

Wellington City Council

Bus Lanes

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Monitoring Surveys

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Traffic Design Group



August 2010

PO Box 30 721  
Lower Hutt 5040  
P: +64 4 569 8497  
[www.tdg.co.nz](http://www.tdg.co.nz)  
New Zealand

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Bus Lanes

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Monitoring Surveys  
Quality Assurance Statement

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Prepared by:  
**Chris Morahan**  
Transportation Engineer



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Reviewed by:  
**Mark Georgeson**  
Director



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Approved for Issue by:  
**Mark Georgeson**  
Director



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## 1. Background

In 2002, Wellington City Council initiated a study to investigate the effects of the introduction of a number of bus lanes around Wellington City. Since that initial study, further surveys have been commissioned on a regular annual basis in order to monitor ongoing changes.

To date, the surveys have been carried out at five sites around Wellington City, as listed below:

- Adelaide Road
- Chaytor Street
- Kaiwharawhara Road
- Glenmore Street, and
- Victoria Street.

Adelaide Road, Chaytor Street and Kaiwharawhara Road have been surveyed since the initial study in 2002, while the Glenmore Street and Victoria Street locations were added in 2004.

In addition to these, the August 2010 surveys also included a detailed 'before' survey of a new route through the central city, incorporating the existing Victoria Street bus lane. This survey separately recorded travel times of buses in both directions along the length of road between Courtenay Place and Willis Street, and is intended to provide a base from which to compare travel times after buses are re-routed through Manners Mall.

The surveys have been used to monitor the travel time reduction for buses and also to determine whether the introduction of the bus lanes has had any effect on cars, cyclists, pedestrians or adjacent land use. The more recent surveys have also included observations of illegal use of the bus lanes, and use by taxis.

This report details the findings from the most recent August 2010 surveys and compares these findings with results from previous years.

## 2. Survey methodology

The methodologies employed for data gathering, for each of the various components of the bus lane monitoring surveys, can be described as follows.

### 2.1 Travel Time Surveys

For each of the locations, travel time surveys were carried out using the survey methodology described below. Car, bus and taxi travel times were surveyed at the Adelaide Road, Chaytor Street, Kaiwharawhara Road and Glenmore Street locations. The Victoria Street and central city route surveys recorded only bus travel times.

#### 2.1.1 Private Vehicle Travel Times

A numberplate survey method was used in the collection of travel time data for cars. This involves recording vehicle registration plates at both the start and end of the survey zone as well as recording the exact time vehicles enter and exit the zone. In order to make accurate comparisons the same start and end points were used as in previous surveys, and measurements were taken to the nearest second.

Due to the large numbers of vehicles using each route, a sample of the total vehicles was captured. This sample was determined based on the colour of the vehicles, and in the case of this survey, as with previous years, only red vehicles were observed.

#### 2.1.2 Bus Travel Times

The bus travel times were surveyed using the same numberplate technique outlined above for private vehicle travel time. However, unlike the private vehicles, all buses were recorded.

Survey staff were also positioned so as to record the length of time buses remained stationary for the embarking/disembarking of passengers, at bus stops along the route. This total stoppage time was then subtracted from the overall travel time.

#### 2.1.3 Taxi Travel Times

Taxis have been allowed to use the bus lanes on Adelaide Road, Chaytor Street, Kaiwharawhara Road and Glenmore Street since 2009. Accordingly, in 2009 taxi travel times were measured in the same manner as cars, using the numberplate method described above. In the 2010 surveys this was repeated, and extended to also record whether the taxi used the bus lane or the traffic lane.

### 2.2 Traffic Volumes

The total number of vehicles which exited the survey zone was also recorded. These counts were recorded in fifteen minute intervals throughout the duration of the survey period.

Traffic volumes were recorded in the same direction of travel as the bus lanes, these being citybound for Adelaide Road, Chaytor Street and Kaiwharawhara Road, and outbound for Glenmore Street. The Victoria Street route traverses the central city between Dixon Street and

Willis Street, following a northerly direction. No traffic volumes were recorded for the new central city route.

### 2.3 Cyclist and Pedestrian Volumes

In order to determine if the bus lanes have presented a change for cyclist or pedestrian activity, cycle flows and pedestrian numbers were also recorded. With the exception of the new central city route, cycle volumes were recorded in each location in the same direction of travel as the bus lane. For pedestrians, both the number crossing the road and the number walking along adjacent footpaths of the survey zones were recorded.

The volumes of pedestrians crossing the road were recorded at marked crossing points. The particular locations surveyed were as follows:

- Adelaide Road – signalised crossing south of The Basin Reserve
- Chaytor Street – signalised crossing at Birdwood Street adjacent to Karori tunnel
- Kaiwharawhara Road – signalised crossing.

Glenmore Street pedestrian counts were limited to those walking adjacent to the bus lane, as there are no marked pedestrian crossings along this route.

No pedestrian surveys were undertaken for the Victoria Street bus lane or the new central city route.

### 2.4 Land Use Activities

The land use of properties adjacent to the bus lanes was also recorded to monitor if and how the bus lanes may have affected local businesses. A survey of the frontage land uses was undertaken in May 2002 prior to the installation of the Adelaide Road and Kaiwharawhara Road bus lanes and subsequent surveys have continued to monitor any changes.

Due to the fact that Glenmore Street and Chaytor Street are in residential areas the land use information has not been monitored at these sites. Land uses have similarly not been monitored for the Victoria Street bus lane, since it only extends for a short section of road restricted for use by buses, nor have they been recorded for the central city route.

### 2.5 Illegal Use of Bus Lanes

In addition to the travel time and traffic volume surveys, the illegal use of the bus lanes by non-bus traffic has also been monitored, noting that from 2009 taxis have been allowed to use the bus lanes on Adelaide Road, Chaytor Street, Kaiwharawhara Road and Glenmore Street.

These surveys were carried out by placing a surveyor at a strategic point from which they are able to view the entire length of the bus lane, allowing them to record the time, approximate location, distance traversed and number of occupants of any offending vehicles.

## 2.6 Time Periods

In common with earlier records, the surveys were carried out over the following periods:

LOCATION	BUS LANE SURVEY TIMES	ILLEGAL USE SURVEY TIMES
Adelaide Road	7:00 - 9:30 am	7:00 - 9:00am
Chaytor Street	7:00 - 9:30 am	7:00 - 9:00am
Kaiwharawhara Road	7:00 - 9:30 am	7:00 - 9:00am
Glenmore Street	4:00 - 6:30 pm	4:00 - 6:00pm
Victoria Street	4:00 - 6:30 pm	4:00 - 6:00pm
Central City route	7:00 - 9:30am x 2 4:00 - 6:30pm x 2	-

**Table 1 : Surveyed Times by Location**

The times of the illegal use surveys differ as they were carried out in accordance with the posted operational times of the respective bus lanes. Even though the Chaytor Street bus lane now operates all day, this report only considers the illegal use from 7:00 - 9:00am to enable direct comparison with previous years.

### 3. Survey sites

The bus lane monitoring surveys were carried out at the six locations described in this chapter.

#### 3.1 Adelaide Road

The Adelaide Road bus lane extends in a northbound direction from 200 metres north of John Street, through to around 30m short of the intersection with Rugby Street at the Basin Reserve. The bus lane was extended in 2004 from its original shorter length between Drummond Street and the Basin Reserve.

The bus lane operates between 7:00am and 9:00am. Outside of these times the bus lane is available for general traffic or parking.

The travel time surveys were carried out between John Street and the limit line south of the Basin Reserve.

#### 3.2 Chaytor Street

The Chaytor Street bus lane extends from 500 metres south of Old Karori Road through to the stop line at the Birdwood Street intersection. As with Adelaide Road, the Chaytor Street bus lane was extended in 2004 from its original layout which started from Curtis Street.

The bus lane operates all day.

In 2006, traffic signals were installed on Chaytor Street at both the Old Karori Road and Birdwood Street intersections. Since then, this survey has used the limit line at the intersection of Old Karori Road and the limit line at the intersection of Birdwood Street as the start and end points of the survey zone respectively.

#### 3.3 Kaiwharawhara Road

The bus lane on Kaiwharawhara Road extends from shortly before the intersection with Old Porirua Road to the Hutt Road intersection.

The bus lane operates between 7:00am and 9:00am Monday to Friday and is available for parking outside of these hours.

For the travel time surveys the start point was located at the driveway of 93 Kaiwharawhara Road, with the end point at the limit line at the intersection with Hutt Road.

#### 3.4 Glenmore Street

The Glenmore Street bus lane extends in a northbound direction from The Rigi up until the intersection with Upland Road.

The bus lane operates on weekdays between 4:00pm and 6:00pm.

For the travel time surveys the start point was taken at Crieff Street, with the end point being at limit line at the intersection with Upland Road.

### 3.5 Victoria Street

'No Entry' restrictions are in place for the short length of Victoria Street between Dixon Street and Manners Street (in the northbound direction only). These restrictions allow for use by buses, taxis and service vehicles with business in Manners Street only, between the hours of 6:00am and 6:00pm Monday to Friday.

The travel times were measured along the length of the bus lane from the pedestrian crossing on Dixon Street at the intersection with Taranaki Street, to the limit lines at the intersection of Manners Street and Willis Street.

### 3.6 Central City Route

This route was surveyed for the first time in these August 2010 surveys, recording buses in both directions. No cars or taxis were recorded along this route, nor traffic volumes, cyclist volumes or pedestrian volumes.

Northbound buses were recorded from just after the bus stop on Courtenay Place opposite Allen Street, along Courtenay Place, Dixon Street, Victoria Street, Manners Street and Willis Street, to just before the bus stop outside the Grand Arcade. Southbound buses were recorded from just after the bus stop on Willis Street outside Millbank Court, along Willis Street, Mercer Street, Wakefield Street, Cuba Street, Manners Street and Courtenay Place, to just before the bus stop east of Allen Street.

## 4. Traffic volumes

The traffic volumes for the August 2010 surveys, along with the results of previous surveys are shown below:

MORNING SURVEY PERIOD	7:00-9:30 TOTAL	PEAK 1 HOUR	PEAK 15 MINUTES	7:00 - 9:30 BUSES	7:00 - 9:30 TAXIS
<b>Adelaide Road</b>					
May 2002	2,699	1,366	377	69	-
July 2002	2,339 (-13%)	1,178 (-14%)	313 (-17%)	62	-
November 2002	2,591 (-4%)	1,293 (-5%)	347 (-8%)	66	-
April 2003*	2,562 (-5%)	1,229 (-10%)	341 (-10%)	68	-
July 2004	2,226 (-18%)	1,186 (-13%)	336 (-11%)	64	-
August 2005	2,353 (-13%)	1,172 (-14%)	335 (-11%)	67	-
August 2006	2,771 (+3%)	1,307 (-4%)	339 (-10%)	68	-
August 2007	2,428 (-10%)	1,183 (-13%)	313 (-17%)	64	-
August 2008	2,248 (-17%)	1,093 (-20%)	296 (-21%)	66	-
August 2009	2,430 (-10%)	1,137 (-17%)	323 (-14%)	73	62
August 2010	2,035 (-25%)	935 (-32%)	239 (-37%)	68	51 (5)
<b>Chaytor Street</b>					
May 2002	1,983	911	264	47	-
July 2002	1,571 (-21%)	733 (-20%)	207 (-22%)	45	-
November 2002	1,769 (-11%)	859 (-6%)	233 (-12%)	43	-
April 2003*	1,803 (-10%)	837 (-9%)	236 (-11%)	43	-
July 2004	1,911 (-4%)	932 (+2%)	247 (-6%)	40	-
August 2005	1,709 (-14%)	815 (-11%)	271 (+3%)	38	-
August 2006	1,482 (-25%)	755 (-17%)	242 (-8%)	44	-
August 2007	1,785 (-10%)	834 (-8%)	215 (-18%)	46	-
August 2008	1,694 (-15%)	789 (-13%)	232 (-12%)	48	-
August 2009	1,740 (-12%)	800 (-12%)	201 (-24%)	45	25
August 2010	1,584 (-20%)	730 (-20%)	206 (-22%)	49	26 (1)
<b>Kaiwharawhara Road</b>					
May 2002	2,421	1,362	348	19	-
July 2002	2,199 (-9%)	1,174 (-14%)	319 (-9%)	15	-
November 2002	2,263 (-7%)	1,219 (-11%)	335 (-4%)	19	-
April 2003	2,411 (-1%)	1,310 (-4%)	368 (+5%)	19	-
July 2004	2,687 (+10%)	1,454 (+6%)	413 (+16%)	21	-
August 2005	2,768 (+13%)	1,465 (18%)	389 (+8%)	19	-
August 2006	2,248 (-7%)	1,212 (-11%)	352 (+1%)	21	-
August 2007	2,239 (-8%)	1,191 (-18%)	363 (+4%)	19	-
August 2008	2,308 (-5%)	1,226 (-10%)	359 (+3%)	19	-
August 2009	2,376 (-2%)	1,289 (-5%)	381 (+9%)	19	23
August 2010	2,381 (-2%)	1,314 (-4%)	339 (-3%)	19	24 (3)

AFTERNOON SURVEY PERIOD	4:00-6:30 TOTAL	PEAK 1 HOUR	PEAK 15 MINUTES	4:00 – 6:30 BUSES	4:00 - 6:30 TAXIS
Glenmore Street					
July 2004	1,968	951	250	44	-
August 2005*	2,641 (+25%)	1,159 (+18%)	314 (+21%)	37	-
August 2006	1,466 (-26%)	660 (-31%)	189 (-24%)	28	-
August 2007	1,349 (-31%)	650 (-32%)	178 (-29%)	39	-
August 2008	1,408 (-28%)	615 (-35%)	162 (-35%)	48	-
August 2009	1,366 (-31%)	602 (-37%)	167 (-33%)	48	15
August 2010	1,120 (-43%)	540 (-43%)	159 (-36%)	45	25 (1)
Victoria Street					
July 2004	978	426	114	205	-
August 2005	434 (-56%)	188 (-56%)	54 (-53%)	198	-
August 2006	963 (-2%)	401 (-6%)	113 (-1%)	213	-
August 2007	871 (-11%)	379 (-11%)	106 (-7%)	201	-
August 2008	839 (-14%)	382 (-10%)	106 (-7%)	206	-
August 2009	891 (-9%)	371 (-13%)	102 (-11%)	196	-
August 2010*	399 (-59%)	182 (-57%)	59 (-48%)	214	-

**Table 2 : Surveyed Vehicle Volumes**

\*Presence of roadworks may have affected results  
+ Taxis using bus lane are shown in brackets

The figures shown in brackets are the percentage change with respect to the surveys carried out prior to the implementation of the bus lanes at each site, with the exception of Victoria Street for which there is no information prior to the implementation of its bus lane.

Amongst these details it can clearly be seen that the traffic volumes observed after the introduction of the bus lanes are consistently lower than the levels recorded prior to installation, while the number of buses using each route has remained generally consistent over the surveyed years.

The August 2009 and 2010 results show the number of taxis recorded, since taxi travel times were added as part of the surveys. Taxis are not allowed to use the Victoria Street bus lane and were therefore not recorded for this location.

Some particular attention has been given to the Chaytor Street bus lane as motorists can use Birdwood Street as an alternative route to and from the city centre. This is not desirable given the more local access function of Birdwood Street compared to the primary route function of Chaytor Street. In order to monitor this, surveys have been undertaken to determine the percent split between the two routes, and to identify any shift in route preference arising from the introduction of the bus lane. The results are shown below:

	<b>7:00-9:30 TOTAL</b>	<b>PEAK 1 HOUR</b>	<b>PEAK 15 MINUTES</b>
<b>Birdwood Street</b>			
May 2002	725	379	100
July 2002	709	383	105
November 2002	748	389	108
April 2003*	714	336	111
July 2004	1,157	668	200
August 2005	834	443	128
August 2006	774	478	141
August 2007	830	403	114
August 2008	754	404	108
August 2009	851	446	121
August 2010	858	473	139
<b>Chaytor Street (South of Birdwood)</b>			
May 2002	2,708	1,920	356
July 2002	2,280	1,088	304
November 2002	2,517	1,230	335
April 2003*	2,517	1,161	340
July 2004	3,058	2,217	447
August 2005	2,543	1,842	399
August 2006	2,256	1,697	383
August 2007	2,615	1,230	321
August 2008	2,448	1,187	340
August 2009	2,591	1,246	322
August 2010	2,436	1,197	315
<b>Percent Using Birdwood Street</b>			
May 2002	21%	16%	22%
July 2002	24%	26%	26%
November 2002	23%	24%	24%
April 2003*	22%	22%	25%
July 2004	27%	23%	31%
August 2005	25%	19%	24%
August 2006	26%	22%	27%
August 2007	24%	25%	26%
August 2008	24%	25%	24%
August 2009	25%	26%	27%
August 2010	26%	28%	31%

**Table 3 : Birdwood Street and Chaytor Street Volumes**

\*Presence of roadworks may have affected results

These results suggest there has been only a minor shift in traffic re-routing from Chaytor Street to Birdwood Street following the introduction of the bus lane.

## 5. Cycle Volumes

The volumes of cyclists recorded at each of the five bus lane sites are shown below:

	<b>7:00 - 9:30 TOTAL</b>	<b>PEAK ONE HOUR</b>	<b>PEAK 15 MINUTES</b>
<b>Adelaide Road</b>			
May 2002	75	37	11
July 2002	59	35	12
November 2002	74	37	11
April 2003*	106	62	18
July 2004	78	54	15
August 2005	74	45	18
August 2006	118	68	24
August 2007	132	86	34
August 2008	106	67	22
August 2009	172	100	33
August 2010	100	58	22
<b>Chaytor Street</b>			
May 2002	52	33	11
July 2002	37	23	10
November 2002	44	29	10
April 2003*	53	33	11
July 2004	35	22	11
August 2005	55	35	14
August 2006	47	33	11
August 2007	64	38	14
August 2008	66	40	12
August 2009	69	42	14
August 2010	88	61	20
<b>Kaiwharawhara Road</b>			
May 2002	55	34	11
July 2002	38	26	9
November 2002	69	50	14
April 2003	83	57	17
July 2004	42	30	9
August 2005	85	60	17
August 2006	124	71	22
August 2007	96	63	22
August 2008	126	59	19
August 2009	133	90	27
August 2010	137	101	42

	<b>7:00 - 9:30 TOTAL</b>	<b>PEAK ONE HOUR</b>	<b>PEAK 15 MINUTES</b>
<b>Glenmore Street</b>			
July 2004	40	25	8
August 2005*	38	24	14
August 2006	32	28	12
August 2007	66	48	14
August 2008	60	42	13
August 2009	66	37	14
August 2010	58	39	15
<b>Victoria Street</b>			
July 2004	22	13	4
August 2005	23	13	5
August 2006	10	5	3
August 2007	21	10	5
August 2008	18	13	5
August 2009	15	10	4
August*	14	7	4

**Table 4 : Surveyed Cycle Volumes**

\*Presence of roadworks may have affected results

With the exception of Victoria Street, all of the sites have shown a generally increasing trend in cyclists using each road, from the time the surveys began. Victoria Street cycle volumes have remained comparatively small. The August 2010 surveys generally recorded similar cyclist numbers to the August 2009 surveys. Adelaide Road had significantly fewer cyclists in 2010, due wet weather during the survey period.

## 6. Pedestrian Volumes

The pedestrian volumes recorded at each site (excluding Victoria Street) are recorded in Table 5.

	<b>CROSSING ROAD</b>	<b>ON ADJACENT FOOTPATH</b>
<b>Adelaide Road</b>		
May 2002	553	226
July 2002	389	151
November 2002	465	358
April 2003*	558	296
July 2004	555	445
August 2005	556	461
August 2006	663	476
August 2007	602	464
August 2008	546	609
August 2009	552	791
August 2010	517	316
<b>Chaytor Street</b>		
May 2002	186	21
July 2002	173	43
November 2002	143	19
April 2003*	189	23
July 2004	104	29
August 2005	208	40
August 2006	218	63
August 2007	231	46
August 2008	258	62
August 2009	213	56
August 2010	313	50
<b>Kaiwharawhara Road</b>		
May 2002	0	28
July 2002	0	21
November 2002	2	33
April 2003	15	55
July 2004	11	64
August 2005	10	51
August 2006	8	55
August 2007	9	47
August 2008	18	61
August 2009	6	63
August 2010	7	57

Glenmore Street		
July 2004	N/A	87
August 2005*	N/A	101
August 2006	N/A	115
August 2007	N/A	98
August 2008	N/A	49
August 2009*	N/A	37
August 2010	N/A	22

**Table 5 : Surveyed Pedestrian Volumes**

\*Presence of roadworks may have affected results

The level of pedestrian activity is usually predisposed to weather conditions and in the case of Adelaide Road and Chaytor Street, University activity.

The 2010 survey results for Chaytor Street and Kaiwharawhara Road continue to show a generally increasing trend of pedestrian activity since the original surveys were performed in May 2002. Kaiwharawhara Road recorded pedestrian numbers marginally lower than recent years but still larger than when the bus lane was introduced in 2002.

The 2010 Adelaide Road surveys were undertaken in cold, rainy conditions which, in a similar manner to the cyclist volumes is clearly reflected by the lower pedestrian count walking along the footpath. Glenmore Street continued its trend of decreasing pedestrian numbers, returning the lowest number yet surveyed.

## 7. Land Use Information

Detailed listings of the observed land use activities and building occupancy adjacent to Adelaide Road and Kaiwharawhara Road are provided in Appendix A.

### 7.1 Adelaide Road

In May 2002, 45 businesses and five vacant buildings were recorded adjacent to the then proposed bus lane. These businesses were made up of a combination of retail and office activities. Since the original survey was performed, 41 new office and retail activities have been established, either replacing existing businesses or occupying vacant premises. At the time of the 2010 surveys, three premises were vacant.

It is not apparent whether any of these changes have arisen due to the implementation of the bus lane. Nevertheless, it is clear that the implementation of the bus lane has not had a negative effect on businesses choosing to locate in this area.

### 7.2 Kaiwharawhara Road

The May 2002 surveys found that 40 businesses existed adjacent to the then proposed bus lane along Kaiwharawhara Road. Changes since the original survey show that 36 new businesses have opened along this section of road, while eight premises are currently vacant.

Again, and with the continued establishment and some turnover of commercial and retail activity in the area, the bus lane is considered to have had no detrimental effect to the desire for business activities to locate along Kaiwharawhara Road.

## 8. 'Before' Bus Lane Implementation

With respect to vehicle travel times along the bus routes, it is first noted that the surveys undertaken prior to implementation of the bus lanes were completed in May 2002 for the Adelaide Road, Chaytor Street and Kaiwharawhara Road routes, in July 2004 for the Glenmore Street route, and in August 2010 for the central city route. No similar surveys were undertaken before the Dixon-Victoria-Manners Streets traffic restrictions were put in place.

### 8.1 Adelaide Road, Chaytor Street, Kaiwharawhara Road and Glenmore Street

The results of the initial surveys conducted in 2002 and 2004 are shown below, with the duration of peak defined as the time for which notable queues were observed and during which travel times increased above the free-flowing times.

	ADELAIDE ROAD	CHAYTOR STREET	KAIWHARAWHARA ROAD	GLENMORE STREET
Peak hour flow rate (vph)	1,366	911	1,362	951
Duration of Peak (mins)	44	63	39	62
Car free flowing time (secs)	48	54	126	50
Average car travel time during peak (secs)	242	136	194	91
Maximum car travel time (secs)	360	230	266	146
Average car delay (secs)	194	82	68	41
Maximum car delay (secs)	312	176	140	96
Bus free flowing time (secs)	66	65	132	57
Average bus travel time during peak (secs)	207	154	197	104
Maximum bus travel time (secs)	317	224	314	151
Average bus delay (secs)	141	89	65	47
Maximum bus delay (secs)	251	159	182	94

**Table 6 :Surveyed Travel Times Before Implementation of Bus Lanes**

As can be seen from the initial results, the duration of peak varied by site from 39 minutes on Kaiwharawhara Road to 63 minutes on Chaytor Street.

From the comparisons of free-flow travel times it can be seen that the delays for both cars and buses were variable, with average car delays of 194 seconds per vehicle for Adelaide Road, 82 seconds per vehicle for Chaytor Street, 68 seconds per vehicle for Kaiwharawhara Road and 41 seconds per vehicle for Glenmore Street. Average bus delays were similar by site, with 141, 89, 65 and 47 seconds per bus respectively.

As shown in Table 6, bus travel times during peak periods on Adelaide Road prior to the implementation of the bus lane were on average less than car travel times. This was probably due to the observation that the queues in the left lane were shorter than those in the right, and as buses always travelled in the left lane their travel times were shorter on average than the private vehicles.

The results of the 'before' surveys for these four routes are shown graphically in Appendix B and fully tabulated in Appendix C.

## 8.2 Central City Route

In the August 2010 round of surveys a new route through the central city was surveyed, ahead of the future rerouting of buses through Manners Mall. These surveys recorded times that buses took to travel between the Allen Street stops on Courtenay Place and the Chews Lane stops on Willis Street. Buses travelling in both directions were recorded and the times that buses were stopped at bus stops were surveyed and subtracted from the total time, to give a travel time. No cars or taxis were surveyed.

The surveys were undertaken on four separate occasions, comprising two morning peak periods (7:00-9:30am) and two afternoon peak periods (4:00-6:30pm). They were undertaken on three consecutive Wednesdays as follows:

- Wednesday 4 August 2010, afternoon surveyed
- Wednesday 11 August 2010, morning and afternoon surveyed
- Wednesday 18 August 2010, morning surveyed.

The observed travel times are shown in Table 7 below. Travel times have been averaged over the entire 2.5 hour survey period, rather than just a shorter peak period as determined for the other routes. This is because the presence of some existing bus lanes and bus priority at signals lessens the effect of congestion along this route, and the bus travel times showed no obvious peak period. Therefore, the whole 2.5 hours survey period has been used in the analysis.

	NORTHBOUND				SOUTHBOUND			
	AM		PM		AM		PM	
	1	2	1	2	1	2	1	2
Bus free flowing time (secs)	205	205	205	205	180	180	180	180
Average bus travel time (secs)	352	258	403	373	272	259	303	281
Maximum bus travel time (secs)	638	418	602	840	664	365	439	425
Average bus delay (secs)	147	53	198	168	92	79	123	101
Maximum bus delay (secs)	433	213	397	635	484	185	259	245

**Table 7: Surveyed Travel Times Through Central City Before Manners Street Bus Route**

The northbound route is slightly longer and therefore has a longer travel time than the southbound route. The evening peak period experiences longer travel times in both directions than the morning peak.

## 9. 'After' Bus Lane Implementation

The corresponding 'after' bus lane implementation travel time surveys have been undertaken from July 2002 and subsequently annually to August 2010 for Adelaide Road, Chaytor Street and Kaiwharawhara Road. 'After' surveys have been undertaken annually from 2005 to 2010 for Glenmore Street, since the initial 'before' survey in July 2004. Annual 'after' surveys have been undertaken on Victoria Street since July 2004. As noted earlier, no 'before' surveys were undertaken on the Victoria Street route prior to the introduction of the traffic restrictions and bus lane.

As in the August 2009 surveys taxi travel times were also measured, but in the August 2010 surveys these have been split to record those that used the bus lane, and those that used the traffic lane.

The results are shown graphically in Appendix B and as fully tabulated results in Appendix C. A summary for each location follows.

## 9.1 Adelaide Road

The results of the most recent five years of 'after' surveys for Adelaide Road are presented below:

BUS LANE IMPLEMENTATION	BEFORE	AFTER				
	May 2002	August 2006	August 2007	August 2008	August 2009	August 2010
Peak hour flow rate (vph)	1,366	1,307	1,183	1,093	1,137	935
Duration of Peak (mins)	44	45	38	42	44	54
Car free flowing time (secs)	48	48	48	48	48	48
Average car travel time during peak (secs)	242	117	80	92	124	79
Maximum car travel time (secs)	360	242	230	254	273	109
Average car delay (secs)	194	69	32	44	76	31
Maximum Car Delay (secs)	312	194	182	206	225	61
Bus free flowing time (secs)	66	66	66	66	66	66
Average bus travel time during peak (secs)	207	114	78	72	92	79
Maximum bus travel time (secs)	317	216	139	132	139	188
Average bus delay (secs)	141	48	12	6	26	13
Maximum bus delay (secs)	251	150	73	66	73	122
Taxis using traffic lane						
Taxi free flowing time (secs)					48	48
Average taxi travel time during peak (secs)					110	91
Maximum taxi travel time (secs)					242	220
Average taxi delay (secs)					62	43
Maximum taxi delay (secs)					194	172
Taxis using bus lane						
Taxi free flowing time (secs)	-	-	-	-	-	48
Average taxi travel time during peak (secs)	-	-	-	-	-	74
Maximum taxi travel time (secs)	-	-	-	-	-	79
Average taxi delay (secs)	-	-	-	-	-	26
Maximum taxi delay (secs)	-	-	-	-	-	31

**Table 8 : Surveyed Travel Times - Adelaide Road**

As shown, a general reduction in average travel time for both buses and cars has been consistently recorded in all the 'after' surveys, confirming the benefits of the bus lane.

Table 8 shows that over the last five 'after' surveys the average car travel time during the peak period has varied between 79 and 124 seconds, with the 2010 times being significantly lower than the travel times recorded before the bus lane was installed. The average bus travel times range from 72 to 114 seconds over the last five years, again showing a marked decrease on the 207 seconds recorded during the May 2002 survey. As shown in Table 2, most taxis were observed to use the traffic lane, despite those using the bus lane having lower travel times. This pattern was seen across all four sites where taxis were surveyed.

## 9.2 Chaytor Street

The results of the most recent five years of 'after' surveys for the Chaytor Street bus lane are tabulated below:

BUS LANE IMPLEMENTATION	BEFORE	AFTER				
	May 2002	August 2006	August 2007	August 2008	August 2009	August 2010
Peak hour flow rate (vph)	911	755	834	789	800	730
Duration of peak (mins)	63	70	76	53	54	74
Car free flowing time (secs)	54	54	54	54	54	54
Average car travel time during peak (secs)	136	99	104	153	172	162
Maximum car travel time (secs)	230	137	159	247	270	263
Average car delay (secs)	82	45	50	99	118	108
Maximum car delay (secs)	176	83	105	193	216	209
Bus free flowing time (secs)	65	65	65	65	65	65
Average bus travel time during peak (secs)	154	70	96	105	105	102
Maximum bus travel time (secs)	224	118	172	145	144	163
Average bus delay (secs)	89	5	31	40	40	36
Maximum bus delay (secs)	159	53	107	80	79	98
Taxis using traffic lane						
Taxi free flowing time (secs)	-	-	-	-	54	54
Average taxi travel time during peak (secs)	-	-	-	-	110	123
Maximum taxi travel time (secs)	-	-	-	-	199	190
Average taxi delay (secs)	-	-	-	-	56	69
Maximum taxi delay (secs)	-	-	-	-	145	136
Taxis using bus lane						
Taxi free flowing time (secs)	-	-	-	-	-	54
Average taxi travel time during peak (secs)	-	-	-	-	-	76
Maximum taxi travel time (secs)	-	-	-	-	-	76
Average taxi delay (secs)	-	-	-	-	-	22
Maximum taxi delay (secs)	-	-	-	-	-	22

**Table 9: Surveyed Travel Time - Chaytor Street**

As shown, the average car travel times have fluctuated above and below the May 2002 result. The last three years' surveys have all recorded similar average car travel times between 153 and 172 seconds, compared to the May 2002 time of 136 seconds.

The average bus travel times recorded during the most recent five 'after' surveys are all lower than those recorded during the 'before' survey of 2002, and have recently been lower than the average car travel times, confirming the benefits of the Chaytor Street bus lane. Taxis using the

traffic lane again had slightly higher travel times than buses, but not as high as cars, with just one taxi observed using the bus lane during the peak.

### 9.3 Kaiwharawhara Road

The results of corresponding surveys for Kaiwharawhara Road are summarised in Table 10.

BUS LANE IMPLEMENTATION	BEFORE	AFTER				
	May 2002	August 2006	August 2007	August 2008	August 2009	August 2010
Peak hour flow rate (vph)	1,362	1,212	1,191	1,226	1,289	1,314
Duration of peak (mins)	39	37	58	56	53	56
Car free flowing time (secs)	126	126	126	126	126	126
Average car travel time during peak (secs)	194	161	170	185	146	169
Maximum car travel time (secs)	266	209	240	205	242	226
Average car delay (secs)	68	35	44	59	20	43
Maximum car delay (secs)	140	83	114	79	116	100
Bus free flowing time (secs)	132	132	132	132	132	132
Average bus travel time during peak (secs)	197	113	168	194	157	158
Maximum bus travel time (secs)	314	217	233	222	199	182
Average bus delay (secs)	65	0	36	62	25	26
Maximum bus delay (secs)	182	85	101	90	67	50
Taxis using traffic lane						
Taxi free flowing time (secs)	-	-	-	-	126	126
Average taxi travel time during peak (secs)	-	-	-	-	165	200
Maximum taxi travel time (secs)	-	-	-	-	191	217
Average taxi delay (secs)	-	-	-	-	39	74
Maximum taxi delay (secs)	-	-	-	-	65	91
Taxis using bus lane						
Taxi free flowing time (secs)	-	-	-	-	-	126
Average taxi travel time during peak (secs)	-	-	-	-	-	179
Maximum taxi travel time (secs)	-	-	-	-	-	180
Average taxi delay (secs)	-	-	-	-	-	53
Maximum taxi delay (secs)	-	-	-	-	-	54

**Table 10 : Surveyed Travel Times - Kaiwharawhara Road**

As shown, the average car travel times have all been lower in the 'after' surveys than in May 2002. Similarly, the average bus travel times have remained similar to or lower than the May 2002 results. Taxi travel times were slightly higher than both car and bus travel times, due principally to the small number of taxis recorded as travelling the full length of the survey site.

## 9.4 Glenmore Street

Results for the 2004 'before' survey along with the most recent five years of 'after' surveys are shown in Table 11.

BUS LANE IMPLEMENTATION	BEFORE	AFTER				
	July 2004	August 2006	August 2007	August 2008	August 2009	August 2010
Peak hour flow rate (vph)	951	660	650	615	602	540
Duration of peak (mins)	62	37	56	53	47	50
Car free flowing time (secs)	50	50	50	50	50	50
Average car travel time during peak (secs)	91	214	87	141	238	656
Maximum car travel time (secs)	146	390	236	280	425	911
Average car delay (secs)	41	164	37	91	188	606
Maximum car delay (secs)	96	340	186	230	375	861
Bus free flowing time (secs)	57	57	57	57	57	57
Average bus travel time during peak (secs)	104	130	88	100	132	220
Maximum bus travel time (secs)	151	216	145	162	173	313
Average bus delay (secs)	47	73	31	43	75	163
Maximum bus delay (secs)	94	159	88	105	116	256
Taxis using traffic lane						
Taxi free flowing time (secs)					50	50
Average taxi travel time during peak (secs)					118	386
Maximum taxi travel time (secs)					141	589
Average taxi delay (secs)					68	336
Maximum taxi delay (secs)					91	539
Taxis using bus lane						
Taxi free flowing time (secs)						50
Average taxi travel time during peak (secs)						327
Maximum taxi travel time (secs)						327
Average taxi delay (secs)						277
Maximum taxi delay (secs)						277

**Table 11 : Surveyed Travel Times - Glenmore Street**

As shown above, the average travel time for cars has fluctuated considerably across the survey rounds undertaken so far, with the most recent survey presenting a notably higher average travel time than any of the previous surveys, reflecting the considerable congestion experienced during the survey. The last four surveys have followed a trend of increasing travel times, which needs to be closely monitored.

Average travel times for the buses remain noticeably shorter than those of the private vehicles, reflecting the beneficial effect of the bus lane which is providing some consistency in bus travel times along the route. Again, the longer average travel time shown for 2010 reflects the congestion on Glenmore Street prior to the bus lane.

Taxi travel times were lower for those that used the bus lane, although it is again noted that most of the taxis were observed to use the traffic lane.

## 9.5 Victoria Street

No 'before' surveys were undertaken on the Victoria Street route. 'After' surveys have been undertaken since 2004, with the five most recent rounds shown in Table 12.

BUS LANE IMPLEMENTATION	AFTER				
	August 2006	August 2007	August 2008	August 2009	August 2010
Peak hour flow rate (vph)	401	379	382	371	182
Duration of peak	52	48	55	59	51
Bus free flowing time (secs)	45	45	45	45	45
Average bus travel time during peak (secs)	267	192	169	258	227
Maximum bus travel time (secs)	361	482	317	453	451
Average bus delay	222	147	124	213	182
Maximum bus delay	316	437	272	408	406

**Table 12 : Surveyed Travel Times of Victoria Street**

Access to Victoria Street between Dixon Street and Manners Street is restricted to buses and other authorised vehicles during the surveyed period. As such, private vehicles and taxis were not recorded along this route. From the results shown in Table 12, it is seen that bus travel times fluctuate considerably, with the 2010 results giving average times midway between those observed in 2009 and 2008.

It is noted that roadworks relating to the construction of bus lanes through Manners Mall restricted access into Manners Street during the surveys. Vehicles travelling south along Victoria Street were unable to turn right into Manners Street as they usually are, resulting in a lower flow rate than other years.

## 10. Illegal Bus Lane Use

Any illegal use of the existing bus lanes in Adelaide Road, Chaytor Street, Kaiwharawhara Road, Glenmore Street and Victoria Street was also recorded. These results are shown below for the five most recent surveys.

### 10.1 Adelaide Road

The results of the Adelaide Road survey are shown in Table 13:

MOVEMENT	AUGUST	AUGUST	AUGUST	AUGUST	AUGUST
	2006	2007	2008	2009	2010
Unauthorised vehicles observed	147/2,771 = 5%	80/2,428 =3%	69/2,248 =3%	146/2,430 =6%	34/2,035 =2%
Proportion using entire bus lane	10%	20%	4%	13%	59%
Proportion using at least half of the bus lane	23%	34%	39%	43%	97%
Proportion using bus lane at turning lane	N/A	N/A	N/A	N/A	N/A

**Table 13: Surveyed Illegal Vehicles at Adelaide Road**

The number of vehicles illegally using the Adelaide Road bus lane has fluctuated over the survey rounds, although the proportion of illegal vehicles has remained under 10% throughout. A slightly lower number of offending vehicles have been observed during the latest 2010 surveys, but the number using at least half or all of the bus lane illegally has remained similar to 2009. These patterns need to be continuously monitored.

### 10.2 Chaytor Street

The corresponding results for Chaytor Street are shown below.

MOVEMENT	AUGUST	AUGUST	AUGUST	AUGUST	AUGUST
	2006	2007	2008	2009	2010
Unauthorised vehicles observed	20/1,482 =1%	26/1,785 =1%	155/1,694 =9%	184/1,740 =11%	211/1,584 =13%
Proportion using entire bus lane	0%	0%	0%	0%	0%
Proportion using at least half of the bus lane	0%	0%	3%	4%	9%
Proportion using bus lane at turning lane	100%	100%	97%	96%	99%

**Table 14 :Surveyed Illegal Vehicles at Chaytor Street**

As with Adelaide Road, the proportion of offending vehicles using the Chaytor Street bus lane has varied over time. The August 2010 surveys revealed a higher proportion of offenders in comparison to previous surveys, continuing an upward trend seen since 2006. Almost all of these offending vehicles use the bus lane for only a short distance before turning left. These changes need to be closely monitored through future surveys.

The large number of vehicles using the bus lane to access Raroa Road reduces queuing on Chaytor Street and continues to be a positive outcome of the implementation of the bus lane.

### 10.3 Kaiwharawhara Road

The results from the Kaiwharawhara Road survey are detailed below:

MOVEMENT	AUGUST 2006	AUGUST 2007	AUGUST 2008	AUGUST 2009	AUGUST 2010
Unauthorised vehicles observed	13/2,248 =0.6%	19/2,239 =0.8%	48/2,308 =2%	94/2,376 =4%	39/2,381 =2%
Proportion using entire bus lane	0%	0%	19%	15%	74%
Proportion using at least half of the bus lane	23%	47%	44%	53%	87%
Proportion using bus lane at turning lane	N/A	N/A	N/A	N/A	N/A

**Table 15 : Surveyed Illegal Vehicles at Kaiwharawhara Road**

As can be seen from the table, the proportion of offending vehicles has remained consistently low throughout the surveys. The August 2010 results show a lower number of offenders than in the previous two years, breaking a trend of increasing levels of offenders seen since 2006. However, the results also show an increase in the number of vehicles using the full length of the bus lane illegally. It is important that rates of offending are closely monitored, to identify whether this trend resumes in future.

### 10.4 Glenmore Street

The results of the Glenmore Street illegal offender surveys are displayed below:

MOVEMENT	AUGUST 2006	AUGUST 2007	AUGUST 2008	AUGUST 2009	AUGUST 2010
Unauthorised vehicles observed	50/1,466 = 3%	2/1,349 = 0.1%	3/1,408 =0.2%	0/1,366 =0%	4/1,120 =0.4%
Proportion using entire bus lane	0%	0%	0%	N/A	50%
Proportion using at least half of bus lane	58%	100%	33%	N/A	75%
Proportion using bus lane at turning lane	N/A	N/A	N/A	N/A	N/A

**Table 16 : Surveyed Illegal Vehicles at Glenmore Street**

As shown, the results from the surveys at Glenmore Street have been consistently low. The August 2010 surveys show that this trend is continuing.

## 10.5 Victoria Street

The results from the Victoria Street Surveys are summarised in Table 17.

<b>MOVEMENT</b>	<b>AUGUST 2006</b>	<b>AUGUST 2007</b>	<b>AUGUST 2008</b>	<b>AUGUST 2009</b>	<b>AUGUST 2010</b>
Unauthorised vehicles observed entering Victoria Street from Dixon Street to Manners Street	108/963 =11%	98/871 =11%	90/839 =11%	108/891 =12%	95/399 =24%

**Table 17 : Surveyed Illegal Vehicles at Victoria Street**

The August 2010 results were affected by roadworks, as noted earlier. It can be seen that the total number of offending vehicles observed in the August 2010 surveys was similar to previous years, but the low volume of other through traffic distorts the percentage to a much higher value than in previous years.

## 11. Summary

An overall summary of the detailed results and findings presented in this report on the changes that have emerged since introduction of the bus lanes, can be described as follows:

### 11.1 Traffic Volumes

The measured total traffic volumes at all of the sites are lower in 2010 than when first recorded, and traffic volumes on Adelaide Road and Glenmore Street were the lowest recorded since the surveys began. Victoria Street also had the lowest recorded traffic volume yet recorded, although this was affected by road works limiting entry into Manners Street.

The number of buses recorded at each of the sites in August 2010 was found to be consistent with volumes recorded in previous surveys.

### 11.2 Cycle Volumes

The number of cyclists recorded during the 2010 surveys are in line with a trend of generally increasing cycle volumes. This increase in cycle popularity is also reflected in the separate Commuter Cycle Surveys undertaken during March of each year.

### 11.3 Pedestrian Volumes

The Adelaide Road surveys recorded low pedestrian numbers, due to inclement weather conditions. The numbers of pedestrians recorded along Chaytor Street were the highest seen since the surveys began in 2002. The Kaiwharawhara Road results show pedestrian numbers similar to previous years, while Glenmore Street recorded the lowest pedestrian numbers since the surveys began in 2004.

### 11.4 Adjacent Land Use

There has been a small number of changes to the adjacent land use and building occupancy along Adelaide Road and Kaiwharawhara Road with no significant change in occupied tenancies.

### 11.5 Travel Times

The 2010 average travel times for cars and buses on Adelaide Road continue to be notably lower than those recorded during the 2002 'before' surveys. The average taxi time was slightly lower for those that used the bus lane, and similar to both the average car and bus average travel times.

The average travel time for buses on the Victoria Street route was slightly lower than last year's result.

The 2010 surveys recorded average car and bus travel times on Chaytor Street to be similar to recent years' travel times. The average car time is higher than what was recorded in the 'before' surveys in 2002, while the average bus travel time is lower. Taxis using the traffic lane had an

average travel time lower than cars but higher than buses, while those using the bus lane had a lower travel time than both cars and buses, on average, reflecting the very low taxi volumes.

The average travel times for Kaiwharawhara Road were found to be similar to previous years, and again noticeably lower than those recorded in the 'before' surveys. The average taxi travel times were higher than both cars and buses for those taxis using the bus lane or the traffic lane.

The average car travel times for Glenmore Street have fluctuated considerably over the years, with the 2010 result being much higher than any previously recorded time, due to heavier congestion during the survey. The average bus travel time was also longer than other years but still substantially less than car travel times. Average taxi travel times were lower than cars but higher than buses, with those using the bus lane slightly lower than those using the traffic lane.

## 11.6 Illegal Bus Lane Use

Generally the results of the 2010 illegal offender surveys continue to show a low proportion of offending vehicles, which are unlikely to be affecting the operation of the bus lanes. However, the recent observations have also indicated a presence of more vehicles using the full lane illegally. Ongoing monitoring of these changing behaviours should focus on Adelaide Road, Kaiwharawhara Road and Victoria Street in particular.

The 2010 surveys on the most part have shown evidence of the continued benefits the bus lanes are providing. Future surveys will serve to determine continuation of this positive outcome.

Traffic Design Group Ltd  
August 2010

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## Appendix A

### Land Uses in Adelaide Road and Kaiwharawhara Road

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## Adelaide Road Land Uses

Street Number	Trading Name	Business	Approx Opening Date	Changes up to November 2002	Changes up to April 2003	Changes up to August 2004	Changes up to August 2005	Changes up to August 2006	Changes up to August 2007	Changes up to August 2008	Changes up to August 2009	Changes up to August 2010
2	Zookenee	Hair Salon	1993									
2A	Empty (old building)	Retail		Brian's Lunch Bar		Gallery & Crafts		Missy C's (Retail)			Paint Tech	
4 to 8	Marketing Impact	Offices	1999									
10	McDonalds	Restaurant, Takeaway	1996									
20	Basin Café	Café, Takeaway										Basin Noodle House
22	Boyle Kawasaki	Sales, repairs	1950									
28	Caltex	Service Station	1980									
42	Driving Sound	Retail, installation	1996									Extreme Automotive
48	S Joseph Ltd	Furniture	1999					Aarque Graphics				
48	Soccer Wellington	Offices	2000			Empty	Visual Group Technological Services	Visual Group			Survey Lab	
52	Cory's	Under Construction					HP Service Centre	HP Service			Stewarts electrical	
58		Electrical Wholesale	1995								Stewarts electrical	
58		Retail								Super Loans		
62	Empty	Offices		Varsity Villas (Accom)	Xtra Cash Loans					Empty		
64	Empty (Construction)										unknown offices	
66	Pizza Hut	Takeaway	1995									
80		Manufacturing								CGM Architecture		
80	Guthrie Bowron	Retail	2002							Rubber Monkey		
76 to 80	Webster's	Framing	1996						The Plumbing Store			
84	Space Station	Storage	1997								Storage King	
102	No-Name	Building Recyclers	1994				Empty					
102	Empty (Doctors)	Medical				Sleep Wake Research						

Street Number	Trading Name	Business	Approx Opening Date	Changes up to November 2002	Changes up to April 2003	Changes up to August 2004	Changes up to August 2005	Changes up to August 2006	Changes up to August 2007	Changes up to August 2008	Changes up to August 2009	Changes up to August 2010
						Centre						
		Research								Building Research Capability in the Social Society		
102	State Insurance	Claims Assessors	1993			Maori Health Research Centre						
102		Medical				Centre For Public Health Research						
102	Massey University	Offices	2000									
102	Hutcheson Bowman & Stewart	Printers	2000						University of Otago School of Medicine			
1	Caledonian Hotel	Bar	1950								Empty	
13	Art for Arts Sake	Retail	1970				Dairy		Art for Arts Sake	Somer Web Design and Development		
15		Restaurant, Takeaway								Chilli Jam Riceburgers		Jack's Bakery
17	Urgent Medical Centre	Medical	1990									
17	After-hours Pharmacy	Medical	1990									
17	Sexual Health Clinic	Medical	2000									
17	Wakefield Radiology	Medical	1990									Pacific Radiology
23	Inhabit	Furniture	1991									
23	NZ Print	Printers	1995									
	The Body Shop	Offices				Empty	Dept of Corrections					
37 to 41	Firestone	Retail, installation	1987									
45 to 55	BP	Service Station	1992									
59	Video Ezy	Retail	1999							Newbolds (additional showroom space)	LV Martin	
59 to 73	Newbolds	Retail	1994								LV Martin	

Street Number	Trading Name	Business	Approx Opening Date	Changes up to November 2002	Changes up to April 2003	Changes up to August 2004	Changes up to August 2005	Changes up to August 2006	Changes up to August 2007	Changes up to August 2008	Changes up to August 2009	Changes up to August 2010
77	Berben Motors	Mechanic	2001				John Calvert Joiner					
81 to 83	Smith and Smith	Glass	1994									
80	Catholic Supplies	Retail					Baby Star					
97	Empty (OFE)	Retail	2002	Connect								
	Carpark											
113	Sport Wellington Region	Offices										
113	Netball Wellington Region	Offices										
113	Smokefree Netball Development Officer	Offices								Wellington Yachting Development	Netball Wellington Centre	
113	Squash Wellington Development Officer	Offices										
113	College Sport Wellington	Offices										
113	Wellington Rugby Football Union	Offices	1997									
113	Association of Blind Citizens of NZ	Offices										
113	Property Management, The Bledisloe Estate Trust	Offices										
113		Offices								Bowls Wellington		
113		Offices								Boxing new Zealand		
121	Fertility Associates	Medical	1997									Royal Foundation for the Blind
121	Royal Foundation for the Blind	Offices	1993									

## Kaiwharawhara Road Land Uses

Street Number	Trading Name	Business	Approx Opening Date	Changes up to 20 Nov 2002	Changes up to March 2003	Changes up to August 2004	Changes up to August 2005	Changes up to August 2006	Changes up to August 2007	Changes up to August 2008	Changes up to August 2009	Changes up to August 2010
	Waterworks	Utility										
8	Tile'N'Save	Retail							Tile World			
8		Offices	2000						Synapse Group	Empty		
	Backhouse Interiors	Retail	2002									
16	What's On Report	Offices	1991									
	Tracer Interiors	Offices	1998						Precision Dental Group			
18		Offices	2007						Apex Electrical and Communications Ltd, Tracer Interiors and Construction Ltd			
22		Offices	2010									HBO and EMTB
22		Offices	2010									Pioneer Finance
22												Empty
34	Coffee Supreme	Manufacturing	1994						Empty			
	Courier Post	Warehouse	2001									
	Mobil Oil	Utility										
1	Carlton Hire	Warehouse	1999			Molesworth Fruit Supply, NZCU's						Empty
5		Retail		Brian Park, Office Furniture (showroom)								
7	Microwave Systems Ltd	Retail, Office	1980									
9 to 13	Dayal Holdings	Office							Body Shop			
15	AH Wong Panel & Paint	Automotive	1992			Empty			The Organic Grocer			Tile Direct
17	Tilecraft	Showroom	2001						Mission Hall Creative			

Street Number	Trading Name	Business	Approx Opening Date	Changes up to 20 Nov 2002	Changes up to March 2003	Changes up to August 2004	Changes up to August 2005	Changes up to August 2006	Changes up to August 2007	Changes up to August 2008	Changes up to August 2009	Changes up to August 2010
	Karcher	Office							Empty		Window Cleaning	Paramount Services
	Neon Illuminated Images	Office							Empty		Window Cleaning	Empty
19 to 25	Harding Electrical Ltd	Office	1988						Window Cleaning			
33/1A	Apple Jacks	Takeaway	1996									
33/1B	Manchester Property Care	Office	1992						Pontifical Mission Aid Societies			
33/1C	C L Dentice	Offices	1995					Serials Safety, Concrete Solutions				Advanced Portable Technologies
33/2A		Offices								Headland group LTD		Xuru: Xerox Gurus
33/2B	Arjay Residential											
33/2C	Cavalier Bremworth	Showroom	2000						Goeff Fieberg Furniture			
33/3A	Coolzone	Offices	1995									
33/3B		Offices								RFD Marine and Aerospace Survival Systems		
33/4A	Cascade Consulting	Offices									Encompass Group	
33/4A	Prime Community Trust	Offices									Encompass Group	
33/4A	The Phoenix Trust	Offices									Encompass Group	
33/4A	Pelorus Trust	Offices									Encompass Group	
33/4A	Waikanae Community Trust	Offices									Encompass Group	
33/4B	Expressions Ltd	Florist	1999						Encompass Group			Prendos Surveyors
33/5A		Offices	2007						ISS Facility Services			Empty
33/5B	Golden Horn Sound	Offices	1998				Oceania Sound, The Dishwasher & Rangehood Centre Ltd					Ludlow Builders

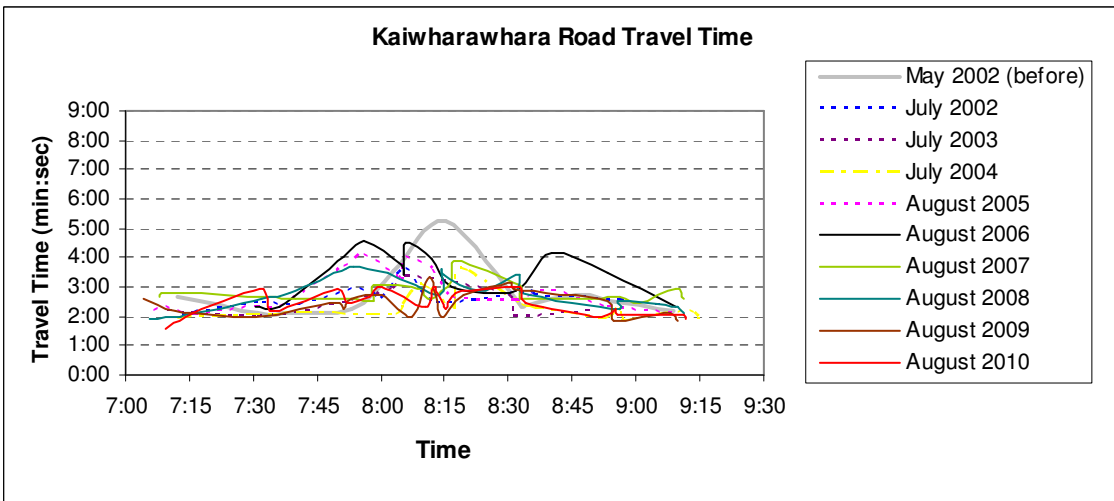
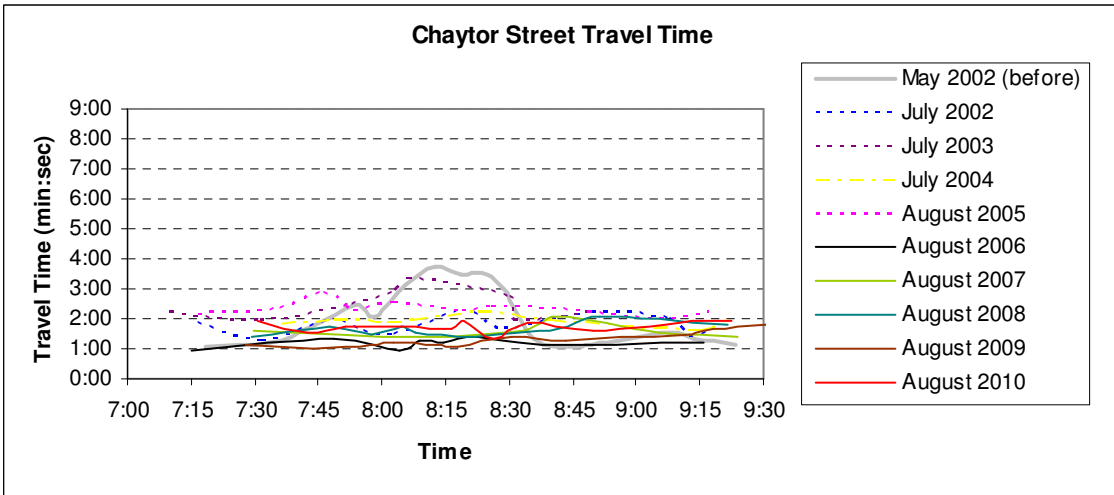
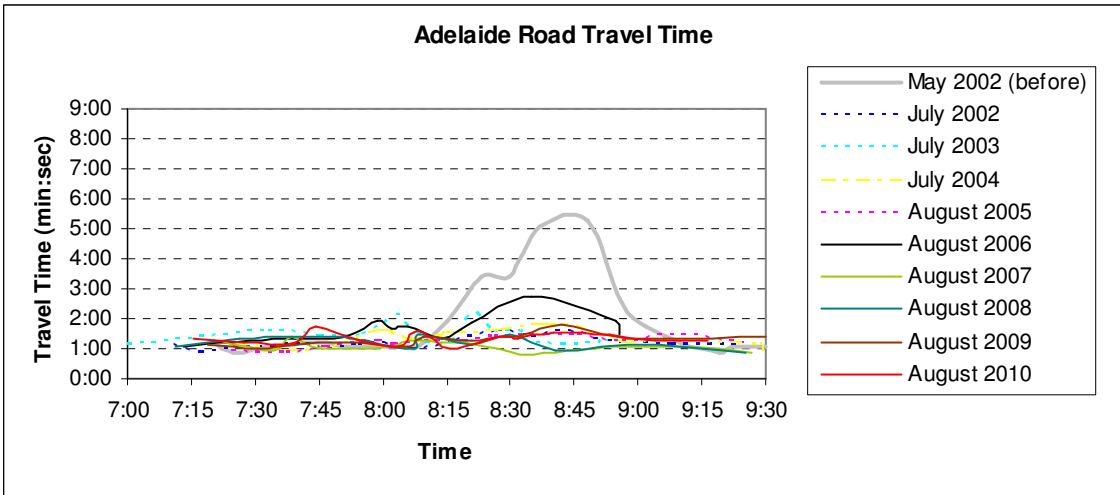
Street Number	Trading Name	Business	Approx Opening Date	Changes up to 20 Nov 2002	Changes up to March 2003	Changes up to August 2004	Changes up to August 2005	Changes up to August 2006	Changes up to August 2007	Changes up to August 2008	Changes up to August 2009	Changes up to August 2010
33/5C	The Roadshow	Offices										
33/5D	Mercury Projects Ltd	Offices	1997					Empty	World Music Group		Vision Media Systems	SOTA Digital
33/6C	Eftpos Ltd	Retail						Empty	Kresta Blinds and Curtains			
33/6D												
33/E	Floor Talks	Showroom	2001						Empty			Concrete Solutions
33/6F	The House of Clay	Retail	1996	Hilti (NZ) Ltd								
33/6G		Retail							Kresta Blinds and Curtains			
33/6H	Arjay Residential	Offices	1996							Empty		
33/7A	Tile Warehouse	Showroom	1997									
33/7B	A J Beck & Co	Retail			Showroom							
33/7C	Microlene (Davey Water Products)	Retail	2000									
33/7C	Hooper & Lndon	Office							Empty			Davey Water Products
33/7D		Retail							Ultra Screen			
33/7E		Retail								The Dominion Post		Empty
	Mobil Oil	Utility										

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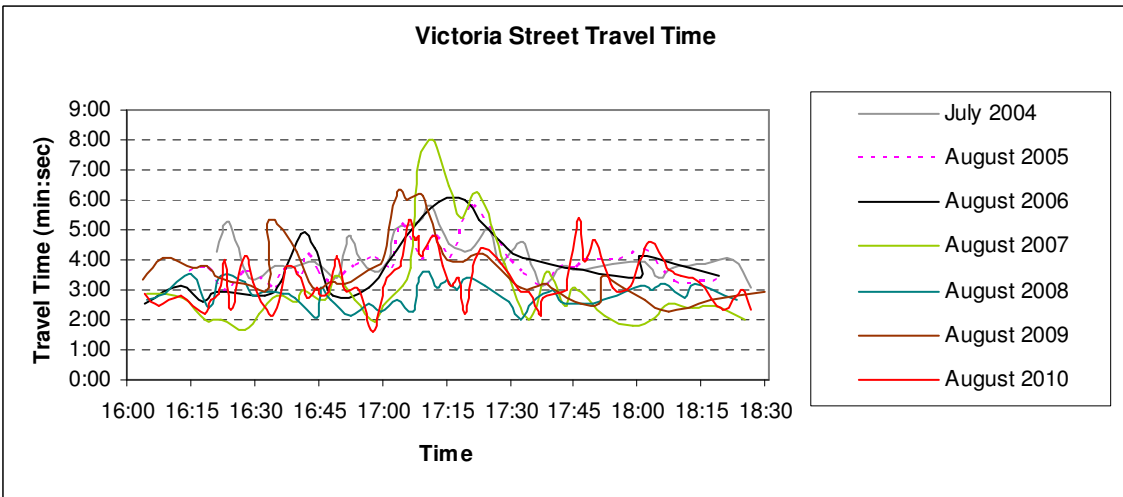
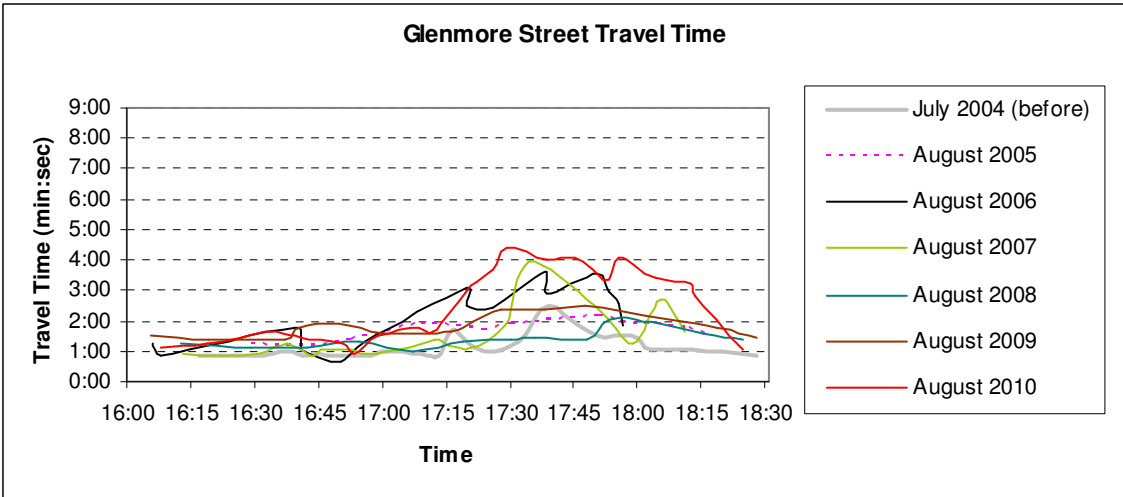
## Appendix B

### Car and Bus Travel Time Graphs

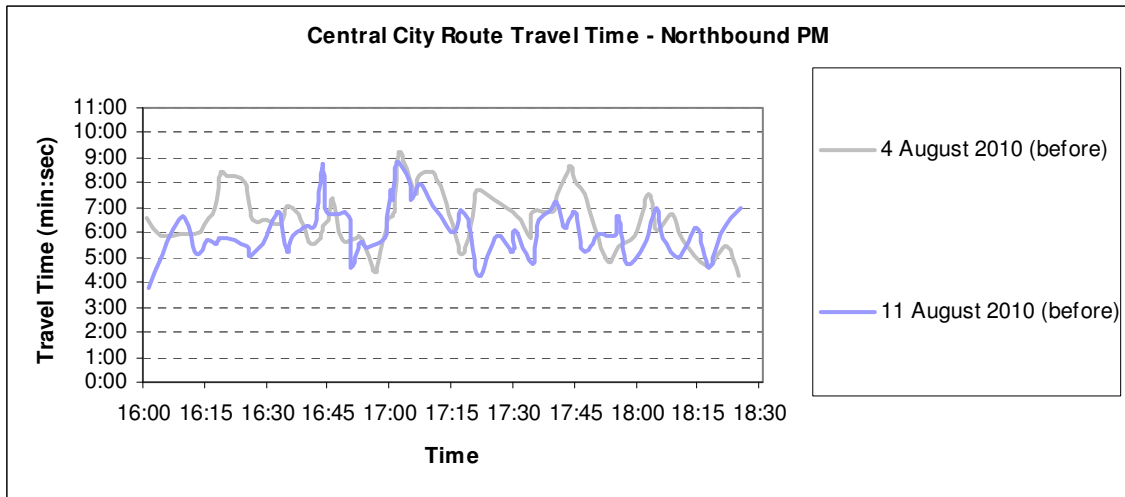
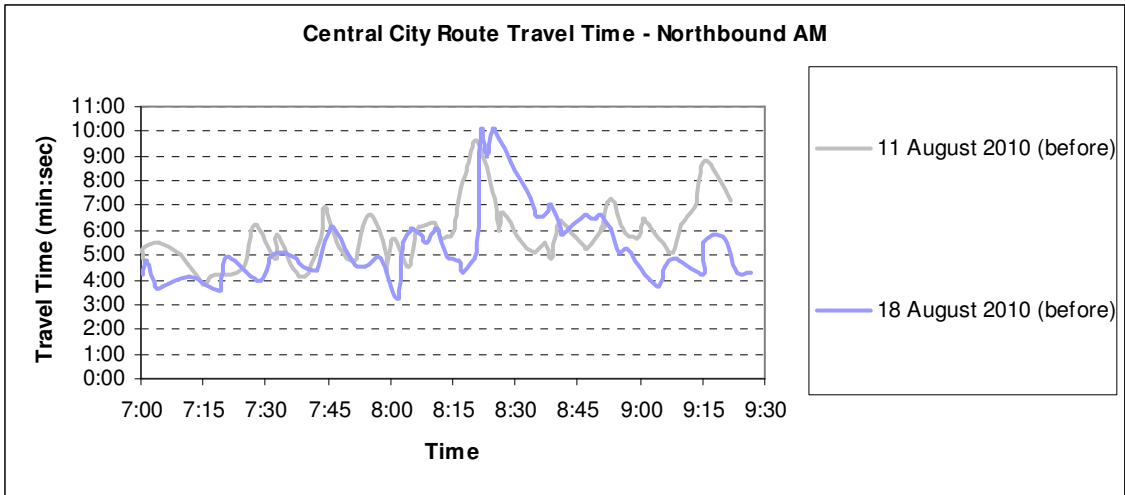
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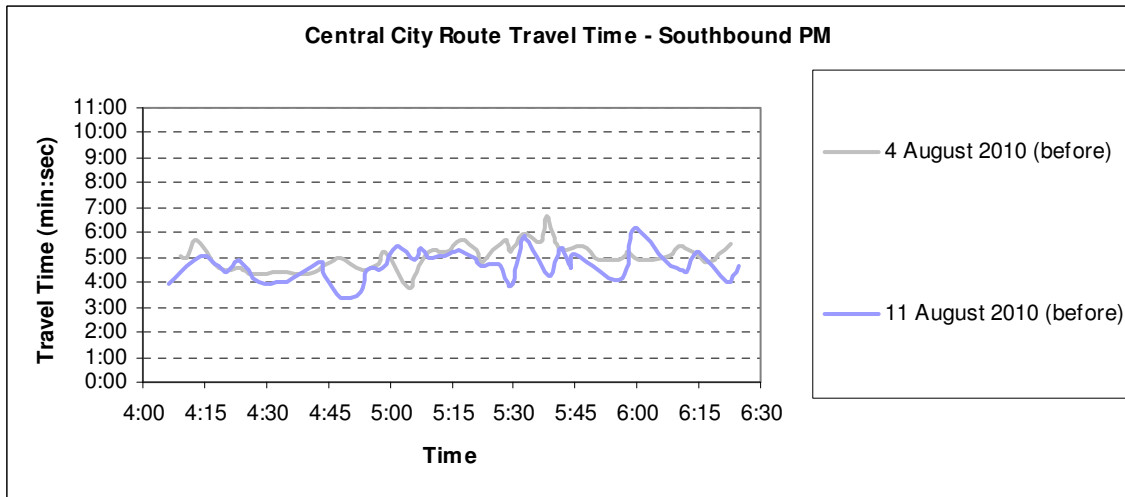
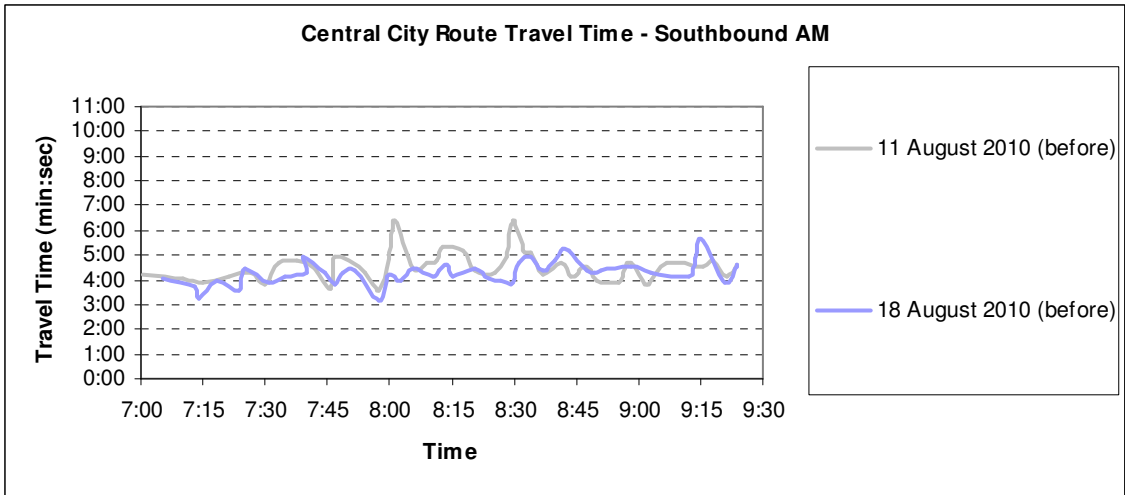
## Bus Travel Times



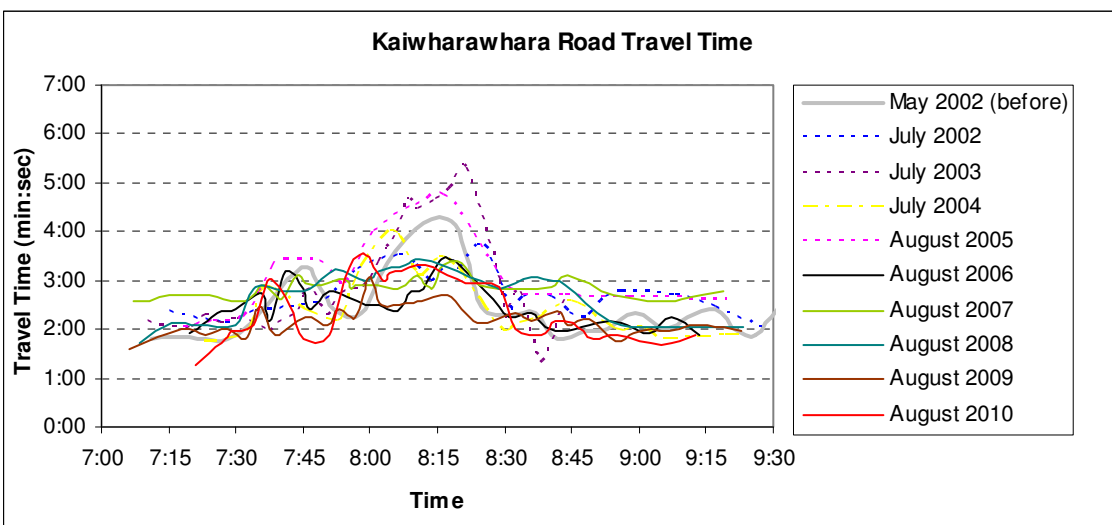
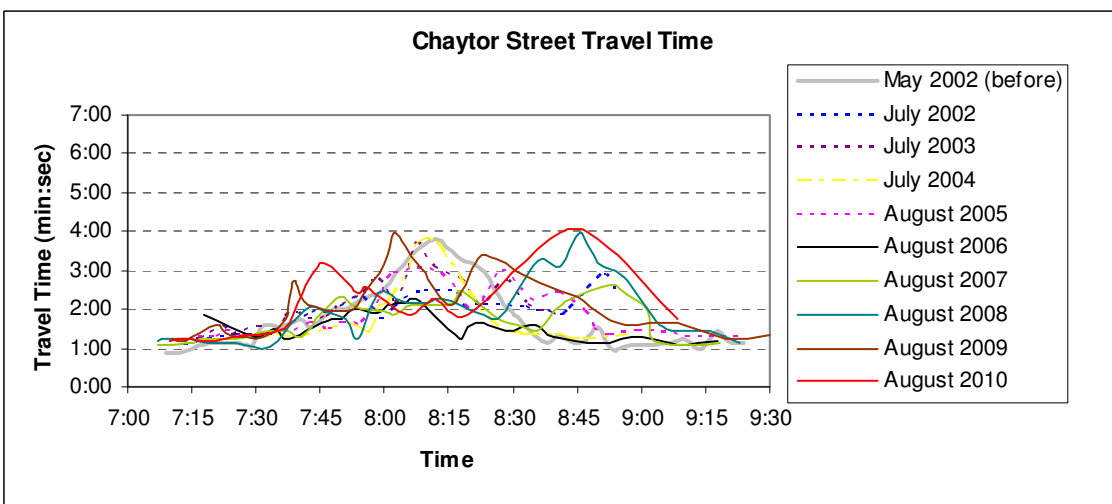
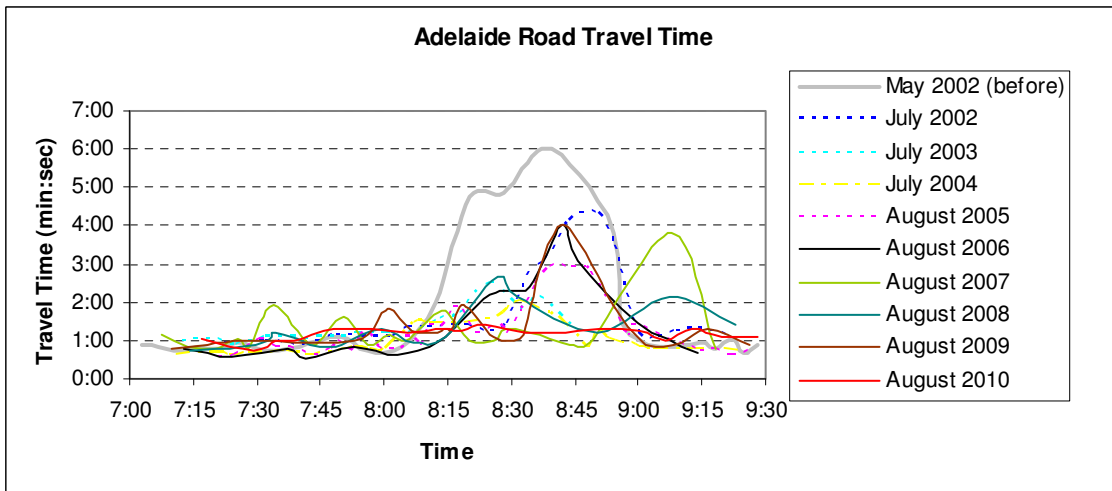
## Bus Travel Times



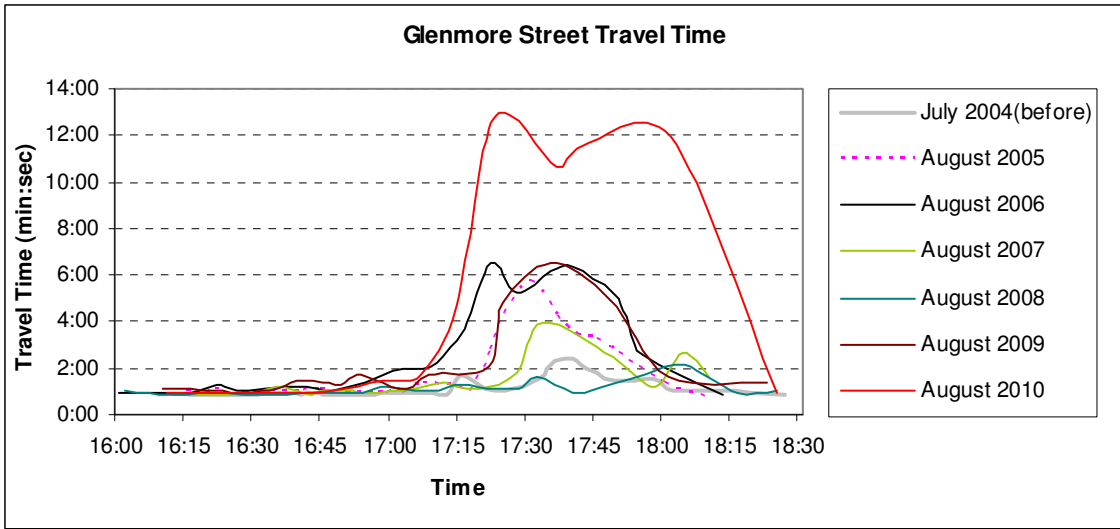
## Bus Travel Times



## Bus Travel Times



## Car Travel Times



## Car Travel Times

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## Appendix C

### Car, Bus and Taxi Travel Time Tables

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**Adelaide Road**

	MAY 2002	JULY 2002	NOV 2002	APRIL 2003*	JULY 2003	JULY 2004	AUGUST 2005	AUGUST 2006	AUGUST 2007	AUGUST 2008	AUGUST 2009	AUGUST 2010
Peak hour flow rate (vph)	1,370	1,180	1,290	1,230	-	1,190	1,170	1,300	1,180	1,090	1,140	935
Duration of Peak	44	36	46	47	45	46	46	45	38	42	44	54
Car free flowing time (secs)	48	48	48	48	48	48	48	48	48	48	48	48
Average car travel time during peak (secs)	242	169	109	162	104	93	101	117	80	92	124	79
Maximum car travel time (secs)	360	365	204	382	215	207	176	242	230	254	273	109
Average car delay (sec)	194	121	61	114	56	45	53	69	32	44	76	31
Maximum car Delay (sec)	312	317	156	334	167	159	128	194	182	206	225	61
Bus free flowing time (secs)	66	66	66	66	66	66	66	66	66	66	66	66
Average bus travel time during peak (secs)	207	87	81	111	87	91	81	114	78	72	92	79
Maximum bus travel time (secs)	317	97	92	216	181	108	122	216	139	132	139	188
Average bus delay	141	21	15	45	21	25	15	48	12	6	26	13
Maximum bus delay	251	31	26	150	115	42	56	150	73	66	73	122
Taxis using traffic lane												
Taxi free flowing time (secs)	-	-	-	-	-	-	-	-	-	-	48	48
Average taxi travel time during peak (secs)	-	-	-	-	-	-	-	-	-	-	110	91
Maximum taxi travel time (secs)	-	-	-	-	-	-	-	-	-	-	242	220
Average taxi delay	-	-	-	-	-	-	-	-	-	-	62	43
Maximum taxi delay	-	-	-	-	-	-	-	-	-	-	194	172
Taxis using bus lane												
Taxi free flowing time (secs)	-	-	-	-	-	-	-	-	-	-	-	48
Average taxi travel time during peak (secs)	-	-	-	-	-	-	-	-	-	-	-	74
Maximum taxi travel time (secs)	-	-	-	-	-	-	-	-	-	-	-	79
Average taxi delay	-	-	-	-	-	-	-	-	-	-	-	26
Maximum taxi delay	-	-	-	-	-	-	-	-	-	-	-	31

\* Construction equipment obstructed the bus lane and required buses to merge back into the adjoining traffic lane

**Chaytor Street**

	MAY 2002	JULY 2002	NOV 2002	APRIL 2003*	JULY 2003*	JULY 2004	AUGUST 2005	AUGUST 2006	AUGUST 2007	AUGUST 2008	AUGUST 2009	AUGUST 2010
Peak hour flow rate (vph)	910	730	860	840	-	954	820	750	830	790	800	730
Duration of peak	63	76	67	81	65	45	70	70	76	53	54	74
Car free flowing time (secs)	54	54	54	54	54	54	54	54	54	54	54	54
Average car travel time during peak (secs)	136	127	90	158	138	125	147	99	104	153	172	162
Maximum car travel time (secs)	230	193	144	264	269	224	220	137	159	247	270	263
Average car delay	82	73	36	104	84	71	93	45	50	99	118	108
Maximum car delay	176	139	90	210	215	170	166	83	105	193	216	209
Bus free flowing time (secs)	65	65	65	65	65	65	65	65	65	65	65	65
Average bus travel time during peak (secs)	154	108	97	125	142	123	142	70	96	105	105	102
Maximum bus travel time (secs)	224	135	123	171	162	133	189	118	172	145	144	163
Average bus delay	89	43	32	60	77	58	77	5	31	40	40	36
Maximum bus delay	159	70	58	106	97	68	124	53	107	80	79	98
Taxis using traffic lane												
Taxi free flowing time (secs)	-	-	-	-	-	-	-	-	-	-	54	54
Average taxi travel time during peak (secs)	-	-	-	-	-	-	-	-	-	-	110	123
Maximum taxi travel time (secs)	-	-	-	-	-	-	-	-	-	-	199	190
Average taxi delay	-	-	-	-	-	-	-	-	-	-	56	69
Maximum taxi delay	-	-	-	-	-	-	-	-	-	-	145	136
Taxis using bus lane												
Taxi free flowing time (secs)	-	-	-	-	-	-	-	-	-	-	-	54
Average taxi travel time during peak (secs)	-	-	-	-	-	-	-	-	-	-	-	76
Maximum taxi travel time (secs)	-	-	-	-	-	-	-	-	-	-	-	76
Average taxi delay	-	-	-	-	-	-	-	-	-	-	-	22
Maximum taxi delay	-	-	-	-	-	-	-	-	-	-	-	22

\* Shoulder of the city bound traffic lane was closed between Curtis Street and Old Karori Road

**Kaiwharawhara Road**

	MAY 2002	JULY 2002	NOV 2002	APRIL 2003	JULY 2003	JULY 2004	AUGUST 2005	AUGUST 2006	AUGUST 2007	AUGUST 2008	AUGUST 2009	AUGUST 2010
Peak hour flow rate (vph)	1,360	1,170	1,220	1,310	-	1,484	1,470	1,210	1,190	1,230	1,290	1,314
Duration of peak	39	103	49	71	45	45	60	37	58	56	53	56
Car free flowing time (secs)	126	126	126	126	126	126	126	126	126	126	126	126
Average car travel time during peak (secs)	194	171	191	193	191	173	220	161	170	185	146	169
Maximum car travel time (secs)	266	263	304	335	345	240	309	209	240	205	242	226
Average car delay	68	45	65	67	119	47	94	35	44	59	20	43
Maximum car delay	140	137	178	209	219	114	183	83	114	79	116	100
Bus free flowing time (secs)	132	132	132	132	132	132	132	132	132	132	132	132
Average bus travel time during peak (secs)	197	162	176	178	161	155	192	113	168	194	157	158
Maximum bus travel time (secs)	314	215	221	297	213	217	245	217	233	222	199	182
Average bus delay	65	30	44	46	29	23	60	19	36	62	25	26
Maximum bus delay	182	83	89	165	81	85	113	85	101	90	67	50
Taxis using traffic lane												
Taxi free flowing time (secs)	-	-	-	-	-	-	-	-	-	-	-	126
Average taxi travel time during peak (secs)	-	-	-	-	-	-	-	-	-	-	-	165
Maximum taxi travel time (secs)	-	-	-	-	-	-	-	-	-	-	-	191
Average taxi delay	-	-	-	-	-	-	-	-	-	-	-	39
Maximum taxi delay	-	-	-	-	-	-	-	-	-	-	-	65
Taxis using bus lane												
Taxi free flowing time (secs)	-	-	-	-	-	-	-	-	-	-	-	126
Average taxi travel time during peak (secs)	-	-	-	-	-	-	-	-	-	-	-	179
Maximum taxi travel time (secs)	-	-	-	-	-	-	-	-	-	-	-	180
Average taxi delay	-	-	-	-	-	-	-	-	-	-	-	53
Maximum taxi delay	-	-	-	-	-	-	-	-	-	-	-	54

**Glenmore Street**

	<b>JULY 2004</b>	<b>AUGUST 2005*</b>	<b>AUGUST 2006</b>	<b>AUGUST 2007</b>	<b>AUGUST 2008</b>	<b>AUGUST 2009</b>	<b>AUGUST 2010</b>
Peak hour flow rate	950	1,160	660	650	620	600	540
Duration of peak	62	45	37	56	53	47	50
Car free flowing time (secs)	50	50	50	50	50	50	50
Average car travel time during peak (secs)	91	156	214	87	141	238	656
Maximum car travel time (secs)	146	348	390	236	280	425	911
Average car delay	41	106	164	37	91	188	606
Maximum car delay	96	298	340	186	230	375	861
Bus free flowing time (secs)	57	57	57	57	57	57	57
Average bus travel time during peak (secs)	104	116	130	88	100	132	220
Maximum bus travel time (secs)	151	128	216	145	162	173	313
Average bus delay	47	59	73	31	43	75	163
Maximum bus delay	94	71	159	88	105	116	256
Taxis using traffic lane							
Taxi free flowing time (secs)	-	-	-	-	-	50	50
Average taxi travel time during peak (secs)	-	-	-	-	-	118	389
Maximum taxi travel time (secs)	-	-	-	-	-	141	589
Average taxi delay	-	-	-	-	-	68	336
Maximum taxi delay	-	-	-	-	-	91	539
Taxis using bus lane							
Taxi free flowing time (secs)	-	-	-	-	-	-	50
Average taxi travel time during peak (secs)	-	-	-	-	-	-	327
Maximum taxi travel time (secs)	-	-	-	-	-	-	327
Average taxi delay	-	-	-	-	-	-	277
Maximum taxi delay	-	-	-	-	-	-	277

\* Roadworks present in the area of Upland Road

**Victoria Street**

	<b>JULY 2004</b>	<b>AUGUST 2005</b>	<b>AUGUST 2006</b>	<b>AUGUST 2007</b>	<b>AUGUST 2008</b>	<b>AUGUST 2009</b>	<b>AUGUST 2010*</b>
Peak hour flow rate (vph)	426	190	400	380	380	370	182
Duration of peak	50	53	52	48	55	59	51
Bus free flowing time (secs)	45	45	45	45	45	45	45
Average bus travel time during peak (secs)	265	248	267	192	169	258	227
Maximum bus travel time (secs)	347	349	361	482	317	453	451
Average bus delay	220	203	222	147	124	213	182
Maximum bus delay	302	304	316	437	272	408	406

\*Roadworks present restricting entry into Manners St

**Central City Route Northbound AM**

	<b>AUGUST 2010 (1)</b>	<b>AUGUST 2010 (2)</b>
Bus free flowing time (secs)	205	205
Average bus travel time during peak (secs)	352	258
Maximum bus travel time (secs)	638	418
Average bus delay	147	53
Maximum bus delay	433	213

**Central City Route Northbound PM**

	<b>AUGUST 2010 (1)</b>	<b>AUGUST 2010 (2)</b>
Bus free flowing time (secs)	205	205
Average bus travel time during peak (secs)	403	373
Maximum bus travel time (secs)	602	840
Average bus delay	198	168
Maximum bus delay	397	635

**Central City Route Southbound AM**

	<b>AUGUST 2010 (1)</b>	<b>AUGUST 2010 (2)</b>
Bus free flowing time (secs)	180	180
Average bus travel time during peak (secs)	272	259
Maximum bus travel time (secs)	664	365
Average bus delay	92	79
Maximum bus delay	484	185

**Central City Route Southbound PM**

	<b>AUGUST 2010 (1)</b>	<b>AUGUST 2010 (2)</b>
Bus free flowing time (secs)	180	180
Average bus travel time during peak (secs)	303	281
Maximum bus travel time (secs)	439	425
Average bus delay	123	101
Maximum bus delay	259	245