	0	0	0	0	0	0	0	0
Toll (Pentone-Grenada Link / Melling-Porirua Link)	0	0	0	0	0	3098	0	0	5280	0	2892
Fare	44626	47887	48001	48205	47925	47919	47748	48128	47777	47979	48002
Parking	203280	202797	202529	202864	202599	202735	202745	202878	202915	202561	202773
Total	247906	250684	250530	251069	250524	254287	250493	251006	256883	250540	254167
	0	0	0	0	0	0	0	0	0	0	0
ECONOMIC EVALUATION											
Cross-valley-link-road user benefits	0	252	-97	491	4078	2186	8521	4310	6133	8385	6483
Porirua-Hutt-link-road user benefits	0	2255	1941	2277	4992	3855	9107	2501	6025	5048	3907
Non-link-road user benefits	0	1885	1757	1824	3299	2501	3899	2033	2779	3347	2459
Region-wide user benefits	0	4392	3600	4592	12369	8542	21527	8844	14937	16780	12848
SUSTAINABILITY											
Environment											
CO2 Emissions (Tonnes)	828	834	828	836	843	843	843	833	842	841	842
CO Emissions (Tonnes)	29	29	29	29	30	30	30	29	30	30	30
Fuel											
Fuel Consumption (Litres)	331055	333566	331329	334575	337262	337275	337124	333082	336651	336567	336802
Safety											
Total Accident Cost (\$)	103523	101673	100851	102021	103284	103142	106177	101749	103935	103384	103297
General Statistics											
Total Number of motor vehicle trips	364827	363648	363401	363600	364268	364054	364806	363564	364440	364205	364015
Total Number of passenger trips	81541	81678	81573	81719	81911	81839	82019	81684	81888	81910	81844
Total Number of slow trips	128865	127875	128217	127572	126899	127182	126613	127864	127143	126949	127194
Total Number of PT trips	37779	38459	38586	38524	38295	38344	38135	38525	38242	38314	38364
Average motor vehicle trip length (km)	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.1	10.1	10.2	10.2
Cost of Congestion (\$)	10211	12038	10760	12857	10420	12079	12000	12127	12665	10583	12381
V/C Ratios	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Melling Bridge (WB)	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.6	0.7	0.6	0.6
SH2 South of SH58 (SB)	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3
Kenn Good Bridge (WB)	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Randwick Rd (SB)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Petone Esplanade (WB)	0.3	0.3	0.3	0.3	0.4	0.4	0.2	0.2	0.2	0.3	0.3
Hutt Rd South of Wakefield (SB)	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.4	0.4
SH2 Dowse - Melling (NB)	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.4
SH2 Dowse - Melling (SB)	0.9	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.4
SH2 Dowse - Petone (NB)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5
SH2 Dowse - Petone (SB)	0.9	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4
SH2 Petone - Ngauranga (SB)	0.6	0.5	0.6	0.5	0.4	0.5	0.4	0.5	0.5	0.4	0.5
SH1 Ngauranga - Aotea Quay (SB)	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
SH1 Aotea Quay - Ngauranga (NB)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9