NZ TRANSPORT AGENCY
WAKA KOTAHI

Otaki Traffic and Transportation Report

OPUS

Otaki Traffic and Transportation Report

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1 Introduction

Opus International Consultants Ltd (Opus) was commissioned by the NZ Transport Agency (NZTA) in conjunction with the Kapiti Coast District Council (KCDC) to compile a comprehensive Traffic and Transportation Report for Otaki.

This report builds on a number of previous reports (refer section 2.4 below as well as incorporating some new data and assessment undertaken specifically for this phase o the project.

1.1 Objectives

The objectives for this report are as follows:

- Update report to include reference to SH1 being one of the Roads Of National Significance (RoNS).
- Keep SH1 traffic moving and improve efficiency.
- Keep traffic on local roads moving.
- Highlight measures which seek to address safety concerns for pedestrians.
- Highlight measures which seek to address local road access (e.g. Waerenga Rd).
- Ensure that the measures identified above will contribute to NZTA's five strategic priorities of:
  - *Plan and deliver roads of national significance (which this is one).*
  - *Improve the road safety system.*
  - *Improve the efficiency of freight movements.*
  - *Improve the effectiveness of public transport.*
  - *Improve customer service and reduce compliance costs.*

1.2 Scope

The Otaki Traffic and Transportation Report has been compiled to incorporate a number of previous reports and present information on the current performance of the parking, pedestrian activity and traffic flows within the study area.

As well as compiling previous reports, some further assessment has also been undertaken including:

- Traffic flow assessment
- Safety assessment
- Parking manoeuvres assessment
- Roundabout assessment
- Pedestrian crossing assessment (consistent with comments and feedback from Jo Draper of NZTA)

1.3 Report format

This report has been divided into three parts:

Part A – Background and Data Collection

Part B – Data Analysis and Discussion

Part C – Improvement Options, Recommendations and the Associated Implementation Pathway.

PART A –BACKGROUND AND DATA COLLECTION

2 Background

2.1 Study Area

The study area encompasses SH1 between the SH1/Mill Rd/Rahui Rd roundabout in the north to the intersection of SH1 and Waerenga Rd in the south as shown in Figure 1 below. The adjacent streets and nearby off-street parking facilities also form part of the study. This includes Arthur Street, Dunstan St, and the three off-street car parking areas located along the service lane between the railway station and the rest area.

Throughout this report, SH1 will be referred to as a north-south route while perpendicular roads, such as Arthur Street, will be considered to be running east-west.

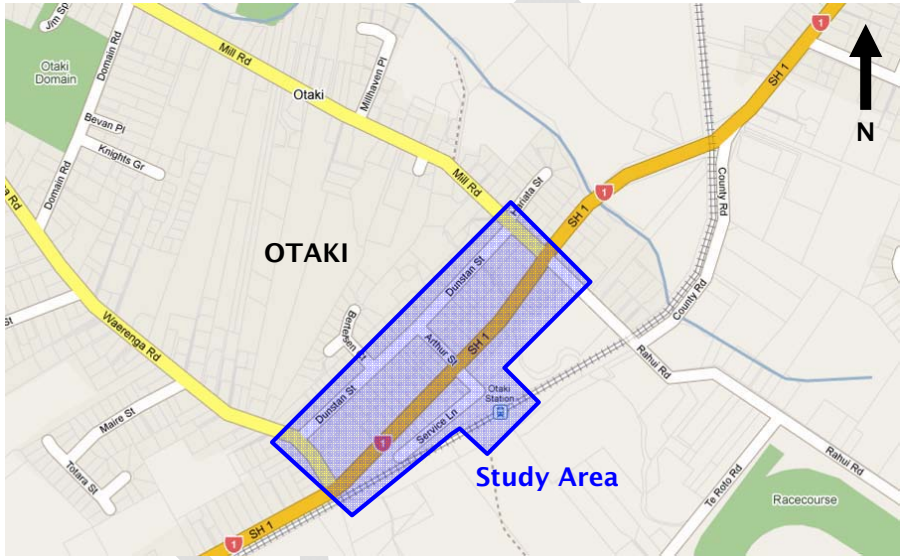

Figure 1 - Study Area (Source: Opus Google Earth Pro Licence 2009)

2.2 Otaki Traffic and Transportation Issues

SH1 between Wellington and Levin (and therefore including Otaki) has been identified as one of the RoNS. It is considered an essential route that requires significant development to reduce congestion, improve safety and support economic growth.

The issues encountered in Otaki can be divided into three groups: parking, traffic, and pedestrians. Improved efficiency of SH1 through Otaki must be balanced with the provision of retail parking and appropriate pedestrian crossing facilities. As requested, based on a review of the previous reports and KCDC inputs, the following issues have been identified as being relevant to this project.

Parking

- The presence of parking and the high turnover rate of vehicles using, and manoeuvring into and out of parallel parking on SH1 results in significant delays to through traffic.

Traffic

- Significant delays and congestion occur in the area during peak travel times, especially in the southbound direction at the end of a long weekend.
- Vehicle turning movements (to/from intersections and accesses) slow and delay through traffic on SH.1
- The performance and accessibility of the roundabout.
- Through traffic on SH1 experiences delays due to the high volume of pedestrians using the pedestrian crossing near Arthur Street.
- Local road accesses need to be safely maintained (e.g. Waerenga Road).

Pedestrians

- There is a high pedestrian demand crossing SH1 in Otaki
- Safe crossing opportunities for pedestrians of all abilities need to be provided across SH1 in Otaki.

2.3 KCDC Issues

KCDC have identified some issues and provided some recommendations for improving the traffic and parking situation in Otaki, these include:

- Do nothing/status quo.
- Otaki Rail service lane improvements (improve entrance, seal and mark parking spaces in Sunday market area).
- Create recessed bus lay-bys.
- Create short term car parks adjacent to the Otaki Information Centre.
- Resurface the roundabout and improve road markings.
- Create a clearway in the peak direction on long (holiday) weekends.
- Encourage greater use of off-street car parking, especially railway car park.
- Improve the entry-exit points at Arthur Street.
- Look at parking restrictions on the state highway to encourage use of free/unlimited off-street parking.
- Review pedestrian crossing points and location of refuge islands.
- Improve visibility of off-road cycleway, connectivity and restrict vehicles parking on it.
- Consider further road user education, especially the use of the 2-lane roundabout.

2.4 Previous Reports, Projects and Recommendations

The **SH1 Otaki Traffic and Parking Study (March 2009)** assessed and analysed the current parking and traffic demand on SH1 through Otaki. The study recommended short, medium and long term options for the improvement of traffic flow through Otaki. The study is the basis for this Otaki Traffic and Transportation Report.

The **SH1 (Otaki): Pedestrian Crossing Review (September 2007)** investigated the effects of pedestrian movements on traffic congestion along SH1 within Otaki township. This report recommended the installation of a central pedestrian island at the marked pedestrian crossing near Arthur Street and additional central

pedestrian islands along the length of SH1 through Otaki to assist pedestrian movements. This project is now complete. Further discussion from this report is covered in section 8.

The **Greater Otaki Project (Date)** aimed to engage with the community and develop a vision for Otaki. The opinions expressed during the community workshops were used to develop the vision and detailed community outcomes. There was a clear consensus within the community that upgrading the Otaki Railway Precinct is important for the area; there was also substantial support for initiatives that address the traffic and parking problems on SH1 through Otaki.

The **North Otaki to Peka Peka Road SAR (2002)** recommended a bypass for Otaki which included grade separated interchange points north and south of the urban area and a new bridge over the Otaki River.

The **Western Corridor Plan (2006)** provides an integrated transportation strategy for the corridor from Wellington to north of Waikanae. It examines the relation between road and rail improvements, car, public transport and freight movements, travel demand management and road pricing. It identifies a package of transport proposals that meet the objectives of the region while considering national interests.

A memo written by **Murray Carpenter of Opus**, examined Maunsell's concept design for the four lane expressway parallel to the existing SH1 alignment between Peka Peka Rd and Otaki and considered whether the expressway construction could be staged in the vicinity of Otaki. The memo concluded that it is not practical to stage the construction of the expressway immediately south of Otaki Township. This is because of the constraints created by the Otaki River and the railway line. This memo also concluded that a full diamond interchange is not necessary at Te Horo (Gear Rd); the interchanges proposed at Peka Peka Rd and Otaki will provide sufficient connectivity for the area in conjunction with SH1.

The **SH1 Kapiti Strategic Study (2009)** recognises the conflicts between improving the efficiency of SH1 through Otaki, and providing retail parking and appropriate pedestrian crossing facilities. NZTA has adopted an Otaki by-pass as the preferred alignment for an upgraded SH1. However, achieving community support for a by-pass will rely upon persuading the stakeholders and public that there will be adequate access to and from SH1 and that removal of high volume traffic flows from the heart of the Railway precinct will bring opportunities for further streetscape enhancements and the creation of a sense of place.

The **Kapiti Coast District Plan** indicates a plan change to Otaki with regard to a subdivision review, however this is still under consultation.

The **Otaki Railway Station car park plans (2007)** show the layout of the new parking areas around the railway station. The plans indicate that there will be 157 car parks (including 4 mobility impaired spaces) provided in addition to bus and motorcycle parking areas.

Dual laning of the Otaki Roundabout was recently completed. This project created additional lanes for through traffic and provided longer merge lanes north and south of the roundabout. This project was implemented to provide relief to traffic congestion through the roundabout.

3 Site Surveys

Site surveys were completed on four occasions as outlined below.

3.1 Sunday 10 June 2007 (Opus)

Pedestrian crossing movements along SH1 north and south of Arthur Street were surveyed with a particular focus on the pedestrian movements and associated delays to vehicles at the existing marked pedestrian crossing. At the time of the survey, the pedestrian crossing consisted of a zebra crossing with kerb extensions, but no central refuge). Given the activity in Otaki on the weekends, the survey was carried out between 11am and 3pm on Sunday June 10 rather than a typical weekday period.

The survey recorded both the actual number of pedestrians using the marked pedestrian crossing as well as the number of times the crossing was specifically used (e.g. four people may have crossed at the same time thereby requiring a vehicle to only stop once).

The volume of traffic in both the northbound and southbound direction was recorded along with the length of the vehicle queue that formed each time a pedestrian used the crossing.

The number of people crossing to the north and south of the pedestrian crossing was also recorded. To the north this data was recorded for a distance of 150m, split into three 50m zones while to the south the number of pedestrians crossing the road was recorded for a distance of approximately 100m (as a single zone).

The survey data from this survey is included in Appendix A.

3.2 Sunday 21 September 2008 (Opus)

Four identified parking areas (both on-street and off-street) were surveyed to look at capacity, utilisation and length of stay. The survey area included State Highway 1, from Waerenga Rd to Mill Rd, the entire length of Arthur Street and the off-street car parking areas located behind the shopping complex on the eastern side of the highway. The availability of on-street parking on Dunstan Street was also observed, but this area was not formally surveyed.

Parking demand is perceived to be highest on weekends and public holidays; therefore the survey was completed on Sunday, 21 September 2008 between 11am and 3pm. It was a cloudy day with a few showers in the afternoon. The Sunday Market and some other events were in progress during the survey.

The study area was divided into three sections, with a surveyor assigned to each section. Every half hour during the survey period the surveyors would walk through their areas and note the location and first four digits of the number plates of any parked vehicles. Based on this data, the total number of parked vehicles, occupancy rate, and the length of stay for each vehicle was determined.

Further information relating to this survey is outlined in section 5. The survey data from this survey is included in Appendix B.

3.3 Labour Day Weekend 24-27 October 2008 (Opus)

A travel time survey and turning movement count were completed on both Friday, 24 October 2008 and Monday, 27 October 2008 to coincide with the Labour Day long weekend. In addition, a parking survey was undertaken on the Friday. The surveys were completed between 3 pm and 8 pm on Friday, and between 12pm and 6pm on Monday to coincide with the peak travel times for the long weekend.

For the Friday parking survey, the methodology used on the 21st of September was adopted, however only on-street parking areas on SH1 were surveyed.

For the travel time survey, a vehicle was driven in a continuous loop along SH1 between Waerenga Road (south of the roundabout) and South Manakau Road. Eleven timing points along the route were identified and the time was recorded each time the vehicle passed each point. On Monday, the queue extended beyond

South Manakau Road, so the route was extended to Mokena Kohere Street (Manakau) and an additional timing point was added at this location.

On both days (Friday and Monday), a turning movement count was conducted at the roundabout that connects SH1 and Mill Road/Rahui Road. The number of vehicles and their classification (light or heavy) was manually recorded for each turning movement in 5 minute intervals.

Further information is outlined in section 5 and 6. The survey data and methodology from this survey are included in Appendix D.

3.4 Easter Weekend 10-13 April 2009 (Opus)

Traffic loop surveys (including vehicle speeds) were undertaken for the Easter holiday period (10-13 April) on SH1.

Further information relating to this survey is outlined in section 7.2. The survey data from this survey is included in Appendix C.

3.5 Labour Day Weekend 23-26 October 2009 (MWH)

Traffic loop surveys were undertaken for the holiday period (23-26 October) on SH1 and on the local roads around Otaki. Traffic loop surveys were also undertaken for the local roads for the week following the holiday weekend (27 October – 3 November).

KCDC CCTV footage was also recorded for the period (16-27 October). There were two cameras recorded, one faces north from a location south of Arthur Street, the other faces north from a location north of Arthur Street.

MWH were in Otaki on Labour Day (26 October) to implement a traffic management plan to improve traffic flows through Otaki. The personnel on site measured the queues and journey times at the roundabout at half hour intervals. The congestion was not deemed to be significant enough to implement the traffic management plan.

Further information is outlined in section 6 and 7. The survey data from this survey is included in Appendix E.

4 Crash History

The CAS data sheets for this analysis are include in Appendix F.

4.1 Waerenga Road and SH1

The five year crash record for the intersection of Waerenga Road and SH1 was obtained from CAS. Between 2004 and 2008 there were only 6 collisions recorded in a 100m radius of the intersection. Of these 6 crashes, only one was actually related to the operation of the intersection (non-injury). In this crash, a vehicle turning right from Waerenga Road failed to give way to a northbound vehicle on SH1. The crash occurred during heavy rain. The circumstances of the remaining crashes are outlined below:

- Two crashes occurred at accesses to commercial properties (one on Waerenga Road and the other on SH1).
- Another two crashes were single vehicle crashes where the driver failed to negotiate the curve on Waerenga Road approaching SH1 and hit a pole or post. Alcohol was a factor in both of these crashes.
- A rear end collision occurred north of the intersection when a northbound driver failed to slow/stop for a queue. This queue was not related to the operation of the intersection, but instead due to other traffic in Otaki.

4.2 SH1 Pedestrian and Cyclists

In the five years (2003-2007) preceding construction of the pedestrian crossing upgrades, there was one pedestrian collision reported in the vicinity of the pedestrian crossing (from a point 100m south to 150m north of the pedestrian crossing). It was a rear-end collision which resulted in the front vehicle being shunted forward and hitting a pedestrian using the marked crossing. This resulted in a minor injury to the pedestrian. During the construction period there were no collisions involving pedestrians recorded.

In the fourteen month period July 2008 to September 2009, since completion of construction, there has been one collision involving a child skateboarder crossing SH1 mid-block, 150m north of Arthur Street. This crash resulted in a minor injury to the child.

4.3 Mill Road and SH1 Roundabout

There were seven crashes (one minor injury) within a 100m radius of the roundabout in the five years (2003-2007) preceding construction of the roundabout widening. Two of the crashes occurred on two different service station forecourts (unrelated to the roundabout), the other five crashes (all non-injury) were on or approaching the roundabout as detailed below:

- Two cars southbound on SH1 were involved in rear end accidents just north of the roundabout, alcohol was suspected in one and the other was a car following too closely.
- Two crashes involved crashes between northbound traffic on SH1 and eastbound traffic on Mill Rd. In both cases the vehicle on Mill Road was at fault and alcohol was a factor.
- One crash involved a vehicle northbound on SH1 speeding and losing control just south of the roundabout and hitting a traffic island, post or pole.

In the fourteen month period July 2008 to September 2009, since completion of the roundabout construction, there were eight crashes (one minor injury) within a 100m radius as detailed below.

- One crash where a car tried to overtake a truck in the SH1 northbound merge lanes north of the roundabout.
- One crash where a car tried to overtake another car on SH1 southbound around the roundabout.
- One crash where a car southbound on SH1 hit a motorcycle turning right from Rahui Road at the roundabout.

- Two rear end crashes caused by queues at the roundabout, one northbound and one southbound on SH1.
- One crash where a car northbound on SH1 hit a cyclist travelling westbound through the roundabout (minor injury).
- One crash between a truck and a car in the southbound merge on SH1 south of the roundabout.
- Once crash between a car and a parked car in the southbound merge on SH1 south of the roundabout.

5 Parking

Information detailing the locations of the parking areas and the graphs and tables discussed in the assessment below are included in Appendix G.

5.1 On-street Parking Demand

The on-street parking on SH1 and Arthur Street was well utilised, during the site surveys, an average occupancy rate[1] of 85 percent was observed on Sunday, 21st September 2008. The occupancy rate was lower on Friday, 24th October 2008 with an average of 45 percent. The percentage of spaces occupied on SH1 and Arthur Street are summarised in Figure 1 and Table 1 (refer Appendix G) for Sunday, 21st September 2008.

On SH1, a higher number of vehicles were observed at the southern end, in the vicinity of the Sunday Market. The portion of Arthur Street east of SH1 (near the railway station) had a higher number of parked vehicles than the western portion.

The percentage of spaces occupied on SH1 are summarised in Figure 2 and Table 2 (refer Appendix G) for Friday, 24th October 2008.

Over 80 percent of all vehicles that parked on SH1 stayed for one hour or less. On Arthur Street, vehicles tend to park for a longer time period with only 37 percent of vehicles staying for one hour or less. The length of stay for vehicles utilising the on-street parking is summarised in Figure 3 and Figure 4 (refer Appendix G). Based on the Figures, it is apparent that the parking trends are similar throughout the weekend.

Further information about on-street parking behaviour is included in section 9.

5.2 Off-street Parking Demand

Car Park C, near the rest area, had an average occupancy rate of 91 percent. On multiple occasions it was observed to be completely full. The high occupancy rate can be attributed to the adjacent Sunday Market that was in progress during the site survey. The average occupancy of the other two off-street parking lots was lower, with an average occupancy of 64 and 61 percent for Car Parks A and B respectively. With a maximum observed occupancy of 75 percent, Car Park A and B had sufficient space to accommodate some additional vehicles. The occupancy rate and total number of vehicles utilising the off-street parking are summarised in Figure 5 and Figure 6 (refer Appendix G).

Sixty percent (60%) of the vehicles utilising the off-street parking lots stayed for one hour or less. More long-term parkers utilised the off-street car parks than the on-street spaces. Fourteen percent (14%) of the vehicles utilising the off-street parking stayed 3 hours or more, compared to only 7 percent of the on-street parkers staying 3 hours or more. The length of stay of vehicles utilising the off-street car parks is summarised in Figure 7 (refer Appendix G).

5.3 Bus Stops

In May 2009 bus operators lobbied NZTA, Greater Wellington Regional Council and Kapiti Coast District Council over the length of the bus stop directly opposite the Information Centre on SH1 in Otaki. Bus operators claim that motorists park too close to the stop, which does not allow buses to enter or exit the bus stop in a safe way. The bus operators would like to have the bus stop lengthened or for yellow lines to be

[1] Occupancy rate is calculated as the number of vehicles parked in the designated parking areas compared to the available number of spaces. Therefore an average occupancy rate of 85 % indicates that 85% of the total numbers of parks were used over the survey period.

placed at either end. The bus operators state that as it stands, if vehicles are parked close to either end of this bus stop, buses cannot stop without the rear of the bus sitting in the live lane.

Table 1 below outlines the properties of the two bus stops in Otaki on SH1.

Table 1 - Bus Stop Properties

Location	Length	Before Bus Stop	After Bus Stop
Northbound	24.5	Pedestrian Refuge	Parking
Southbound	17.6	One car park immediately prior, then a vehicle entrance prior to that	Vehicle entrance immediately after followed by parallel parking

6 Travel Time

Figures and tables detailing the results from the travel time surveys are discussed below and are included in Appendix H.

6.1 Labour Weekend 2008

The average travel speed along SH1 between Otaki and Manakau for both directions of travel on the Friday and Monday of the Labour Day weekend (24-27 October) is shown figure 1 (refer Appendix H). There were only minor variations in the average travel speed between Friday and Monday for traffic in both directions with the exception of southbound traffic on Monday where significant delays and queuing were experienced. This coincides with the expected peak caused by people from the Wellington region returning home after being away for the long weekend. A similar delay was not experienced on Friday in the northbound direction, but this could be due to a wider spread of travel times with some people choosing to travel throughout the day on Friday and others on Saturday.

On Monday 24th in the southbound direction, the lowest average speed was 11km/h; this was experienced at Arthur Street, just south of the roundabout.

Figure 2 (refer Appendix H), shows the average, minimum and maximum travel times recorded for each direction and day. There was little difference in the minimum and maximum travel times recorded on Friday in both directions, and on Monday in the northbound direction. An average travel time over the route (one direction) of approximately seven minutes was recorded for these three periods. However, the results for Monday in the southbound direction show significant variation in the total travel time. The minimum recorded travel time is similar to the results for the other periods and directions, but the maximum travel time recorded for southbound on Monday was just over thirty five minutes.

The travel time for each of the twelve southbound runs that were completed on Monday are shown in figure 3 (refer Appendix H). Southbound Monday travel times are comparable to the other days and directions for the first six runs which were completed between 12pm and 2pm. On the 7th run delays were experienced, beginning near Lawlors Rd. The delay experienced on each of the subsequent runs continued to increase as the traffic queue extended further north along the SH1. Runs nine and ten, which were completed between 4pm and 5:30pm, experienced the most delay. However, all runs completed after 2pm took at least seventeen minutes, compared to an average of seven minutes for the other days and directions.

One of the key points to note in figure 3 is that in the first few runs the speed is relatively constant between the beginning of the route and the roundabout at Mill Road. Once vehicles pass through the roundabout, vehicle speeds drop significantly between the roundabout and Arthur Street. Based on site observations and the journey time data this appears to be due to the congestions caused by the parking movements, pedestrian activity and the environmental issues. After the first few runs this congestion is not as apparent in figure 3 because the congestion between Mill Road and Arthur Street causes vehicles to queue back through the roundabout. This results in vehicles encountering the queue progressively earlier along the route after each run.

6.2 Labour Weekend 2009

Whilst monitoring the traffic flows on Monday 26 October 2009, MWH undertook some simple travel time surveys from the back of the queue to the roundabout (refer table 1 in Appendix H).

It is difficult to compare the travel time surveys undertaken by MWH on Labour Day 2009 with the Opus travel time surveys undertaken on Labour Day 2008 because a different methodology was used for each survey.

7 Traffic Volumes

Figures presenting the traffic volumes data (as discussed below) are included in Appendix I.

The Average Annual Daily Traffic (AADT) on SH1 as it passes through Otaki was approximately 16,000 vehicles in 2008 with 10 percent heavy vehicles.

7.1 Labour Weekend 2008

Turning movement counts were surveyed at the roundabout at the intersection of SH1 and Mill Road/Rahui Road on the Friday and Monday of the Labour Day long weekend.

Friday 24 October

The traffic volumes, in fifteen minute intervals, for each approach and the overall total are summarised in figure 1 (refer Appendix I).

The percentage of road users using the outer (left hand) lane of the roundabout was poor for the northbound direction on SH1 and contributes to the small amount congestion experienced in the area. Eighty-three percent (83%) of the northbound vehicles used the right hand lane. This could be due to a lack of understanding of how the roundabout operates; however, it also relates to the delays and legibility. If less delay occurs, it is more than likely the lane utilisation will be poor. Fifty three percent (53%) of southbound traffic used the inner (right hand) lane on the roundabout; this shows that the southbound lanes are both well utilised. Heavy commercial vehicles accounted for 5 percent of the observed traffic.

On Friday, the peak hour was from 4:30 pm to 5:30 pm with a total of approximately 2000 vehicles using the intersection. The peak hour volumes for each movement, including vehicle classification are summarised in figure 2 (refer Appendix I).

Monday, 27 October 2008

On Monday, there was generally more traffic travelling through the roundabout southbound than northbound as shown in figure 3 (refer Appendix I). However, significant delays were only experienced by southbound traffic.

On Monday the peak traffic flow was recorded from 12:30 pm to 1:30 pm. However, based on travel time and the observed queue length, the greatest demand from southbound vehicles occurred later in the afternoon this is not directly reflected in the traffic volumes. The peak hour traffic volumes are shown in figure 4 (refer Appendix I). Overall, heavy commercial vehicles only accounted for two percent of vehicles; this is expected since many businesses are closed on public holidays.

7.2 Easter Weekend 2009

Traffic loop surveys (including speed) were undertaken in Otaki over Easter weekend 2009 (10-13 April).

Figures 5 and 6 (refer Appendix I). show a strong correlation between the traffic volumes and the vehicle speeds. During the peak of the traffic flow, there is a noticeable reduction in vehicle speeds.

Tables 1 and 2 (refer Appendix I) make a comparison between the Easter weekend 2009 (10-13 April) and a typical Thursday – Monday period (12-16 February 2009). The comparison shows that the total traffic volumes per day over the Easter Weekend are very similar to the total traffic volumes per day over a typical weekend (with noticeable increases above a typical Thursday and Monday.

7.3 Labour Weekend 2009

Traffic loop surveys were undertaken over Labour Weekend for both the local roads and for SH1 (refer section 3.5). The local road surveys were primarily to be used to assess traffic behaviour if NZTA implemented their traffic management plan which restricted movements to SH1 at Mill Road and Arthur Street. The traffic management plan was not put into action on Labour Day as the congestion was not deemed to be significant.

Figure 7 in Appendix I makes a comparison between the traffic volumes on Labour Day Monday (26 October 2009) versus a typical Monday (2 November 2009). In general the traffic profile at each of the sites was more centred on a central peak for Labour Day when compared with the morning and evening peaks of a typical weekday.

All of the local road sites west of SH1 had a reduction in the total number of vehicles per day on Labour Day when compared to a typical weekday.

On Rahui Road east of SH1 There was little difference east of County Road and increase west of County Road. This implies that on Labour Day few people used the alternative route south via South Manakau Road and Waitohu Valley Road this makes sense as the queue from the roundabout did not extend back to the turn off to South Manakau Road. However, it appears that a small number of vehicles have tried to skip part of the queue by travelling down County Road and Rahui Road.

The flows on SH1 for Labour Day (26 October) were higher (by 1500 vehicles) than those on the typical Monday (2 November 2009), however both flows are lower than the AADT for 2008.

8 Pedestrian Demand

8.1 2007 Survey Results

As stated in section 3.1, a pedestrian crossing review was undertaken for SH1 in Otaki in 2007. Appendix J includes the key figures and tables which present the results of the 2007 survey.

The key points to come out of this assessment include:

SH1 through Otaki performs a range of functions resulting in a number of competing demands by different types of road users. The traffic and pedestrian survey undertaken along SH1 indicated that:

- The marked pedestrian crossing is well used; however, a consequence of this is that it imposes delays on through traffic using the state highway.
- Pedestrians use the flush median to both the north and south of the marked crossing to help cross the road; in particular over the section 50 to 100 metres north of the marked pedestrian crossing.
- An opportunity exists to reduce vehicle delays at the marked pedestrian crossing by splitting the crossing into two separate parts through the use of a central pedestrian island.
- Potential enhancements to assist pedestrian movements to the north and south of the marked pedestrian crossing exist, albeit at the potential loss of some car parking spaces.

Based on a review of the survey data, crash records and guidance contained in the NZTA draft Pedestrian Planning and Design Guide, it was recommended that:

- A central pedestrian island is installed at the marked pedestrian crossing to help minimise delays to motor vehicle traffic. Modifications to the kerb extensions are needed in order to meet minimum central island and traffic lane widths.
- The tracking movements of heavy vehicles should be checked to ensure turning vehicles at the Arthur Street intersection don't collide with the proposed central island at the crossing. Any problems may be addressed either by relocating the marked pedestrian crossing (and proposed central island) slightly further north, taking access considerations into account; or by making Arthur Street (west) inbound (westbound) only, thereby preventing trucks from turning left onto the state highway and colliding with the central island. This will naturally have an impact at the other SH1 intersections.
- Additional central pedestrian islands are installed along the length of SH1 through Otaki to assist pedestrian movements and provide protection to pedestrians in the middle of the road. It is noted that the provision of pedestrian islands may result in a loss of on-street car parking spaces. As such, the number of additional facilities and hence pedestrian amenity may need to be balanced with on-street car parking desires.

All of the recommendations listed above were completed and constructed as part of the Otaki roundabout dual laning project. The project included changing the pedestrian crossing to a staggered pedestrian crossing with central island and adding two pedestrian refuges, one north and one south of the pedestrian crossing.

9 Video Analysis

9.1 Surveyed Data

As stated in section 3.5, KCDC CCTV footage was obtained for Otaki over and before Labour Weekend 2009.

From the video a brief analysis of the traffic behaviour was undertaken on Labour Day between 12.00pm and 5.30pm.

The data was analysed to record:

- The number of visible pedestrian crossings, both at the controlled crossing and at locations north and south of the controlled crossing.
- The number of visible parking manoeuvres.
- The number of turns into and out of Arthur Street.

9.2 Results

The data recorded above was plotted against the traffic volumes and queue.

The data shows the following key trends:

A plot of queue versus traffic (refer Figure 2) shows that the queue is not directly related to the traffic volume as the traffic flow steadily increases between 12.00pm and 5.30pm and the queue has died away by 5.00pm.

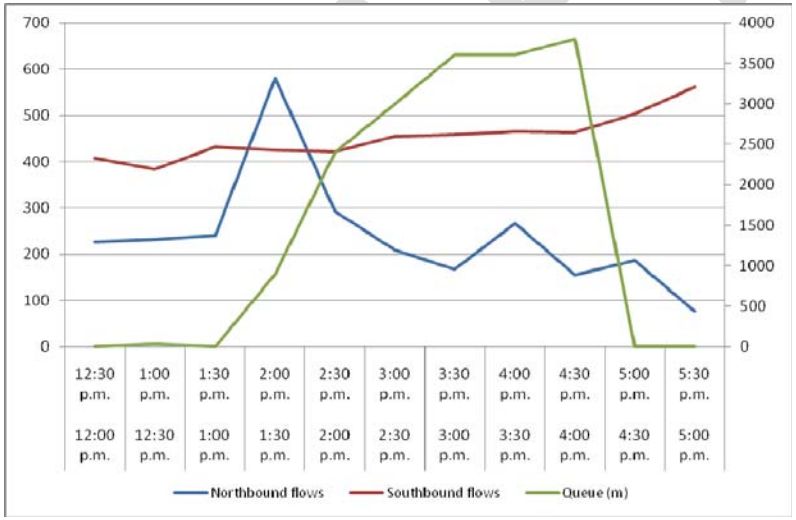

Figure 2 – Queue versus traffic flows (Labour Day 2009)

A plot of queue versus pedestrians (refer Figure 3) shows that the highest pedestrian crossing demand is directly related to the start of the queue forming. The pedestrian demand starts to drop before the queue reaches its peak (refer figure 2, Appendix J).

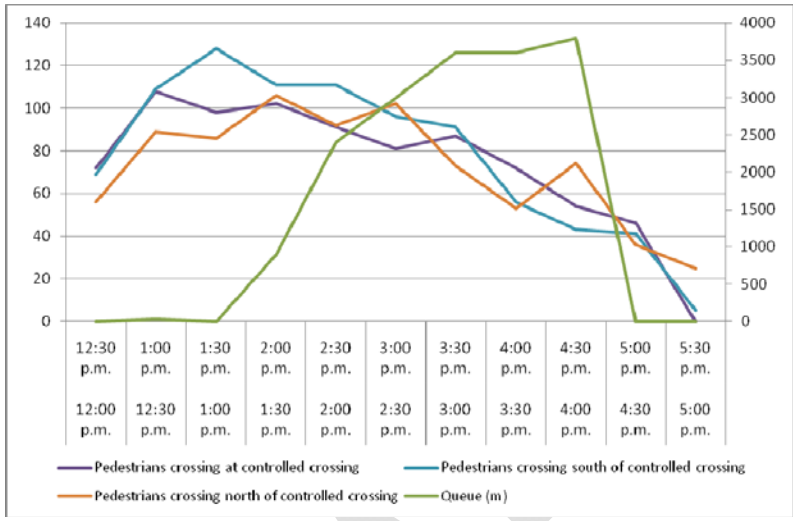

Figure 3 - Queue versus pedestrians crossing (Labour Day 2009)

A plot of queue versus turning movements at Arthur Street (refer Figure 4) shows that the turning demand is directly related to the start of the queue forming. The turning demand starts to drop before the queue reaches its peak (refer figure 3, Appendix J).

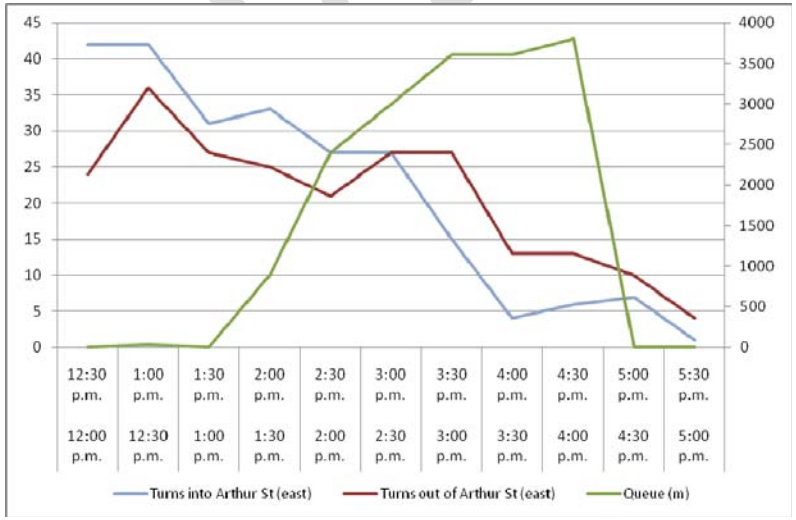

Figure 4 - Queue versus Arthur Street turns (Labour Day 2009)

A plot of queue versus parking manoeuvres (refer Figure 5) shows little discernable relationship between the two, the parking manoeuvres is relatively consistent across the period (refer figure 4, Appendix J).

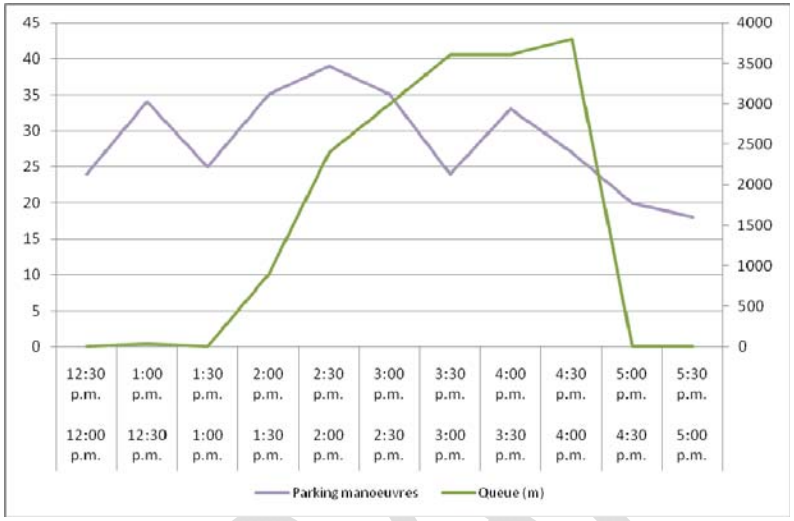

Figure 5 - Queue versus parking manoeuvres (Labour Day 2009)

There appears to be a clear relationship between the high demand for pedestrian and turning movements at Arthur Street and the start of the queue.

PART B –DATA ANALYSIS AND DISCUSSION

10 Roundabout Performance

Traffic flows were surveyed on the Friday and Monday of the Labour Day weekend (24-27 October 2008), primarily to determine whether the multi lane roundabout layout affected queuing and travel delays through Otaki during peak times. This is one of the busiest weekends of the year for travelling and therefore represents a worst case scenario. The data collected as a result of those surveys indicated that there were still significant delays north of the roundabout approaching Otaki during peak times, specifically the southbound traffic returning home after the long weekend.

The traffic movements indicated that a significant proportion of the northbound traffic used only one of the two lanes available to head through the roundabout; however this did not seem to create significant delays for traffic heading in this direction. The roundabout, whilst allowing for additional traffic and associated capacity still does not address delays created by a merge point just south of the roundabout; hence probably does not have a significant overall impact on reducing travel times of traffic moving through the entire survey route in a southbound direction. The increased capacity does however seek to separate out movements left and right and as a result, improves the efficiency of turning movements in and out of the local road network.

The Sidra intersection modelling package was used to assess the performance of the roundabout and to determine capacity levels. During both the Friday afternoon and Monday peaks the roundabout operates well with a Level of Service (LOS) of A or B, 95th percentile queues of 8 vehicles or less, and average delays of 15 seconds or less for all movements. As a sensitivity test, the roundabout was tested with a single lane carriageway instead of the current dual lane arrangement. The roundabout continues to operate well with a LOS of A or B for all movements, except the right turn from Mill Road during the Friday afternoon peak which has a LOS of C. Appendix K contains the Sidra outputs for the roundabout.

The demands on the township are significant and there are a number of competing demands including traffic flows, community and business owners needs, parking and pedestrian activities. As discussed in Section 6 earlier, the cause of queuing back from the northern arm of the roundabout appears to be caused by downstream congestion on the through route, encountered between the roundabout and Arthur St. As a consequence, it is a reasonable assumption that when congestion of this nature occurs the roundabout does not add to the congestion problem.

A swept path analysis was undertaken for the roundabout using Autoturn and as expected, cars can easily complete all manoeuvres at the roundabout while staying within their lane. However, buses, semi-trailers and B-trains encroach slightly into the neighbouring lane when travelling straight through (in both directions) the intersection on SH1. These larger vehicles are able to complete all turning manoeuvres (both right and left turns) at the intersection; however, their tracking path generally requires both lanes of the roundabout.

As suggested by KCDC, an additional approach lane on Mill Road for left turns could be provided. However to accommodate this, additional land would be required from the property on the northwest corner or significant changes to the deflection at the roundabout. These changes are not warranted based on the low volume of traffic using this approach and the satisfactory performance of this movement and the whole roundabout with the current layout.

Analysis of the CAS database shows that, in the fourteen month period since the construction of the two-lane roundabout there have been eight crashes, as discussed earlier in Section 4.3. Only one of these crashes has resulted in a minor injury with the remaining seven crashes being damage only accidents, the accidents examined do not show any particular crash trends.

Overall the roundabout operates well with sufficient capacity, an acceptable geometric layout and a relatively high number of low severity crashes in a short period of time. Overall, it is concluded that the roundabout does not contribute to the queues and congestion for peak weekend traffic in Otaki, while on a typical day the design and capacity is sufficient to meet the current needs of SH1 and local traffic movements.

11 Southbound Congestion

As noted in Section 10, the congestion is directly related to the activities of the Otaki Town Centre.

11.1 Traffic

As discussed in Section 9.2, the southbound queue length was plotted against the SH1 traffic volume and the number of turning movements at Arthur Street. The queue is not directly related to the traffic volume since the volume of traffic continues to increase throughout the day; however the queue has died away by 5:00pm. Therefore it can be concluded that higher traffic volumes alone do not cause the queue to form.

The turning demand at Arthur Street is directly related to the start of the queue forming. However, the turning demand starts to drop before the queue reaches its peak. Once a queue forms, a bottleneck is created and the queue tends to grow. A small reduction in the number of turning vehicles is not sufficient to cause the queue to dissipate. Only with significant changes to the environmental conditions in the area does the queue dissipate.

Changes to the turning movements at Arthur Street would in part improve the flow of traffic (particularly right turn movements); however these are relatively light and provide the ability for motorists to park off of the State Highway. A safer and more efficient option for motorists wishing to access Arthur Street (west) would be for them to turn right at the roundabout and head down Dunstan Street. This could be achieved through a minor improvements in signage (refer Section 14.4).

11.2 Parking

The parking surveys undertaken on Sunday 21 September 2008 indicated that there is a significant demand for parking spaces around Otaki, and this was particularly evident on Market Days. However, the information gathered on occupancy rates on these busy days, indicates that there is sufficient space available for people to park, both on and off-street. Notwithstanding that, the issue of congestion is enhanced by people slowing to look for and manoeuvre into the parks along SH1. Drivers loop around the roundabout in their search for parks, however, improved signs informing drivers of parking availability may help alleviate this practice. It is also noted that since the surveys were undertaken, the project to provide additional carpark spaces in behind the shopping centre adjacent to the railway station has been completed and this has provided for additional future demand if required.

The plot in Figure 5 shows little discernable relationship between parking manoeuvres and the queue length. Based on visual observations, the parking manoeuvres cause some delay to the through traffic on SH1, but this does not seem to be a significant factor in the creation of the queue.

The data collected on the Friday of the Labour Day weekend (24 October 2008) showed significantly differing trends for parking demand when compared to the Sunday (26 October 2008). However, this is not surprising given that it was a long weekend and people were more likely to be heading out or passing through the township rather than stopping to shop. This also highlights that Otaki has built up a critical mass to the extent that it now operates as a shopping destination in its own right and not only acts as a place to stop when passing through.

11.3 Pedestrians

There is a strong correlation between increased pedestrian crossing demand and the formation of a traffic queue as shown in Figure 3. As congestion increased, pedestrian volumes decline throughout the day (however remain much higher than a typical day), but the queue continues to grow. This is most likely related to the fact that a queue does not dissipate easily once it is formed; only significant changes to the environment will enable the queue to die away. In the case of Otaki, the queue surveyed in the 2009 Labour weekend has died away by 5:00 pm which corresponds to the closure of most shops and significant reductions in the number of pedestrians crossing SH1, less traffic turning at Arthur Street and fewer parking manoeuvres on SH1. The overall environmental conditions change significantly in Otaki following the closure of the shops when there is limited retail activity and associated side friction.

Currently, with the zebra crossing (near Arthur Street) in place there is minimal delay to pedestrians, instead motorists must give way to any pedestrians wishing to cross which generates significant delays for motorists

and results in the formation of extensive queues during peak times. One solution to this problem could be the management or removal of pedestrian movements through the introduction of a signal controlled crossing, grade separation (over-bridge or underpass) or removal of the crossing completely. It is considered that any significant structure (over-bridge or underpass) in Otaki would have little or no benefit to users, be difficult to implement and have significant cost implications. The removal of the crossing could be considered viable through the creation of a shared use street environment, however this would only be possible if the road status altered and was found to carry significantly lower traffic volumes in the future. In the present form and function as a strategic state highway the removal of a formal crossing facility from this stretch of road would impact significantly on pedestrian accessibility and safety, particularly for vulnerable users such as those with disabilities, young children and the elderly.

Pedestrian actuated signals are therefore considered to be the most viable solution and are able to more equitably assign priority between pedestrians and motorists and reduce the delay for vehicles. However, this will result in some delay for pedestrians.

The Australian Manual of Uniform Traffic Control Devices[2] provides a set of conditions that can be used to justify the provision of a pedestrian actuated signal. If the pedestrian volume exceeds 350 pedestrians per hour for each of 3 hours and the traffic volume exceeds a total 1000 vehicles per hour both directions when there is a central pedestrian refuge a pedestrian signal is warranted.

Based on the pedestrian survey conducted on the 10th of June 2007, the traffic volume requirement is easily met with over 1300 vehicles per hour; however there were only 145 to 180 pedestrians per hour using the marked crossing. If the number of pedestrians crossing SH1 in the vicinity of the crossing (from 100m to the south, to 150m to the north) is considered then the pedestrian volume easily exceeds the 350 pedestrians per hour threshold.

Similarly, based on the data from the Monday of the Labour Day weekend (26 October 2009) the 1000 vehicles per hour threshold are easily met. However, the number of pedestrian using the marked crossing was much below the 350 pedestrians per hour threshold (The crossing was used 160 to 200 times per hour).

Alternatively Austroads[2] states that, 'a pedestrian crossing is justified and pedestrian volumes are very heavy and coincide with high traffic volumes to the extent that excessive delays to road traffic are likely'. In Otaki, a pedestrian crossing is justified based on this Austroads guidance since extensive queues form during peak periods. The provision of a signalised crossing would ensure that sufficient priority is assigned to the vehicles to minimise the delay they experience while maintaining an adequate level of service for pedestrians.

The New Zealand Pedestrian Crossing Facilities Calculation Spreadsheet[3] was also used to determine the impact of providing a signalised pedestrian crossing in Otaki. The spreadsheet calculates the net present value (NPV) of the delay to motorists and pedestrians. This spreadsheet was produced in February 2007, which predates the most recent changes to the Economic Evaluation Manual (EEM), therefore the economic benefits determined by this spreadsheet are based on a 25 year evaluation period (instead of the current 30 year evaluation period) and old discounting values. The use of the spreadsheet, with the outdated values, is considered acceptable for this preliminary assessment and will provide a relative sense of scale of the possible benefits.

The NPV of the delay to motorists with a zebra crossing is approximately $310,000. There is no delay cost to pedestrians since it is assumed they are able to immediately cross the road. By providing a signalised

[2] AS 1742.10-1990, Manual of Uniform Traffic Control Devices Part 10: Pedestrian Control and Protection

[3] New Zealand Transport Agency, The New Zealand Pedestrian Crossing Facilities Calculation Spreadsheet, 2007

pedestrian crossing, the NPV of the delay to pedestrians is $184,000 while the delay cost to motorists is $219,000. By providing a signalised crossing, the overall delay cost (considering both pedestrians and motorist) increases by $93,000 over the zebra crossing. However, by providing a signalised crossing the delay to motorists is reduced.

These figures are based upon the traffic and pedestrian volumes on a typical Sunday (by using survey data from Sunday 10 June 2007). The NPV of the delay to motorists calculation is based upon a table in the Guidelines for the Selection of Pedestrian Facilities[4] which predicts the average delay per vehicle based on the traffic volume and pedestrian volume. While the delay predicted by this table appears reasonable for the site conditions encountered in 2007, the excessive delay experienced during peak weekends is not captured by this methodology and the NPV of motorist delay with a zebra crossing during peak holiday periods is expected to be much higher. Appendix L provides a more detailed discussion of the assumptions used in this calculation and the methodology.

A PUFFIN crossing could be considered for this location since it would further minimise vehicular delays while providing a good level of service for pedestrians (refer Section 15.1).

[4] New Zealand Transport Agency, Guidelines for the Selection of Pedestrian Facilities

12 Waerenga Safety Assessment

As previously discussed in Section 4.1, in the five year period from 2004 to 2008 there has only been one crash related to the operation of the intersection. The lanes are well marked and there are adequate sightlines for drivers completing all turning manoeuvres at this intersection, as shown in Figure 5 below. No improvements to this intersection are required; however KCDC has said they would like to enhance the intersection to improve access for the local community and existing parking areas to the west. See Section 14.6 for possible further improvements to the intersection. These changes would allow drivers making a right turn from Waeranga Road to complete the manoeuvre in two stages and provide an increased merge taper length which is compliant with current New Zealand Standards.

Figure 6 - Existing Layout for Waerenga Road and SH1 Intersection

13 Other KCDC Concerns

Associated with this assessment and previous work carried out in Otaki, KCDC have provided some recommendations for improving the traffic and parking situation in Otaki. Some of these measures have been incorporated into the options sections (see sections 14 to 17). The others are addressed below:

- **Do nothing/status quo** – we do not believe that this is an acceptable solution. The background data included in this report highlights that a problem exists, however it is recognised that the problem is concentrated around certain times.
- **Otaki rail service lane improvements (improve entrance, seal and mark parking spaces in Sunday market area**) – NZTA and KCDC maintenance staff are working together to make improvements to this area. Recent improvements have also incorporated a toilet facility to the south of Otaki in this vicinity which helps to reduce the number of people using the facility outside the Information Centre on the western side of SH1. As a result this has reduced the need for motorists to stop and cross the road at this location. The improvements to the service lane are part of a KCDC project to improve this area. The significant parking demand in this area is was highlighted by the high occupancy rate of the parking area at the southern end of the service lane (85%). However, our surveys have highlighted that there are other parking areas closer to the shopping areas that are currently under utilised.
- **Create recessed bus lay-bys** – we understand this recommendation has arisen from problems caused by buses blocking SH1 traffic when they load/unload passengers and people parking in the bus stops. Bus lay-bys make it more difficult for buses to fully pull into and out of the stop. To address the issue with buses blocking SH1 the bus bays should be lengthened and/or enhanced and there should be more rigorous enforcement of the parking restrictions (refer Section 14.5)
- **Create short term car parks adjacent to the Otaki information centre** – This option could be considered, although if access was to be provided into and out of the proposed parking area from SH1 then this is likely to create additional delays to through traffic. The area identified for parking to be sited is a valuable piece of green amenity space and appears to be well used by both the local community and passing motorists. No further work has been undertaken as part of this study, however it could form part of a wider masterplan for Otaki in the future.
- **Resurface roundabout and improve road markings** – This work has been completed.
- **Create clearway in peak direction on long (holiday) weekends** – This option (B3) is presented in section 15.
- **Encourage greater usage of off-street car parking, especially railway car park** – We believe that the current signage from the SH1 is adequate, and any other education should be a KCDC led initiative to educate shopping patrons.
- **Improve entry-exit point at Arthur Street – Vehicle swept paths** into and out of Arthur St west were checked prior to the construction of the improved pedestrian crossing facilities. However, due to physical constraints at the site it would be difficult to improve the intersection further without putting in some form of control (e.g. traffic signals). This would have a significant impact on the traffic flow through the town. Alternatively should option (B2) or (B1) in section 15) be considered, this would improve the sight distance for vehicles on Arthur St and help the intersection operate more safely and efficiently.
- **Look at parking restrictions on highway to encourage use of free/unlimited off-street parking** – this option (A1) is presented in section 14.
- **Review pedestrian crossing points and location of refuge islands** – a review as part of the pedestrian crossing study was undertaken which identified three locations for crossing points (refer section 8). The work to implement these changes has already been completed.
- **Improve visibility of off-road cycleway, connectivity and restrict vehicles parking on it** – NZTA and KCDC should work together to investigate the possibility of installing some signs on the State Highway and locally to improve the visibility of the cycleway. KCDC should investigate the use of bollards to restrict vehicles parking on the cycleway or the entrance to the cycleway. This would be particularly important if parking is limited on the State Highway and the demand for off-street parking increases.

- **Consider further road user education, especially use of 2-lane roundabout** – based on our analysis the roundabout (and lane utilisation) is acceptable. Road user education could be completed by KCDC for local road users, however, it is noted that a significant proportion of those using the roundabout do not reside in the area, so it may be quite difficult to reach the target audience. Two lane roundabouts with approach flares and exit merge lanes similar to the Otaki roundabout are common-place and most drivers should be familiar with them. The markings and signage at the roundabout approaches are considered to be clear.

PART C –IMPROVEMENT OPTIONS AND RECOMMENDATIONS

This part of the report has been based upon options for change, which have been broken into four core components:

- Short term improvements – measures which could happen immediately or on a temporary basis.
- Medium term improvements – measures which could be implemented following planning design, consultation, design and funding approval (likely to require at least a one year implementation period).
- Long term options – measures which that require long term strategic planning and investment (likely to fit within a 10 year strategic plan or longer).
- Recommendations and associated implementation pathway.

The options presented and the recommendations made in this report are based upon the information collected, previous investigation work and the assessment undertaken for the purposes of this project. Meetings have been held between NZTA, KCDC and Opus to discuss the contents of the report, however limited consultation has occurred with key stakeholders and affected parties to evaluate the suitability of the options being presented and the recommendations made.

The original brief for this project was to examine the parking facilities and the impact the parking has on traffic flows and also assess the expected operation of the improvement options for SH1 through the township. This scope has evolved and the current report is not only focusing on the parking but wider transportation issues associated with Otaki and how these issues impact on through traffic, local traffic, businesses and the local community.

The primary focus of the options presented relates to the objective of improving traffic flow and associated congestion in Otaki, particularly in a southbound direction on Sunday afternoons and holiday weekends. In addition, this report (and inputs from KCDC) has identified a number of other options to improve wider transportation issues in the Otaki township.

A number of options were considered as part of this assessment that have not been included in this option assessment. Suggestions such as those identified for the Mill Road approach to the roundabout were not progressed as we failed to identify a suitable option that could be progressed, or provided little or no benefit to the objectives of the project. Therefore these options have not been discussed further in this part of the report.

14 Short Term/Temporary Options

Four short term options have been identified that could be considered to improve traffic flow through Otaki during peak periods. Options A1 and A2 are focussed around specific peak traffic flow periods, including holidays and Sunday afternoons. Options A3 and A4 are focussed on small improvements that could be made to improve the efficiency of traffic flow.

Other options to address existing transportation issues include:

A5 – Bus Stop Improvements (south of the roundabout)

A6 – Waerenga Road Safety Improvements

In addition to those options presented in this report, NZTA developed an alternative traffic management plan which could be implemented during periods of significant congestion and delay in a southbound direction. This option involved temporary traffic management restrictions from Mill Road and Arthur Street, refer Appendix M for details of the traffic management plan which has yet to be trialled. Based on the assessment undertaken in Part B of this report, such a traffic management plan may result in some improvements to the performance of the roundabout; however it is unlikely to address the fundamental problem associated with the flow breakdown in a southbound direction. Such a traffic management plan also has a significant cost

implication, has dis-benefits for the local community and could not easily be implemented on a more permanent basis (e.g. every Sunday afternoon).

14.1 Option A1: Parking restrictions (short term stay)

This option would involve applying a short term parking restriction (P30) to parking areas on the east of the highway during peak hour traffic. From previous surveys this would likely be on Sundays (2pm-5pm) and on Public Holidays (10am – 6pm), however this would need to be trialled to coincide with peak travel times.

The theory behind this option is that the short stay parking would act as a deterrent as people may decide that this is not sufficient time to shop/visit Otaki and will look for longer term off-street parks. However, in reality because the on street parks will be shorter stay, this option is likely to create more movements as people manoeuvre into and out of the parks. This would probably have a detrimental effect on the congestion and delays through Otaki as we believe that these movements into and out of on street parking contribute significantly to the cause of the congestion and delays.

Other issues with this option are:

- Compliance with and enforcement of the short stay restriction may be difficult
- The reduction in the number of parking manoeuvre conflicts may increase their speeds through the route this may have an effect on safety, however due to the large volumes of traffic and the need to still merge from two lanes into one south of the roundabout this effect is not considered to significant.
- The restriction of parking during peak times will divert motorists to off-street parks on Arthur Street, which may increase the number of conflict points at this intersection; however
- Surveys indicate that the majority of drivers are parking for less than 30 minutes, so this may have limited effect.

This would involve the installation of additional advance and parking layout signage, while also requiring enforcement to have the desired impact.

14.2 Option A2: Prohibiting peak parking

This option would involve prohibiting parking on the southbound side of SH1 during peak hour traffic. From previous surveys this would likely be on Sundays (2pm-5pm) and on Public Holidays (10am to 6pm); however this would need to be trialled to coincide with peak travel times.

The benefits of prohibiting parking from the southbound side of SH1 would create less conflicting movements and therefore minimise the effects on through traffic.

The issues with this option are:

- Compliance and enforcement with the restriction may be difficult and there is likely to be opposition from retailers.
- The reduction in the number of parking manoeuvre conflicts may increase their speeds through the route this may have an effect on safety, however due to the large volumes of traffic and the need to still merge from two lanes into one south of the roundabout this effect is not considered to be significant.
- The restriction of parking during peak times will divert parkers to off-street parks on Arthur Street, which may increase the number of conflict points at this intersection.

This would involve the installation of additional advance and parking layout signage, while also requiring enforcement to have the desired impact.

Discussions have highlighted that a trial of this option may be beneficial in determining whether it would be successful. Details of a traffic management plan that could be used to trial Option A2 has been included in Appendix M. It is proposed that this trial take place, subject to support from KCDC and the Otaki Community Board.

It would be important to ensure that there would be sufficient capacity in the off-street parking areas off Arthur Street to cope with the people who normally park on the State Highway. A brief analysis has shown that the new car-parking area adjacent to the railway station has the capacity to cope with the number of people that normally park on SH1, while other car parks on the local road network would provide spill over capacity.

14.3 Option A3: Increase length of merge lane south of the roundabout

This option would provide additional space for southbound vehicles exiting the roundabout to move through the route and assist in reducing delays for southbound traffic. This option was also discussed as part of the Otaki roundabout project in 2008 and was considered not desirable due to the location of others services and facilities.

Benefits:

- Reduce delays to southbound traffic; however, this is not seen to be the main cause of the delay.

Issues:

- Difficult to provide given the location of several accesses, bus stop and pedestrian refuges located just south of existing merge.
- May not get community support due to the removal of additional parking outside local businesses.
- May create additional safety issues for pedestrians crossing the route close to the information centre, toilets and other shopping facilities.

14.4 Option A4: Additional signage for northbound/southbound parking traffic.

This would provide advance signage to indicate those northbound drivers wishing to park for shopping purposes to turn onto Waerenga Road and then onto Dunstan Street to park and therefore removing some of the demand for parking on the highway. A safer and more efficient option for motorists wishing to access Arthur Street (west) would be for them to turn right at the roundabout and head down Dunstan Street. This could also be achieved through a minor improvements in signage.

Benefits:

- Assists in reduction of conflicts and vehicles movements adjacent to SH1 for northbound and southbound traffic.
- Decreases travel times for vehicles heading north.

Issues:

- Difficult to encourage drivers off the state highway where there is still parking available in areas located closer to the shopping area.

14.5 Option A5: Bus stop improvements.

The existing bus stops used by local and national bus services are could be enhanced to improve accessibility and reduce the impact stopping buses have on the through flow of traffic in both a north and south bound direction. Increasing bus cage lengths and associated entry and exit parking restrictions should be implemented to address the concerns held by bus drivers and the community. Increasing enforcement, both now and under an improved bus stop configuration is needed as address exiting driver behaviours. The improvement works are shown in below in Figure 7 and in Appendix O.

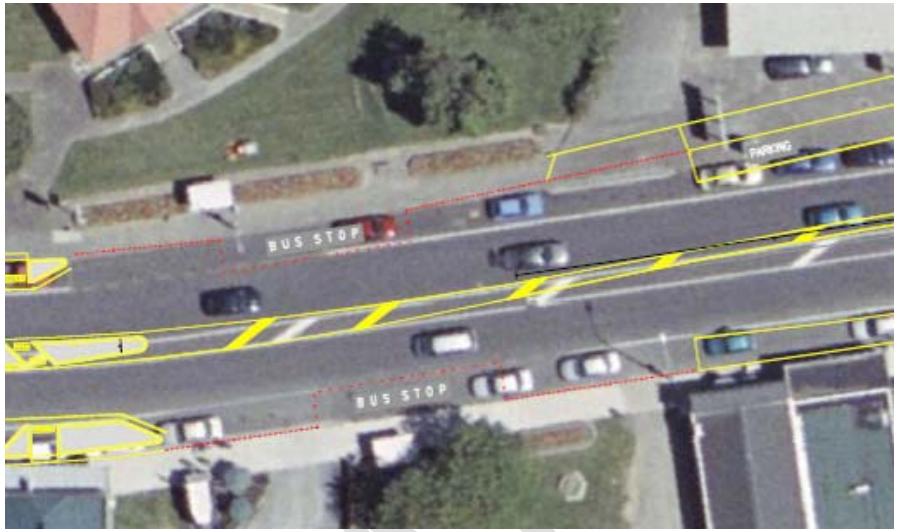

Figure 7 Bus Stop Improvements

Benefits:

- Increase accessibility and safety for buses accessing / exiting the bus stop and bus passengers using the stop.
- Reduced delay to through traffic caused by buses blocking or restricting through traffic.

Issues:

- Reduction in the number of parking spaces available on the State Highway (could be viewed as a positive in light of problems associated with parking movements).
- Essential that enforcement occurs and this has a cost implication.

Bus laybys were considered, however they would result in a greater loss of parking, footway and are likely to create a more protected parking area for illegal motorists.

14.6 Option A6: Waerenga Road safety improvements.

- This would involve a right turn bay for traffic exiting Waeranga Road in a southbound direction and increase the viability of this intersection for those wishing to park on the local road network or avoid the SH1 / Mill Road roundabout. The improvement works are shown in Figure **8** below and in Appendix P.

Figure 8: State Highway 1/Waeranga Road Safety Improvements

Benefits:

- Improved accessibility and safety for movements from Waeranga Road and the local road network to SH1.
- Relatively simple and cost effective measure to implement.

Issues:

- May result in a small increase in minor crashes at this location as drivers seek to merge with southbound SH1 traffic.

15 Medium Term Options

There are a four medium term options that could be considered to improve the flow of traffic (particularly in a southbound direction) and improve parking facilities along SH1 through Otaki. These all need further planning, consultation and design work to take into consideration that there are several conflicting issues through the township relating to; traffic flows, delays, parking demand, pedestrian movements, economic viability, and the need to create a sense of retain community interaction.

15.1 Option B1: Replace the Existing Zebra Crossing with a Signal Crossing

This option (as shown in Figure **9** and Appendix Q) would involve replacing the existing zebra crossing north of Arthur Street with a signal controlled pedestrian crossing and revised island layout. Recent changes to the alignment through Otaki have improved pedestrian crossing facilities, but failed to resolve the fact that heavy traffic flows coincide with heavy pedestrian demands in the weekends and during holiday periods to contribute to the southbound delay in particular. A pedestrian signal will reduce the delay both north and south bound while providing greater certainty to pedestrians.

To assist with the movement of traffic to and from Arthur Street and safety associated with the proposed crossing, the indicative location of the signal has been shifted approximately 10m north of the existing crossing and yellow box markings (or "keep clear") have been identified across the northbound lane at Arthur Street.

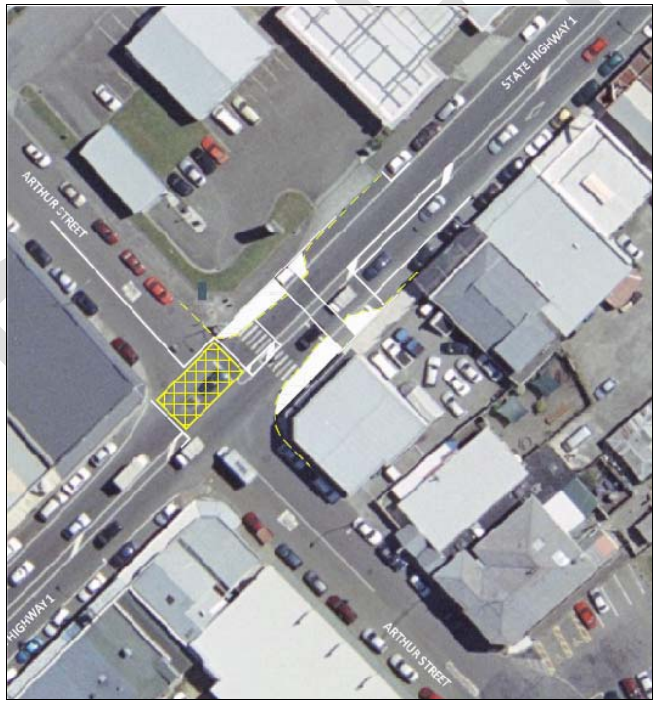

Figure 9 Signalised Pedestrian Crossing

This site is ideally suited to the use of a signalised Puffin crossing (Puffin – refer DTLR Traffic Advisory Leaflet 1/01, 1/02). The use of Puffin crossings in NZ is currently not permitted, however they are being trailed in Lower Hutt[5], with initial research proving to be extremely successful in encouraging pedestrians compliance. The next phase of this trail is planned to look at benefits to traffic (already proven overseas). Ultimately this location is ideally suited to a Puffin crossing due to the significant variability in traffic and pedestrian activity and the need to avoid lost time associated with false pedestrian calls on the strategic highway network.

The benefits of this option are:

- Management of traffic and a reduction in delay for through traffic, particularly during peak periods and times of heavy traffic flow (holiday weekends).
- Improved safety for pedestrians, particularly those with disabilities or more vulnerable.

The issues with this option are:

- Reduced accessibility and freedom for pedestrians (managed crossing movements).
- Could result in more pedestrians jay walking or avoiding the dedicated crossing point.
- Arthur Street and service station movements need to be managed.
- To retain the over dimension route through this area, the crossing distance may need to be wider than desirable, resulting in more delay than necessary (this needs further discussion and consideration).
- Cost implications and unlikely to be needed or warranted once a bypass is implemented.

Despite this option having a number of issues, these should be addressed through the planning and design phase, with consideration given to the installation of a puffin crossing in this location.

15.2 Option B2: Large kerb build-outs/parking manoeuvre areas

This option (as shown in Figure 10) would involve retaining the current parking arrangement with additional manoeuvring areas for those parking on the east side of the highway. The option would involve a reduction in lane widths (from 4m to 3.5m) and removal of the flush median to provide additional kerb build-outs. In addition the option would need to consider urban form to enhance the road space and not create an unusable space for the local community. The flush median on the eastern side of the highway would be for vehicles to move in and out of parking bays with minimal effect on the through traffic. This could be implemented with either signalised pedestrian crossing (preferred) or a revised zebra crossing layout.

The benefits of this option are:

- Reduction in lane width and speed of traffic through the route and therefore a reduction in risk to vulnerable road users and other manoeuvring vehicles.
- Vehicles parking on the eastern side of the highway can manoeuvre out of the carpark with limited disruption on through traffic and therefore create more even southbound traffic flows.

The issues with this option are:

- Could be an expensive option and will be disruptive.
- Cyclist safety may be affected with the narrower lane width; however, they could use the hatched zone when not used by vehicles.
- Reduced total width between islands may affect SH1's viability as an over-dimension route.

[5] Evaluation of Near-side Puffin Display, Opus, 2009.

- Likely to result in double parking as vehicles would not disrupt the through traffic.
- Maybe confusing for motorists.

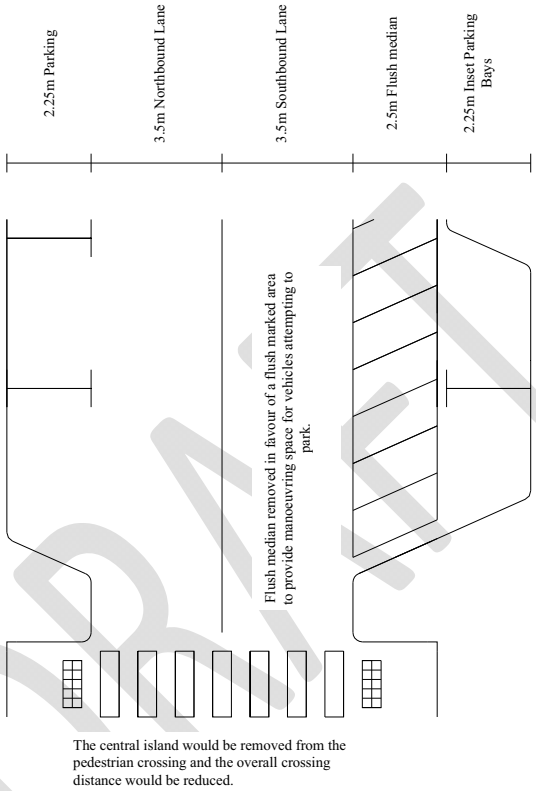

Figure 10 - Option B2

15.3 Option B3: Clearway with Increased Capacity

This option (as illustrated in Figure 11) would effectively remove the parking on the southbound side of the highway south of the roundabout during peak flows (e.g. Sunday 2pm-5pm and Public holidays 10am – 6pm) to cater for two lanes of southbound traffic through the township and therefore relieve congestion during these times. The details of this are included in Figure 11 below and an example sign with time restrictions is shown to the right.

Example sign

Benefits

- Assists in controlling travel delays and congestion.
- Shift merge away from roundabout during peak periods.

Issues

- Encourage vehicle use locally in particular which would create more demand and potentially delay on the network.
- May be difficult to enforce and therefore low compliance with the clearway restriction.
- Two southbound lanes will increase vehicle operating speeds through the highway and therefore increase risk to turning vehicles and pedestrians.
- Pedestrian kerb build-outs and marked pedestrian crossing would need to be removed and this would not be desirable from safety point of view.
- Would create a more vehicle focussed environment

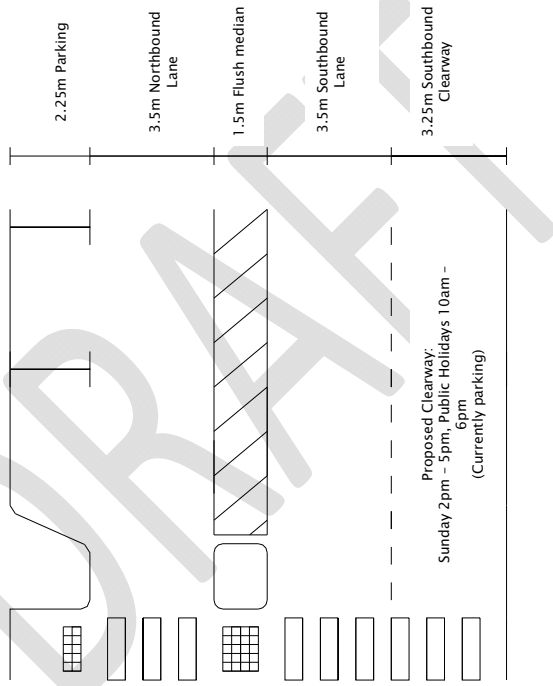

Figure 11 - Option B3

15.4 Option B4: Alternative routes for Southbound Parking Traffic.

Currently there are no alternative routes for southbound traffic wishing to park off-street without travelling through the township and using Arthur Street intersection. The creation of a link to the railway parking area from the north would encourage the use of this facility and reduce demand and need for the provision of better access directly off the State Highway. This option could be explored further in conjunction with

development plans to the north east of the highway and incorporate an access link to the parking adjacent to the Railway Station (as illustrated in Figure 12). This option may need to be completed in conjunction with clearway concepts outlined in Option A2 or B3 to encourage use and address the through flow problems on SH1. The success of this option would depend on whether enough vehicles used the parking, thus reducing the impact of the vehicle movements.

Benefits:

- Assists in reduction of conflicts for southbound traffic.
- Decreases travel times for vehicles heading south.
- Improve connectivity to and from residential areas.

Issues:

- Difficult to encourage drivers off the state highway if enforcement is limited and where there is still parking available in areas located closer to the shopping area.
- Likely to require associated traffic management and restrictions on SH1 in order to address the issues associated with southbound vehicle flows.

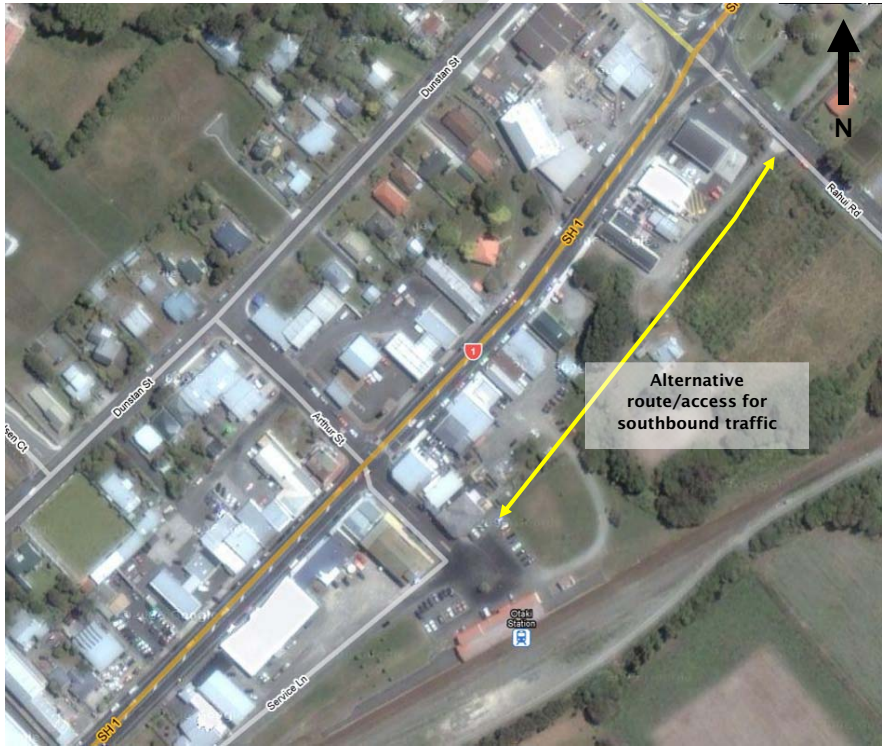

Figure 12 - Option B4 (Source: Opus Google Earth Pro Licence 2009)

16 Long Term Options

As previously noted there is only one long term option that has been presented to relieve the congestion on SH1 in Otaki. It should be note that other options have been considered in the past however, option C1 remains NZTA's preferred long term solution. This option is consistent with the Governments current Roads of National Significance (RoNS) policy, which seeks to improve the strategic link between Wellington Airport and Levin.

16.1 Option C1: Traffic Bypass

This option has been previously detailed in the SH1 Kapiti Strategic Study and recognises the conflicts between improving the efficiency of SH1 through Otaki and provided retail parking and appropriate pedestrian crossing facilities. NZTA have recently carried out further consultation on the preferred scheme for Otaki and a decision is expected before Christmas 2009 as to the future of this option and when it will be progressed.

It is anticipated that the next phase of the project will include design refinement, gaining designation and resource consents to proceed to detail design and implementation. This is consider to be the only long term option currently on the table.

Irrespective of what long term solution is finally agreed upon, there are significant cost implications and end solution should seek create a sense of place for Otaki, incorporating community objectives and issues, improve legibility of network, and minimise negative economic effects and loss of business.

The proposed alignment of the Otaki Bypass is shown in Figure 13.

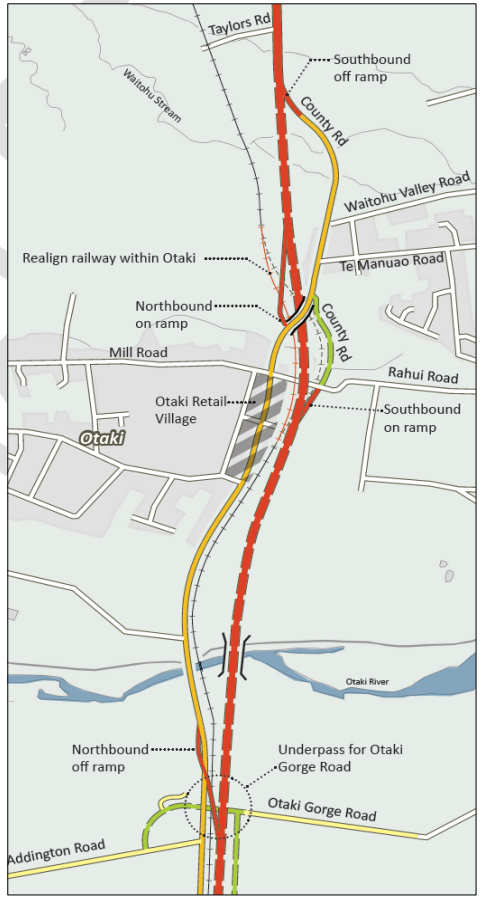

Figure 13 – Otaki Bypass Scheme (Reference: Kapiti SH1 Strategy Study Technical Report)

17 Recommendations and Associated Implementation Pathway

As discussed within the options, its is apparent that the implementation of changes such as traffic management improvements, parking restrictions, additional off-street parking facilities and improvements to through flow will have an effect on congestion and safety issues through the study area which is likely to be beneficial in the short term.

Is evident from the analysis undertaken in this report and previous reports produced that there are a number of conflicting uses occurring in Otaki which contribute to a deterioration in traffic conditions, poor environmental conditions, and the overall wellbeing of the streetscape. In order to address these concerns in the future, the long term traffic bypass (Option C1) needs to be implemented.

NZTA should continue to work with KCDC and the community to develop a long term traffic bypass scheme which reduces congestion, addresses safety issues, and improves the overall environment through Otaki Township while providing a strategic linkage between Otaki and the north.

In the short to medium term it is therefore recommended that a combination of measures need to be investigated and implemented, following consultation with the community and key stakeholders. These options have been placed in priority order and include:

1. Option B1: Replace the existing zebra crossing with a signal crossing. Given that the existing pedestrian movement has been identified as a major contributor to the breakdown in traffic flow during heavy demands, it is recommend that the investigation work should begin to install a signal crossing north of Arthur Street. Ideally a puffin crossing would be installed at this location in order to reduce delay to motorists and improve safety for pedestrians.
2. Option A2: Prohibiting Peak Parking. This option would be implemented first (through a traffic management trail) and would require a substantial amount of consultation and enforcement to make people aware of the changes. Note this would not involve drivers using the parking area as an additional southbound traffic lane.
3. Option A5: Bus Stop improvements. In addressing the problems associated with bus stop accessibility and enforcement it is recommended that modifications are made to the bus stops in both a north and south bound direction. The changes to the southbound stop could also incorporate increases to the merge length from the roundabout (Option A3), however this unlikely to address the objectives of this report.
4. Option A6: Waerenga Road Safety Improvements. This option would provide improved accessibility and safety for those vehicles exiting Waerenga Road, thus providing a better alternative for vehicles accessing SH1 southbound and avoiding delays associated with travel between the roundabout and Arthur Street. This a relatively low cost measure which could be implemented immediately.
5. If option A2 proves to be unsuccessful or results in significant local dissatisfaction, then option B2: Large kerb buildouts/parking manoeuvre areas could be developed. This option would require a significant amount of urban design input and the development of a streetscape plan.

Those options which involve changes to parking restrictions, it is recommended that KCDC, NZTA and the NZ Police work together to ensure the desired output of the proposed improvements is achieved. In order to do this, the local community and businesses will need to recognise the benefit of these measures. Based on the initial assessment undertaken, it would appear that motorists are more likely to stop in Otaki under 'typical' uncongested conditions, while environmental conditions are clearly improved through the movement or traffic.

It is recommended that longer term plans for strategic through traffic to bypass Otaki Township are progressed, while the options identified above are considered for implementation in the short to medium term.

Under NZTA project delivery procedures, there is likely to a need for further investigation and justification for particular options, however it may be possible to deliver improvements as a minor safety project or part of the ongoing maintenance programme for the state highway network. It is recommended that consideration is given to the long term form of Otaki and the timing of the proposed Otaki bypass project before

implementation occurs for any short term option which has a significant cost implication (eg. a signalised pedestrian crossing or redesign of the main street to include manoeuvre areas for parking).

Appendix A

Survey Data 10 June 2007

Otaki Pedestrian Crosssing Counts - 10 June 2007

Time	No of Time Zebra is used	No. of people using the zebra each time	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each time	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each time	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each time	Queue's (No. of) vehicles)	
			Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing
11.00-11.15	1	7	2	2	11.00-11.30	1	3	3	2	11.30-11.45	1	1	2	6	11.45-12.00	1	1	2	4
	2	6	1	1		2	2	3	2		2	2	2	3		2	2	2	0
	3	1	3	2		3	1	2	2		3	2	0	1		3	3	2	1
	4	2	3	2		4	1	3	2		4	1	3	2		4	1	1	1
	5	3	4	3		5	2	4	3		5	5	1	5		5	2	1	5
	6	1	1	1		6	4	0	2		6	2	0	3		6	4	1	3
	7	2	0	1		7	3	2	6		7	2	0	3		7	1	3	0
	8	2	1	2		8	2	1	4		8	1	3	2		8	1	0	1
	9	2	3	0		9	1	2	2		9	2	1	3		9	2	2	3
	10	1	2	2		10	1	0	0		10	1	1	3		10	2	0	2
	11	2	0	0		11	2	2	4		11	1	0	1		11	5	6	7
	12	2	1	3		12	3	2	2		12	2	1	0		12			
	13	1	2	1		13	2	0	3		13	4	0	3		13			
	14	1	0	0		14	2	1	8		14	1	0	2		14			
	15	1				15	1	1	2		15	5	1	3		15			
	16	2				16	2	3	3		16	1	2	3		16			
	17	5				17	5	1	8		17					17			
	18	4				18	4	0	4		18					18			
	19	2				19	2	1	2		19					19			
	20	2				20	2	3	10		20					20			
	21	2				21	2	1	5		21					21			
	22	4				22	4	3	6		22					22			
	23	1				23	1	0	2		23					23			
	24	3				24	3	0	10		24					24			
	25					25					25					25			

Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)	
			Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing
12.00-12.15	1	1	1	0	12.15-12.30	1	1	1	0	12.30-12.45	1	1	2	3	12.45-13.00	1	1	0	0
	2	3	5	1		2	1	2	1		2	5	3	5		2	4	3	2
	3	2	0	0		3	1	2	3		3	1	5	1		3	4	5	1
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	9	2	1	1		9	1	0	2		9	3	1	1		9	3	1	3
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	12	3	5	6		12	2	2	3		12	7	5	12		12	3	0	5
	13	1	0	2		13	1	3	3		13	2	1	1		13	1	1	1
	14	3	1	2		14	2	3	5		14	2	3	3		14	1	0	0
	15	1	2	3		15	1	3	3		15	2	3	3		15	2	1	1
	16	2	0	1		16	14	9	7		16	1	2	0		16	1	0	0
	17	2	0	2		17					17	3	1	0		17	2	2	2
	18					18					18	3	1	1		18			
	19					19					19	3	0	1		19			
	20					20					20	2	0	1		20			
	21					21					21	2	2	2		21			
	22					22					22	2	1	1		22			
	23					23					23	1	6	1		23			
	24					24					24	3	6	2		24			
	25					25					25					25			

Otaki Pedestrian Crosssing Counts - 10 June 2007 13/11/2009

Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)	
			Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing
13.00-13.15	1	2	1	1	13.15-13.30	1	1	0	1	13.30-13.45	1	1	0	2	13.45-14.00	1	2	8	3
	2	2	2	4		2	2	0	2		2	1	0	1		2	5	0	2
	3	2	2	3		3	2	0	1		3	2	0	0		3	2	0	2
	4	2	2	2		4	4	4	3		4	2	1	0		4	1	0	0
	5	1	0	2		5	2	3	2		5	2	2	2		5	5	2	2
	6	3	3	4		6	4	0	2		6	2	1	5		6	2	0	2
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	13	2	5	3		13					13	1	2	3		13			
	14	4	3	0		14					14	2	1	1		14			
	15	3	0	1		15					15	1	0	2		15			
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	19	1	0	2		19					19					19			
	20					20					20					20			
	21					21					21					21			
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	24					24					24					24			
	25					25					25					25			

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Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)		Time	No of Time Zebra is used	No. of people using the zebra each	Queue's (No. of) vehicles)	
			Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing				Nth of Xing	Sth of Xing
14.00-14.15	1	3	4	10	14.15-14.30	1	2	2	2	14.30-14.45	1	6	0	1	14.45-15.00	1	1	1	1
	2	2	3	10		2	2	0	1		2	1	3	3		2	6	1	4
	3	2	1	3		3	1	1	1		3	1	2	4		3	2	1	0
	4	2	3	0		4	1	1	2		4	1	6	1		4	1	2	0
	5	1	2	0		5	2	2	2		5	1	0	0		5	5	1	3
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	12	7	5	1		12	1	0	0		12					12	2	0	0
	13	2	3	0		13	1	1	0		13					13	1	0	0
	14	6	4	5		14	1	2	0		14					14	1	1	1
	15	2	4	0		15	2	2	1		15					15	2	4	3
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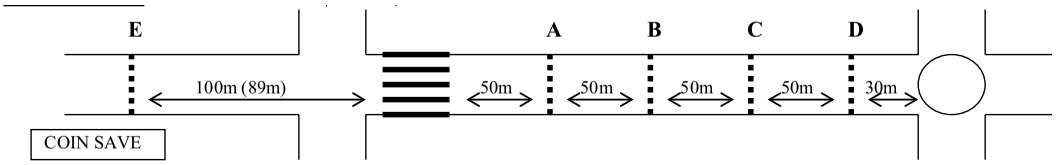
	17	2	3	2		17					17					17	2	9	4
	18	2	3	2		18					18					18			
	19	2	3	2		19					19					19			
	20	3	2	4		20					20					20			
	21					21					21					21			
	22					22					22					22			
	23					23					23					23			
	24					24					24					24			
	25					25					25					25			

Time	Nth Bound	Sth Bound
11.00-11.15	194	137
11.15-11.30	220	100
11.30-11.45	271	129
11.45-12.00	208	107
12.00-12.15	214	121
12.15-12.30	186	117
12.30-12.45	213	154
12.45-1300	195	108
13.00-13.15	222	133
13.15-13.30	173	119
13.30-13.45	172	137
13.45-14.00**	195	157
14.00-14.15	175	160
14.15-14.30	203	150
14.30-14.45	158	146
14.45-15.00	162	174



Time	SOUTH 0-100m (E) [89m]	NORTH 0-50m (A)	NORTH 50-100m (B)	NORTH 100-150m (C)	Totals
11.00-11.15	25	0	18	6	49
11.15-11.30	21	5	19	27	72
11.30-11.45	26	8	16	32	82
11.45-12.00	29	16	16	8	69
12.00-12.15**	26	6	28	10	70
12.15-12.30	13	9	26	7	55
12.30-12.45	20	5	21	7	53
12.45-13.00	12	6	20	10	48
13.00-13.15	24	4	15	5	48
13.15-13.30	26	7	16	11	60
13.30-13.45	30	3	21	65	119
13.45-14.00	27	9	19	11	66
14.00-14.15	20	2	45	13	80
14.15-14.30	14	3	21	10	48
14.30-14.45	15	11	14	8	48
14.45-15.00	37	1	15	13	66
Totals	**365**	**95**	**330**	**243**	

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Appendix B

Survey Data 21 September 2008

Date: 21/09/2008 Parallel Park P1 Parallel Park P1
Survey Name Echelon Park P2 Echelon Park P2
Street Name/Car Park SH1 (WS) No Parking NP No Parking NP

Start on Southside of the Road

	Comments	Type	11:00-11:30	11:30-12:00	12:00-12:30	12:30-13:00	13:00-13:30	13:30-14:00	14:00-14:30	14:30-15:00
1	Waerenga Rd/SH1 Intersection	NP								
2	New world supermarket	NP								
3		P1	XX14	UD69	UB20	UB20	UB20	UB20	BCQ2	EMF5
4		P1			ZN99		XD27	AT28	SQ66	UZ18
5		P1	BRY2	BRY2	BRY2	BRY2	BRY2	BRY2	BRY2	BRY2
6		P1	DSM7	DSM7	CQ74	ZG80	TJ25	ATY3	ATY3	ATY3
7		P1	DSD8	DSD8	DSD8	DSD8	DSD8	DSD8	DSD8	DSD8
8		P1								
9		P1	EHP1	EHP1	EHP1	EHP1	EHP1	EHP1	EHP1	EHP1
10	Exit	NP								
11		P1	TD22	TD22	TD22	TD22	TD22	TD22	TD22	TD22
12		P1	EL27	EL27	EL27	EL27	EL27	EL27	EL27	EL27
13	Exit	NP			JUDE	UL19				WR91
14		P1	CUM9	TZ18		TW20	YP19	EHU8	NW65	NW65
15		P1	XT92		WO96		RX87	EHU8		
16	Exit	NP								
17		P1	WO96	WO96	RQ88	RD70	DGM1	BLA1	BCT3	
18		P1	XI42	XI42	DKQ8	DWR3		EFR4	DSK7	DPK4
19	Exit	NP	DGG5	DGG5	TH71		AWL6	CRL7		CRG4
20		P1	DZS5	DZS5	DZS5	DZS5	BEU8	BEU8	BEU8	BEU8
21	Petrol Station Exit	NP								
22		P1	EEW8	EEW8	DTC3		DRL5	DGP7	DGP7	DGP7
23	Petrol Station Exit	NP								
24		P1	BEM9	ZQ53	UG35		TZ35	EMJ4	EMJ4	
25	Ped crossing	NP						CQP7		
26		P1	CEL5	CEL5	CEL5	CEL5	BRQ7	WD46	EGNL	EGNL
27		P1	ODG1	ODG1	ODG1	BWC3	BWC3	BWC3	BWC3	DDQ8
28		P1	SPP7	EQS2			UP56	UP56	UP56	
29		P1	ECY7	ECY7	ECY7	ECY7	ECY7	ECY7	ECY7	ECY7
30		P1			CHJ4		65YN	65YN	65YN	65YN
31		P1	DAR8	ZF80		CPM4	DNV5	DNV5		
32		P1	ZFIX	ZFIX	ZFIX	UE42	UE42	UE42	UE42	BHN7
33		P1	ATZ8	EMW9	DQR1	DQR1	DQR1	AYT4	AYT4	OGR8
34		P1	DMR2	EHU5	EHU5	EHU5	EHU5	EHU5	EHU5	
35		P1								ENR6
36	Arthur St. South	NP								
37	Arthur St. North	NP								
38	Ped crossing	NP								

SH1 (West) Parking Survey - 21 September 2008 13/11/2009

39	Petrol Station Exit	NP								
40		P1	YT14	YT14	AHP7	AHP7	AHP7	AHP7	BTF5	BTF5
41		P1	EAW1	EAW1	DNB1	CCK8	CCK8	APE9	PU20	
42		P1	BNQ8	CQJ7	CQJ7		AFB1		RI19	
43	Petrol Station Exit	NP								
44		P1	DSZ4	XF35	XF35	EQC6	EQC6	CLK6	END7	EGF7
45	Exit	NP								
46		P1	ATZ8	ABG6		BKH8	BKH8	UM83	UM83	UM83
47		P1			EUT1					
48	Ped crossing	NP								
49	Bus stop	NP		CAP9	YK50		DQQ8	BSW7		
50		P1		ZH29	EHT9	ZH29		DS25	DWF9	BDZ6
51		P1		DQA2	OX82					DGE2
52	Exit	NP			ZH29					
53		P1	RG29	RG29	RG29	RG29	RG29	RG29	RG29	RG29
54		P1	OR82	OR82	OR82	OR82	OR82	OR82	OR82	OR82
55		P1				TE16	ZF98		DBW8	WD31
56		P1				DER3			SPS9	
57		P1		TZ72					YQ10	
58		P1		CBQ9			SN80			1TEJ
59	Farm land Exit	NP								
60	Mill Rd/SH1 Intersection	NP								
	Page 2/2	**Finish time**								
	Parked		30	34	34	28	34	34	33	30
	percentage		75%	85%	85%	70%	85%	85%	83%	75%

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Date:	21/09/2008	Parallel Park	P1	Parallel Park	P1
Survey Name		Echelon Park	P2	Echelon Park	P2
Street Name/Car Park	SH1 (ES)	No Parking	NP	No Parking	NP

Start on Southside of the Road

	Comments	Type	11:00-11:30	11:30-12:00	12:00-12:30	12:30-13:00	13:00-13:30	13:30-14:00	14:00-14:30	14:30-15:00
1	Grass	NP	CMW1	CMW1	CMW1					
2	Grass	NP	XL53	XL53	XL53	XL53		UM59		
3	Grass	NP	YH72	YH72	YH72	YH72	YH72	YJ21	YJ21	
4	Grass	Np	YF50	YF50	YF50	YF50	YF50	YF50	YF50	
5	Grass	NP			BDA2		EQU7			
6	Grass	NP				YF50				
7	Waerenga Rd/SH1 Intersection	NP								
8		P1					BAA7	ENQ5	DSR2	EHR2
9		P1	DHM4	DHM4	DHM4	DHM4	BWZ4	DKR8		
10		P1	TQ66	DYZ1	PU95	PU95	PU95	PU95	PU95	S36
11		P1	NO69	NO69	CBM8	BCH4			DNU8	
12		P1		DTQ9	NO69	NO69		CUX5	BCJ2	
13		P1			EAM9	EAM9	BWU2			
14		P1	AZA4		TG93	TG93	UC99			UF49
15		P1	EMU4	EMU4		CMF	DFK1			
16		P1	CW53	CW53	CW53					
17	Exit	NP								
18		P1	EMS5	YK64	YK64	ANJ1	BQB3	32QW	UZ30	TQ79
19		P1	AE55			XF64	EBN7			
20		P1		ENK1	PL34	WD16	CLS8	TQ46		EMG1
21		P1	XP76	XP76	DAD2	AXK9	AXK9	AXK9	AXK9	CFQ7
22		P1	TS47	TS47	DMW2	DMW2	DMW2	NC98	DJB2	GN26
23		P1	DUK1	DUK1	DUK1	DUK1		EDR6	DEK7	DEK7
24		P1	ELR2	ELR2	ELR2	ELR2	ELR2	ELR2	ELR2	ELR2
25		P1	DZT7	DZT7		YM68	YM68			
26		P1	AJM3	AJM3	TH12		WE82	EB28	BBC5	BBC5
27		P1	SE52	SE52	AJM3	DYN1		CHA2	CPF5	DGB6
28		P1	BFD7	BFD7	BSF4	RD85	CNQ3	CNQ3	EL23	EL23
29		P1			BUN4	OC24	OC24	DPP3		
30		P1	DGQ4	DGQ4						
31	Exit	NP			CRS3	EBE6	DZA5	DZA5	DZA5	DZA5
32		P1	WD95	WD95	WD95	WD95	EJH2	BEB0	BEB0	
33		P1	DWG8	DWG8	BGS9	BGS9	YH97	BRU1	RW74	RW74
34		P1	DSN1	DSN1	CZE7	DJW3	CQF7	CQQ5	ZQ21	JNRE
35		P1	ZY11	DQQ5	WI11	WI11	BEW8			
36		P1	DSP2	DSP2	DSP2			YJ82	YJ82	YJ82
37		P1								
38		P1				XL38	XL38	XL38	XL38	XL38

SH1 (East) Parking Survey - 21 September 2008 13/11/2009

39	Ped crossing	NP								
40		P1	ECS6	CKS2	EBP3	DKG5	DKG5	BEN1	BEN1	BEN1
41		P1	IX86	IX86	IX86			ZF77	ZF77	ZF77
42		P1	SF30	DAD2	TUA7	TUA7	EDR6	EQC6	EQC6	EQC6
43		P1	EKY7	ELR2	AKG9	TLA7		SK10	ZI88	
44		P1	BWH3	EKY7		ABS9	DUU6	DUU6	BLN2	ATR8
45		P1		ART8	ART8	ART8	ART8	RFT6	CSP8	
46		P1	CMN2	YP49	WB98	WB98	WB98	WB98	GU60	BFE2
47	Arthur St South	NP								
48	Arthur St North	NP								
49	Ped crossing	NP					EA56			
50		P1	EKR4	XFS0	XFS0	AYQ4	SX66	EFA8	XC62	XC62
51		P1	EMH9	DRC9	DJA4	CBR9	CBR9	CET9		EPG9
52		P1	WW29	XQS7	XQS7	CZY6	DJW3	BMR6	CET9	CET9
53		P1	BKM6	BKM6	BKM6	BKM6	BKM6		EAC1	DNA8
54		P1	XB07				UGQ3	ZC82	BES8	BES8
55		P1	CWW9				TB91		ZL82	ZL82
56		P1		XR47	XR47				DQH5	
57		P1	DTJ5	DZ84	DZ84	DZ84	EAW8	EAW8	EWA8	CAJ7
58		P1	XB52	ZD85	ZD85	TNNA	NARI	AQB1	AQB1	EGS9
59		P1	AE51	CU17	BH27	DEQ9	TY32	DSC1	DSC1	
60		P1		ACG5	BKJ6		WH38	WH38		EPT8
61		P1		AEJ1	AEJ1	AEJ1			ELB6	
62	Ped crossing	NP								
63		P1	DRH3	SH34	AAI2	ZN12	EPT7	EPT7	AGR5	CBJ8
64	Exit	NP	SX60		CWZ7	DX35		EBQ7	CQQ6	
65	Bus stop	NP							SB97	EKC7
66		P1	TQ72						YY89	YY89
67	Exit	NP								
68		P1	DQQ5		BRL1	BFM4	BFM4	ZP77	XS90	BWU2
69		P1			CHF3	ERB7	ERB7		CJG2	AUN7
70		P1		BSG8	BSG8		AJZ9	EBB7	WO69	
71	Exit	NP								
72		P1		BSM5	BSM5	BSM5	BSM5			
73		P1	CCA3	BBS3	BBS3	BBS3	BBS3	BBS3	BBS3	BBS3
74		P1	ASH3	DZK2	DZK2	DZK2	DZK2	DZK2	DZK2	DZK2
75	BP Petrol Station Exit	NP								
76	Rahui Rd/SH1 Intersection	NP								
	Page /	**Finish time**	11:10	11:40	12:12	12:40	13:40	13:40	14:10	14:40
	Parked		47	48	52	49	48	44	46	38
	percentage		84%	86%	93%	88%	86%	79%	82%	68%

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Date: 21/09/2008 Parallel Park P1 Parallel Park P1
Survey Name Echelon Park P2 Echelon Park P2
Street Name/Car Park Arthur St. (NS) No Parking NP No Parking NP

Start on Westend of the Road

	Comments	Type	11:00-11:30	11:30-12:00	12:00-12:30	12:30-13:00	13:00-13:30	13:30-14:00	14:00-14:30	14:30-15:00
1	Dunstan St/Arthur St Intersection	NP								
2		P1	BNR2	BNR2	RY11	RY11	RY11	UM49	UK11	
3		P1	YK70	DCA9	DCA9	DCA9	DCA9	DCA9	OX40	OX40
4		P1	Y168	Y168	Y168	Y168	Y168	Y168	Y168	Y168
5		P1			EMT9	EMT9		XO93	XO93	XO93
6		P1	CFE9	CKE9	CHF9		ABH8		AQA2	AQA2
7	Petrolstation Exit	NP								
8		P1	DWP7	DWP7	ERC8	ERC8	ERC8	CHM7		DYN7
9		P1	DTQ9	CBY9	CBY9	EFS8	TY75	TY75	ATS4	ATS4
10		P1	ZU79	CJF2	CJF2	CJF2	CJF2			DEL7
11		P1	ANP2	ANP2	RG49	ST56	ST56	UW16		
12		P1	PE20	PE20	PE20	PE20	PE20	PE20	PE20	PE20
13		P1	WW14	WW14	WW14	WW14	WW14	WW14	WW14	WW14
14		P1								
15		P1								
16	SH1/Arthur St Intersection (W)	NP								
17	SH1/Arthur St Intersection (E)	NP								
18		P1	SJ92	SJ92	SJ92	SJ92	SJ92	SJ92	SJ92	SJ92
19	Exit	NP	CYT4	CYT4	CYT4		DFT3	DFT3		CU23
20		P1	SP30	SP30	AAF8	ARL3	ARL3	ARL3	ARL3	ARL3
21		P1	EMAT		SFD	SFD	SFD	SFD	SFD	SFD
22		P1	CLB9	ZX94	UL31			PQX1		
23		P1	CSC7	CSC7	CSC7	DLL5	2029	CHN9	CHN9	CHN9
24	Carpark Entrance	NP				CSC7	CSC7	CSC7	CSC7	CSC7
	Page 2/2	**Finish time**								
	Parked		16	15	17	15	16	16	13	15
	percentage		89%	83%	94%	83%	89%	89%	72%	83%

Date: 21/09/2008 Parallel Park P1 Parallel Park P1
Survey Name Echelon Park P2 Echelon Park P2
Street Name/Car Park Arthur St. (SS) No Parking NP No Parking NP

Start on Westend of the Road

	Comments	Type	11:00-11:30	11:30-12:00	12:00-12:30	12:30-13:00	13:00-13:30	13:30-14:00	14:00-14:30	14:30-15:00
1	Dunstan St/Arthur St Intersection	NP								
2		P1		AQY3	DZ57	BFQ7	BFQ7		YM68	YM68
3		P1		ECZ8		YF21	YF21		AFD1	AFD1
4	Exit	NP								
5		P1			ADH6	ADH6	AAA3	BWC1	BWC1	
6	Exit	NP								
7		P1	BTJ9	BTJ9	EGH8	EGH8	OMM5		JONS	ENW3
8		P1	DWJ5	XC79	ECD4	ECD4	UQ77	UQ77	UQ77	WO97
9		P1	CBF1			DCP4	DCP4	DCP4	DCP4	DCP4
10		P1	DDC2	DDC2	DDC2				LFAL	LFAL
11		P1	UC93	UC93	UC93	UC93	UC93	UC93		EJN4
12	SH1/Arthur St Intersection (W)	NP	RF34	RF34	RF34	RF34	RF34	RF34		
13	SH1/Arthur St Intersection (E)	NP			DYF3	DYF3	DYF3	DYF3		
14		P1	EER7	EER7	ARD7	DUQ2		CFT9	XT38	ENN4
15		P1	AGG8	DGF4	U160	U160		DBY6	BNE7	BNE7
16		P1	UI60	UI60	AMD7	BLW2	BLW2	ROMP		SKFN
17		P1	LJU4	YA54	YB75		UR10	CCP7	NN97	NN97
18		P1	UX54	YB75	85XY			XDEB		
19		P1	SF63	SF63	SF63	SF63	SF63		CEJ7	CNR3
20		P1	CMA9	CMA9	EDQ2	DCA2	DCA2	DCA2	XG87	RZ84
21	Carpark Entrance	NP								
	Page 2/2	**Finish time**								
	Parked		13	14	15	14	13	12	12	13
	percentage		87%	93%	100%	93%	87%	80%	80%	87%

Date: 21/09/2008 Parallel Park P1 Parallel Park P1
Survey Name Echelon Park P2 Echelon Park P2
Street Name/Car Park Car Park A No Parking NP No Parking NP

Start on Southside of the Road

	Comments	Type	11:00-11:30	11:30-12:00	12:00-12:30	12:30-13:00	13:00-13:30	13:30-14:00	14:00-14:30	14:30-15:00
1	Disable carpark	P2		ASP4	ASP5					
2	Disable carpark	P2	CPF5						ELR3	
3		P2	BEZ5	BEZ5	BEZ5	BEZ5	BEZ5	BEZ5	BEZ5	BEZ5
4		P2	AUZ3	AUZ3	AUZ3	AUZ3	AUZ3	AUZ3	AUZ3	AUZ3
5		P2		CLC7	BQG6	EPW9	EPD6	EPD6	YD59	YD59
6	Trees	NP								
7		P2	TN19	TN19	TN19	TN19	TN19	TN19	TN19	TN19
8		P2	PQ43	PQ43	PQ43	PQ43	CNL8	CK03	CK03	XR16
9		P2	ZE90	ZE90	DMB4	DMB4	DAM4	DAM4	DAM4	DAM4
10		P2	CHWL	CHWL	CHWL	DKP4	DKP4	DKP4	ATW3	ATW3
11		P2	BHR7		WS11	WS11	WS11	WS11	WS11	WS11
12	Trees	NP								
13		P2	ALP9	ALP9	ALP9	ALP9	DQU9		EHU3	EHU3
14		P2		ANM2	ANM2	ABS7	ABS7	ABS7	CRE9	DYS4
15		P2		TB74	TB74	XN73			CWP8	CAU1
16		P2			ARL3	TK23	TK23	TK23	TK23	
17		P2	TS42		BYU3	BYU3	XY32	BLT2		XF94
18		P2								
19	End row	P2	YB61	YB61	YB61	YB61	YB61	YB61	YB61	YB61
20		P2			UC44	UC44			CMZ9	CMZ9
21		P2			ELZ1	ELZ1		BFW4	BFW4	ASD6
22	End row	P2		AHN5	AHN5	AHN5	AHN5		XP83	XP83
23		P2	DCU6						AMS8	AMS8
24		P2		BMR5	EDH6	BFD7	BFD7	BFD7	BFD7	BFD7
25		P2	YR17	CUQ5	CUQ5	CUQ5	CUQ5	CUR3	CUR3	CUR3
26		P2	MRCE	MRCE	ZE77	ZE77	ZE77	ZE77	ZE77	ZE77
27		P2	AHK7	AHK7	AHK7	AHK7	AHK7	AHK7	AHK7	AHK7
28		P2		EHT6	CME7	CBY4	CBY4	DSP4	DSP4	DSP4
29		P2	XW96	CDA5	CDA5	DMT9	TJJN	TJJN	TJJN	TJJN
30		P2		AMS8	AMS8	AMS8	AMS8	AMS8	BYN3	BYN3
31	Trees	NP								
32		P2	ABH6	ABH6	ABH6	ABH6	ABH6	ABH6	ABH6	ABH6
33		P2	UK97	UK97	UK97		BNM1	BNM1	BJY3	YL15
34		P2	ANT9	BKR8	BKR8	BKR8	DMM5	CWS8	CWS8	CWS8
35		P2	WL78	WL78	WL78	WL78	WL78	WL78	WL78	WL78
36		P2	CEW2	CEW2	CEW2		EHJ1	CUQ6	AZA6	
37		P2	ABS5	ABS5	BAA7	CNM2	CNM2	CNM2	BSZ2	ZY35
38	End row	P2	EBG6	TX22	BBY4	BBY4	CWE9	CWE9	CWE9	DTJ3

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39	Turn	NP			UT32		XG16			
40		P2			BEUT	BEUT			CUY1	CUY1
41		P2	NH66	ABP5	ABP5	KE22	KE22	KE22	KE22	KE22
42		P2	YC49	YC49	YC49	XC96	XC96		CJJ8	CJJ8
43		P2	DLY5	DLY5	DLY5	EAJ1	EAJ1	EAJ1	EAJ1	EAJ1
44		P2		DAS7	DAS7	DAS7		CYS2	CYS2	CYS2
45		P2								
46		P2	WC43	WC43	WC43	WC43		CDE6	CDE6	CDE6
47		P2		DKD5	DKD5	DJL8	DJL8			
48		P2							CQP6	CQP6
49	Trees	NP								
50		P2		CZA1	CZA1	BLC9	BLC9	BLC9	RT64	
51		P2		AT44	CPY8	CPY8	CPY8	CPY8	CPY8	CPY8
52		P2				YY54				
53		P2								
54		P2				APY7	APY7	APY7	APY7	APY7
55		P2								
56		P2								
57	End row	P2								
58		P2								
59		P2								
60	End row	P2								
61		P2					BSC9	BSC9	BSC9	BSC9
62		P2								
63		P2				EQG9	EQG9			
64		P2			AEB7	AEB7	AEB7	AEB7	AEB7	AEB7
65		P2			ZS58					
66		P2			TW20	CBZ7				
67		P2			CECI	CECI				DWY3
68		P2			JKL6				WY39	
69		P2				DKL6	DKL6	DKL6	DKL6	DKL6
70		P2		DKL6	HOGE	HOGE		EMD1	EMD1	EMD1
71		P2		XS24					CEN2	CEN2
72		P2		CNQ2					CAB3	
73		P2		EQC8	EQC8	EQC8				
74	End row	P2	ZS21	ZS21	XX12	XX12		DTD1		WW47
75	Trees	NP								
76		P2			DZW4				EEF2	EEF2
77		P2			UE48	CWL5	CWL5		DYL5	DYL5
78		P2				EJZ9	EJZ9	EJZ9		
79		P2			RZ10	RZ10	RZ10			
80		P2		PURR	PURR	PURR	PURR	PURR	PURR	BYK8
81	End row	P2		CKQ4	CKQ4	DESL	YW77	YW77	YW77	YW77
82	House exit	NP								

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83	Working Area / Roundabout	NP		PRL1		ZCRU	ECD9	ECD9	ECD9	ECD9
84	Working Area / Roundabout	NP		XC53	XC53	AMY7	ECD9	ECD9	ECD9	ECD9
85	Working Area / Roundabout	NP					ECD9	ECD9	ECD9	ECD9
	Page /	**Finish time**	11:18	11:45	12:10	12:43	13:15	13:40	14:08	14:40
	Parked		28	44	56	55	48	45	56	53
	percentage		37%	59%	75%	73%	64%	60%	75%	71%

Date: 21/09/2008 Parallel Park P1 Parallel Park P1
Survey Name Echelon Park P2 Echelon Park P2
Street Name/Car Park Car Park B No Parking NP No Parking NP

Start on Southside of the Road

	Comments	Type	11:00-11:30	11:30-12:00	12:00-12:30	12:30-13:00	13:00-13:30	13:30-14:00	14:00-14:30	14:30-15:00
1	Disable carpark	P2								
2	Disable carpark	P2								
3		P2	WC76	WC76	WC76	WC76	WC76	WC76	WC76	WC76
4		P2		CCE6	CCE6	CCE6	CCE6			ECM8
5	End row	P2	OA58	OA58	OA58	OA58	OA58	OA58	OA58	OA58
6	Door exits	NP	ZP16	ZP16	ZP16	ZP16	ZP16	ZP16	ZP16	ZP16
7		P2	WS30	WS30	WS30	WS30	WS30	WS30	WS30	WS30
8		P2	ECT5	ECT5	ECT5	ECT5	ECT5	ECT5	ECT5	ECT5
9		P2	XX52	XX52	XX52	XX52		WN39	WN39	WN39
10		P2	DJW5	DJW5	DJW5	DJW5	DJW5	DJW5	DJW5	DJW5
11	End row	P2	ST61	ST61	ST61	ST61	ST61	ST61	ST61	ST61
12	Turn	NP								
13		P2	UT54	UT54	UT54	UT54	CGP9	CGP9		
14		P2	DBK7		DCW5		CWL2	CWL2	CWL2	CWL2
15		P2				ZP14	ZP14	ZP14	ZP14	
16		P2	EDA8	EDA8	EDA8	EDA8	EDA8	EDA8	EDA8	EDA8
17	End row	P2		TR4FIC	TR4FIC	TR4FIC	TR4FIC	TR4FIC	TR4FIC	TR4FIC
18	Turn	NP					UT54			
19		P2		DWD4	DWD4	DWD4				
20		P2	BZD7	BZD7	BZD7	BZD7	BZD7	BZD7	BZD7	BZD7
21		P2	YX77	YX77	YX77	YX77	YX77	YX77	YX77	YX77
22		P2				ZI52	ZI52			
23		P2								
24		P2								
25		P2	YM28	YM28	YM28	YM28	YM28	YM28	YM28	YM28
26	End row	P2					XM39	XM39	XM39	XM39
27		P2	CHL8			CAQ1	CAQ1			
28		P2	UJ35	UJ35	UJ35	XS73		END7		
29		P2	SR92	SR92	SR92	SR92	SR92	SR92	SR92	SR92
30		P2	CFA2	CFA2	CFA2	ABH6	ABH6			
31		P2	WT69	WT69	WT69	WT69	WT69	WT69	WT69	WT69
32	End row	P2								
33	Turn	NP								
34		P2	CMU9	CMU9	CMU9	CMU9	CMU9	CMU9	CMU9	CMU9
35		P2	ADC4	ADC4						
36		P2	ARE5	ARE5	ARE5	ARE5	ARE5	ARE5	ARE5	ARE5
37		P2	DJP1	ALA4	ALA4	DHN9				
38		P2	CAK5	CAK5	CAK5		CAK5			

39		P2	HA62	HA62	HA62					
40		P2	MI73	MI73	MI73					
41	Exit	NP								
42		P2	YH79	YH79	YH79					
43		P2	CHEQ	CHEQ	CHEQ	CHEQ	CHEQ	CHEQ	CHEQ	CHEQ
44		P2	WFT9	BSC6	BSC6			WR21		
45		P2	XANG	XANG	XANG	XANG	XANG	XANG	XANG	XANG
46		P2	WG48	WG48	WG48	WG48	WG48	WG48	WG48	WG48
47	End row	P2	OS85			AKR6	AKR6		ZT40	
48		P1	BMS3	BMS3		AQB1				
49		P1								
50		P1	AQN2	AQN2	AQN2	AQN2				
51	End row	P1				BGY5				
52	Turn	NP								
53		P2								
54		P2	ZJ67		RATT					
55		P2	ENY2					SL22		
56		P2			CDT3	EKG1	EKG1			
57		P2	AUP9	AUP9	AUP9		WN81	WN81	WUN81	WN81
58		P2	CWZ7	BUB8	BUB8	BUB8	BUB8	BUB8	BUB8	BUB8
59	End row	P2	DJP3		CHY4	CHY4				
60	Turn	NP			BSA5	BSA5			BDD7	BDD7
61		P2	EAW8	EAW8						
62		P2				EAH6				
63		P2	XX11	XX11	XX11					
	Page /	**Finish time**	11:30	11:58	12:25	12:51	13:20	13:47	14:17	14:45
	Parked		41	38	40	38	33	29	27	26
	percentage		73%	68%	71%	68%	59%	52%	48%	46%

Date:	21/09/2008	Parallel Park	P1	Parallel Park	P1
Survey Name		Echelon Park	P2	Echelon Park	P2
Street Name/Car Park	Car Park C	No Parking	NP	No Parking	NP

Start on Southside of the Road

	Comments	Type	11:00-11:30	11:30-12:00	12:00-12:30	12:30-13:00	13:00-13:30	13:30-14:00	14:00-14:30	14:30-15:00
1		P2	WJ58	WJ58	WJ58	WJ58	WJ58	NN97	APQ4	BUB8
2		P2	DAR9	DAR9	DAR9	DAR9	DAR9	DAR9	DAR9	DAR9
3		P2	AQY3	AQY3	BUJ2		BHT2	BKA4	CNL9	DTW9
4		P2	XA65	XA65	XA65	XA65	XA65	XA65	XA65	XA65
5		P2	BHC7	BUK7	UN26	UN26	UN26	UN26	UN26	
6		P2	YQ55	YQ55	YQ55		AAH9	AAH9	AAH9	AAH9
7		P2	CRA3	CRA3	CRA3	CRA3	CRA3	CRA3	CRA3	
8		P2	DRQ4	DRQ4	DRQ4	DRQ4	DRQ4	DRQ4	ZM53	ZM53
9		P2	AWY4	AWY4	AWY4		DZT4	DZT4		
10		P2	CCR8	WB25	WB25	WB25	WB25	WB25	WB25	WB25
11		P2	CPF5	YU58	EAD1	EAD1	BQC7	BQC7	YB99	
12		P2	CTP1	CTP1	CTP1	CTP1	CTP1	CTP1	CTP1	CTP1
13		P2	BTC3	BTC3	BTC3	BTC3	BTC3	BTC3	BTC3	
14		P2	RP14	RP14	RP14	RP14	RP14	RP14	RP14	RP14
15		P2	DWS6	DWS6	DWS6	DWS6	DWS6	DWS6	DWS6	DWS6
16		P2	TW15	TW15	TW15		EMG4	EMG4		
17		P1	TA11	TA11	TA11	TA11	TA11	TA11		
18		P1		NUTE	NUTE	NUTE				
19		P1	5PBE	5PBE	5PBE	5PBE	5PBE	5PBE	5PBE	5PBE
20		P1	5PBE	5PBE	5PBE	5PBE	5PBE	5PBE	5PBE	5PBE
21	TURN / EXIT	NP	XR45					CMU8	TA11	SU44
22		P1	CYT6	CYT6	CYT6	CYT6	CYT6	CYT6	CYT6	
23		P1	DYD2	DYD2	DYD2	DYD2	DYD2	DYD2	DYD2	DYD2
24		P1	MH99	MH99	MH99	MH99	MH99	MH99	MH99	
25		P1	EMG4	EMG4	EMG4	EMG4	BNF4	BNF4		CRA3
26		P1								
27	YELLOW LINE	NP	YB67	YB67	YB67	YB67	YB67	YB67	YB67	YB67
28	EXIT	NP								
	Page /	**Finish time**	11:30	11:58	12:25	12:51	13:20	13:47	14:17	14:45
	Parked		25	25	25	21	24	25	21	16
	percentage		100%	100%	100%	84%	96%	100%	84%	64%

Appendix C

Survey Data Labour Weekend 2008

Otaki Traffic Survey

Job No. 5-c1501.00
Task. 0005c

Surveys will be undertaken on two days:

- Between 15:00 – 20:00

On Friday 24th October 2008

- Between 12:00 – 18:00

On Monday 27th October 2008

A practice run/record is recommended.
It normally takes 1 hour drive from Wellington to Otaki.
Therefore we will start **at:**

- **13:30 On 24/10/2008**
- **10:30 On 27/10/2008**
- **Meet in Opus Wellington Office Level 7**

Three Surveys for each day will be carried out:

- Travel Time Survey
- Turning Count Survey
- Parking Survey

Detailed instructions are as following:

Opus International Consultants Limited
Wellington Office

Level 9, Majestic Centre
100 Willis Street, PO Box 12-003
Wellington, New Zealand

Telephone: +64 4 471 7000
Facsimile: +64 4 471 1397
Website: www.opus.co.nz

1. Travel Time Survey

On each survey day staff will use a vehicle to monitor travel times on the defined route on SH1.

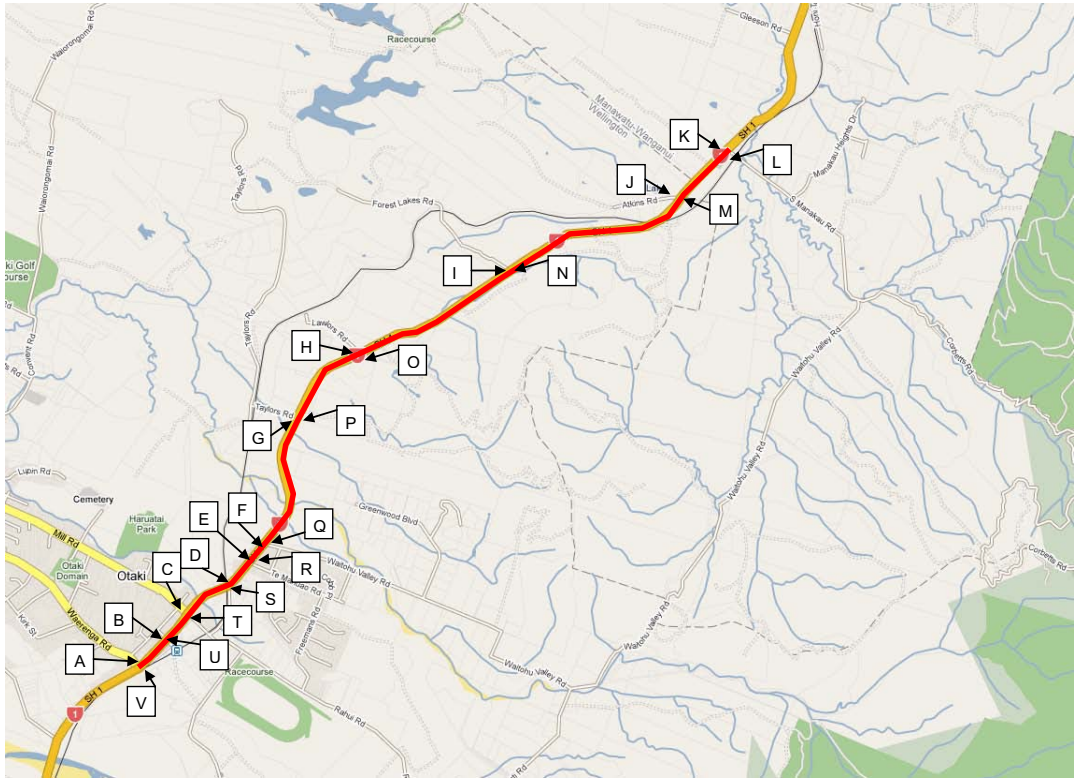
Route: is State Highway 1 in Otaki which starts at Waerenga Rd, passes through Otaki, turns back at South Manakau Rd and finishes at Waerenga Rd (see Graph 1).

Methodology

Two staff are required for this survey: One driver (Bob.H) and one recorder (Mingyue.W).

Each route has a start, a finish and intermediate timing points. The routes will be driven in a car with a passenger recording the time at pre-defined points along the route. A time management macro was used to record the time according to the laptop's internal clock into an MSExcel spreadsheet. The macro enabled the time to be recorded at the touch of a button thus reducing the likelihood of errors.

Graph 1: Otaki-Travel survey route



Route SH1 – median points
A=Start- Waerenga Rd/SH1 (NB)
B= Arthur St/SH1 (NB)
C= Mill Rd/SH1 (NB)
D= County Rd/SH1 (NB)
E= Te Manuao Rd/SH1 (NB)
F= Waitohu Valley Rd/SH1 (NB)
G= Taylors Rd/SH1 (NB)
H= Lawlors Rd/SH1 (NB)
I= Forest Lakes Rd/SH1 (NB)
J= Atkins Rd/SH1 (NB)
K=S Manakau Rd/SH1 (NB)
Right turn into S Manakau Rd, U-turn heading West and Left turn onto SH1 (SB)
L= S Manakau Rd/SH1 (SB)
M= Atkins Rd/SH1 (SB)
N= Forest Lakes Rd/SH1 (SB)
O= Lawlors Rd/SH1 (SB)
P= Taylors Rd/SH1 (SB)
Q= Waitohu Valley Rd/SH1 (SB)
R= Te Manuao Rd/SH1 (SB)
S= County Rd/SH1 (SB)
T= Mill Rd/SH1 (SB)
U= Arthur St/SH1 (SB)
V= Waerenga Rd/SH1 (SB)
Left turn into Waerenga Rd and U-turn back on SH1 (NB)

If have any questions, please feel free to contact me for assistance:

Best Regard

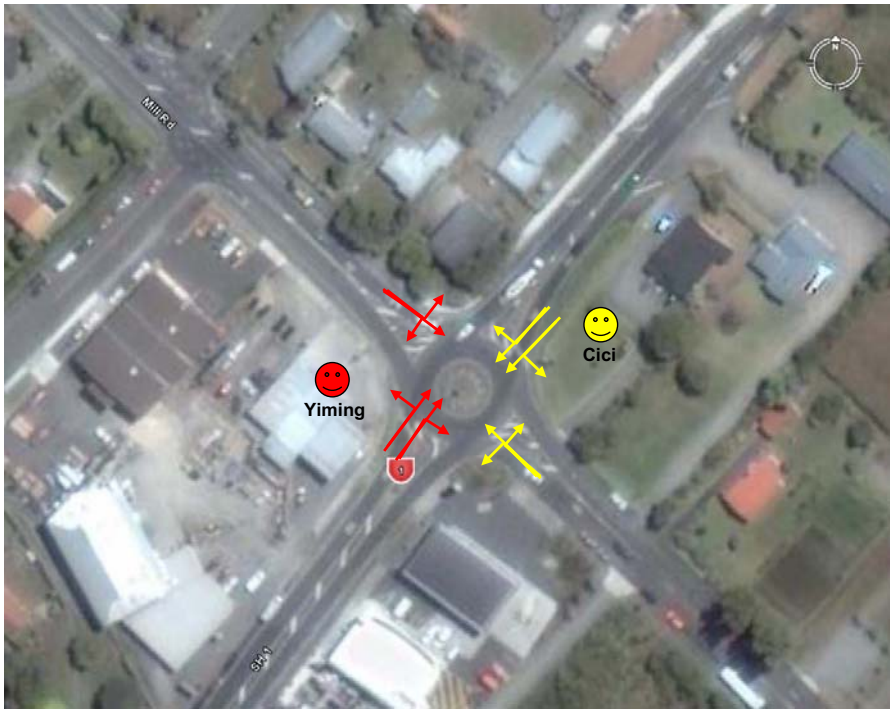
Hailin (Bob) Hu
Mob: 021 – 783 522
Ph: 04 – 4717 010 ext(x8010)
e-mail: hailin.hu@opus.co.nz

2. Turning Count Survey

1. **SH1 / Mill Rd**
2. **SH1 / Rahui Rd**

- **Count no. of car head to each direction for Every 5 mins**

Name	Site Position	Counts
Cici.Z	SH1 / Mill Rd	1.Left Turn Traffic from SH1(NB) to Mill Rd 2.Straight ahead Traffic on SH1 (NB) 3.Right turn Traffic from SH1(NB) to Rahui Rd 4.All movements from Mill Rd to SH1 and Rahui Rd
Yiming.X	SH1 / Rahui Rd	1.Left Turn Traffic from SH1(SB) to Rahui Rd 2.Straight ahead Traffic on SH1 (SB) 3.Right turn Traffic from SH1(SB) to Mill Rd 4.All movements from Rahui Rd to SH1 and Mill Rd



If you have any questions, please feel free to contact me for assistance:

Hailin (Bob) Hu
Mob: 021 – 783 522
Ph: 04 – 4717 010 ext(x8010)
e-mail: hailin.hu@opus.co.nz

3. Queue Length Survey

Four legs of Roundabout Intersection of Mill Rd/SH1/Rahui Rd:

1. **SH1 (NB) Approaching**
2. **Mill Rd Approaching**
3. **SH1 (SB) Approaching**
4. **Rahui Rd Approaching**

Count the no. of cars in the queue for each leg every 5 minutes.

If you have any questions, please feel free to contact me for assistance:

Hailin (Bob) Hu
Mob: 021 – 783 522
Ph: 04 – 4717 010 ext(x8010)
e-mail: hailin.hu@opus.co.nz

4. Parking Survey

Three targeting variables are identified for recording:

- No. of Vehicles
- Location of vehicles
- Duration of parking for each vehicle per site

According to these targets, a spreadsheet is designed for each car park; the surveyor is to record all information manually with a pen.

For SH1 between Waerenga Rd and Mill Rd, the surveyor will record the parking types (either no parking, parallel or angle) for each side of the road plus some comments. If a Car is parked, the first 4-digits of its number plate are recorded.

- **The survey is to run every half hour.**

If you have any questions, please feel free to contact me for assistance:

Hailin (Bob) Hu
Mob: 021 – 783 522
Ph: 04 – 4717 010 ext(x8010)
e-mail: hailin.hu@opus.co.nz

On Site Instructions

It is **your responsibility** to report to the survey supervisor at the appropriate location promptly at the beginning of your shift. You will be directed to your survey station.

Survey Supervisors will be on hand to assist in the hand-over of equipment from one enumerator to another; they will know your names.

When you arrive on site:

- Check that you have been given the correct equipment and/or survey forms
- Write your name on any forms in the space provided
- Check your watch against the supervisor's time and note both times on the form i.e. your time and the supervisors time.
- Start and stop work as instructed by the Supervisor (or according to your written instructions if you are working at an unsupervised site).
- When you have finished each task, pass the equipment back to the Supervisor. Equipment and survey forms are needed for data processing later on. Please note the forms should be left with the Supervisor
- If you are unsure of any observation please circle the affected value(s). At the conclusion of the survey write any notes on the back of the sheet to explain why you where unsure about an observation. This will assist us in correcting the survey if necessary.
- Be exact about any times you record (i.e. if you are late to arrive on site or if you were absent from the survey during any recorded period). If we know that there are errors, we can allow for them, otherwise the whole survey may need to be re-done at great expense because cross-checks on the data will show up inconsistencies.

<u>GENERAL NOTES:</u>

This is a group effort. Some tasks rely on each other to produce a complete data set. Any "gaps" in the data will reduce (or destroy) the value of the survey. Also, please remember to be polite to any members of the public. Do not obstruct footpaths. If you are asked what you are doing, say it is a "Kapiti Traffic Survey". It is nothing to do with the Police.

If it rains please keep your data sheets dry (each Supervisor has cling film available) but carry on collecting data in the rain unless the Supervisor tells you to stop.

Call your supervisor if you need to be relieved for a while for a toilet break or otherwise.

Bring suitable clothes and dress appropriately for the climatic conditions.

You will need to provide pens and pencils (please bring both although we will have spares). You should have access to a digital watch for the recording of times.

SAFETY IS THE MAIN PRIORITY. No enumerator will be required to work on the roadway, but it may be necessary to cross roads in order to move between survey locations: when doing so, take the utmost care. Do not rush even if you fear being late.

Appendix D

Survey Data Easter Weekend 2009

MetroCount Traffic Executive - Opus International Consultants

Speed Statistics by Hour

SpeedStatHour-21 -- English (ENZ)

Datasets:
Site: **[01N01001SBD] Otaki SBD**
Direction: 3 - South bound, A hit first, **Lane:** 0
Survey Duration: 13:40 Sunday, 5 April 2009 => 14:01 Friday, 17 April 2009
File: 01N01001SBD17Apr2009.EC0 (Plus)
Identifier: T3070FAD MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:
Filter time: **0:00 Sunday, 12 April 2009 => 0:00 Monday, 13 April 2009**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 10259 / 108638 (9.44%)

Speed Statistics by Hour

SpeedStatHour-21
Site: 01N01001SBD.0S
Description: **Otaki SBD**
Filter time: **0:00 Sunday, 12 April 2009 => 0:00 Monday, 13 April 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 10259
Posted speed limit = 60 km/h, Exceeding = 62 (0.60%), Mean Exceeding = 64.58 km/h
Maximum = 78.9 km/h, **Minimum** = 10.1 km/h, **Mean** = 43.3 km/h
85% Speed = 49.7 km/h, **95% Speed** = 53.3 km/h, **Median** = 43.6 km/h
20 km/h Pace = 33 - 53, **Number in Pace** = 9104 (88.74%)
Variance = 43.54, **Standard Deviation** = 6.60 km/h

Hour Bins

Time	Bin		Min	Max	Mean	Median	85%	95%	>PSL 60 km/h	
0000	59	0.6%	34.6	72.7	50.0	50.0	55.4	57.6	2	3.4%
0100	32	0.3%	39.8	63.6	50.4	49.7	55.8	58.7	2	6.3%
0200	34	0.3%	35.9	57.2	49.5	49.7	54.0	55.8	0	0.0%
0300	30	0.3%	44.1	66.6	51.4	50.4	56.9	59.0	1	3.3%
0400	36	0.4%	33.7	68.4	53.5	52.2	59.4	63.0	5	13.9%
0500	35	0.3%	30.7	71.7	52.3	50.4	59.8	67.7	6	17.1%
0600	75	0.7%	29.4	66.8	48.6	48.6	55.1	59.4	3	4.0%
0700	87	0.8%	17.8	67.8	46.6	47.2	53.6	56.2	1	1.1%
0800	290	2.8%	12.7	67.9	46.1	46.1	51.5	55.4	3	1.0%
0900	504	4.9%	12.2	67.1	42.1	42.5	48.6	51.5	3	0.6%
1000	642	6.3%	16.3	59.3	40.4	40.3	45.7	49.0	0	0.0%
1100	735	7.2%	20.1	60.9	38.5	38.5	43.9	48.2	2	0.3%
1200	748	7.3%	16.1	78.9	39.4	38.9	44.3	47.9	1	0.1%
1300	826	8.1%	15.1	63.0	38.6	38.5	44.3	47.5	1	0.1%
1400	914	8.9%	16.3	61.0	40.6	40.3	46.1	48.6	1	0.1%
1500	1039	10.1%	16.4	72.6	42.6	42.8	47.9	50.8	2	0.2%
1600	1078	10.5%	12.2	64.9	45.1	45.4	49.7	52.6	3	0.3%
1700	886	8.6%	13.1	58.9	45.6	45.4	50.0	52.9	0	0.0%
1800	675	6.6%	29.3	67.0	46.6	46.1	51.1	54.4	6	0.9%
1900	515	5.0%	19.2	77.1	47.2	46.8	51.5	54.0	5	1.0%
2000	425	4.1%	33.4	64.6	47.8	47.5	52.2	55.1	4	0.9%
2100	339	3.3%	10.1	64.4	47.3	47.5	52.9	55.4	4	1.2%
2200	173	1.7%	17.6	61.6	48.7	48.6	53.3	57.2	4	2.3%
2300	82	0.8%	10.5	67.6	50.6	50.8	56.9	59.0	3	3.7%
----	**10259**	**100.0%**	**10.1**	**78.9**	**43.3**	**43.6**	**49.7**	**53.3**	**62**	**0.6%**

MetroCount Traffic Executive - Opus International Consultants
Speed Statistics by Hour

SpeedStatHour-22 -- English (ENZ)

Datasets:
Site: **[01N01001SBD] Otaki SBD**
Direction: 3 - South bound, A hit first. **Lane:** 0
Survey Duration: 13:40 Sunday, 5 April 2009 => 14:01 Friday, 17 April 2009
File: 01N01001SBD17Apr2009.EC0 (Plus)
Identifier: T3070FAD MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:
Filter time: **0:00 Monday, 13 April 2009 => 0:00 Tuesday, 14 April 2009**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 10715 / 108638 (9.86%)

Speed Statistics by Hour

SpeedStatHour-22
Site: 01N01001SBD.0S
Description: **Otaki SBD**
Filter time: **0:00 Monday, 13 April 2009 => 0:00 Tuesday, 14 April 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 10715
Posted speed limit = 60 km/h, Exceeding = 59 (0.55%), Mean Exceeding = 63.05 km/h
Maximum = 77.1 km/h, **Minimum** = 11.4 km/h, **Mean** = 42.9 km/h
85% Speed = 49.3 km/h, **95% Speed** = 52.9 km/h, **Median** = 43.2 km/h
20 km/h Pace = 33 - 53, **Number in Pace** = 9424 (87.95%)
Variance = 45.19, **Standard Deviation** = 6.72 km/h

Hour Bins

Time	Bin		Min	Max	Mean	Median	85%	95%	>PSL 60 km/h	
0000	50	0.5%	36.9	69.9	51.2	50.4	56.5	61.9	4	8.0%
0100	30	0.3%	14.2	62.4	52.5	53.6	58.3	61.9	4	13.3%
0200	31	0.3%	41.8	65.4	53.3	52.9	58.7	60.1	5	16.1%
0300	31	0.3%	36.0	66.5	52.3	52.2	57.6	61.2	4	12.9%
0400	30	0.3%	42.1	65.1	53.8	53.3	60.8	63.4	5	16.7%
0500	61	0.6%	14.7	67.6	50.1	51.1	58.3	66.6	7	11.5%
0600	94	0.9%	20.5	60.0	47.1	47.5	53.3	56.5	0	0.0%
0700	138	1.3%	15.1	73.2	48.5	49.3	54.7	58.7	6	4.3%
0800	249	2.3%	12.7	60.6	44.2	45.0	50.8	53.6	1	0.4%
0900	493	4.6%	14.4	60.2	41.4	41.4	46.8	50.8	1	0.2%
1000	786	7.3%	12.1	54.5	36.4	36.4	42.5	45.7	0	0.0%
1100	369	3.4%	11.4	52.7	36.7	37.1	41.8	45.0	0	0.0%
1200	394	3.7%	20.1	61.3	37.9	37.4	43.6	47.5	1	0.3%
1300	811	7.6%	17.7	62.3	38.8	38.5	44.6	48.2	1	0.1%
1400	870	8.1%	16.7	58.1	39.3	38.9	45.4	48.6	0	0.0%
1500	883	8.2%	13.7	60.9	43.6	43.6	49.0	51.8	1	0.1%
1600	904	8.4%	15.6	61.0	42.8	42.5	47.9	51.8	1	0.1%
1700	1012	9.4%	20.3	59.4	43.9	43.6	48.2	51.5	0	0.0%
1800	1028	9.6%	15.2	61.9	44.6	44.6	49.3	52.2	1	0.1%
1900	1077	10.1%	30.1	61.6	45.7	45.7	49.7	52.2	2	0.2%
2000	684	6.4%	23.7	63.0	47.1	46.8	51.1	53.3	1	0.1%
2100	409	3.8%	34.9	64.5	48.1	47.9	52.6	56.2	5	1.2%
2200	197	1.8%	32.2	77.1	49.5	49.0	53.3	57.6	4	2.0%
2300	84	0.8%	28.7	70.9	50.6	49.7	56.2	60.8	5	6.0%
----	**10715**	**100.0%**	**11.4**	**77.1**	**42.9**	**43.2**	**49.3**	**52.9**	**59**	**0.6%**

MetroCount Traffic Executive - Opus International Consultants
Speed Statistics by Hour

SpeedStatHour-19 -- English (ENZ)

Datasets:
Site: **[01N01001] Otaki NBD**
Direction: 1 - North bound, A hit first. **Lane:** 0
Survey Duration: 13:23 Sunday, 5 April 2009 => 14:16 Friday, 17 April 2009
File: 01N01001NBD17Apr2009.EC0 (Plus)
Identifier: S4195GQ7 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:
Filter time: **0:00 Thursday, 9 April 2009 => 0:00 Friday, 10 April 2009**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 10303 / 100332 (10.27%)

Speed Statistics by Hour

SpeedStatHour-19
Site: 01N01001.0N
Description: **Otaki NBD**
Filter time: **0:00 Thursday, 9 April 2009 => 0:00 Friday, 10 April 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 10303
Posted speed limit = 60 km/h, Exceeding = 24 (0.23%), Mean Exceeding = 64.15 km/h
Maximum = 73.0 km/h, **Minimum** = 10.1 km/h, **Mean** = 34.3 km/h
85% Speed = 45.0 km/h, **95% Speed** = 49.3 km/h, **Median** = 35.6 km/h
20 km/h Pace = 28 - 48, **Number in Pace** = 6581 (63.87%)
Variance = 112.43, **Standard Deviation** = 10.60 km/h

Hour Bins

Time	Bin		Min	Max	Mean	Median	85%	95%	>PSL 60 km/h	
0000	28	0.3%	38.6	59.6	52.1	51.5	56.2	58.0	0	0.0%
0100	31	0.3%	29.0	69.3	50.8	48.6	56.2	65.2	5	16.1%
0200	41	0.4%	40.7	73.0	53.4	52.9	58.7	60.8	3	7.3%
0300	36	0.3%	36.1	71.5	52.4	51.8	56.2	61.9	4	11.1%
0400	55	0.5%	31.4	65.6	49.4	50.0	54.0	57.6	2	3.6%
0500	112	1.1%	20.4	65.0	48.9	49.0	54.0	58.3	3	2.7%
0600	193	1.9%	16.7	63.7	46.7	47.5	51.8	54.0	3	1.6%
0700	257	2.5%	18.4	59.8	43.5	44.3	49.3	53.6	0	0.0%
0800	0	0.0%	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0%
0900	324	3.1%	17.9	55.3	36.3	37.4	43.2	46.8	0	0.0%
1000	742	7.2%	10.2	52.6	29.0	27.7	39.6	44.3	0	0.0%
1100	508	4.9%	10.2	57.8	28.9	28.1	38.9	43.2	0	0.0%
1200	840	8.2%	10.2	51.7	32.7	32.8	40.7	44.6	0	0.0%
1300	900	8.7%	10.6	57.2	27.6	27.4	37.8	42.5	0	0.0%
1400	877	8.5%	10.2	51.2	28.4	28.1	39.2	43.6	0	0.0%
1500	898	8.7%	10.2	54.9	25.4	23.4	36.7	41.0	0	0.0%
1600	813	7.9%	10.1	58.5	32.1	33.5	42.8	45.7	0	0.0%
1700	684	6.6%	15.3	56.9	39.0	39.6	45.4	47.9	0	0.0%
1800	870	8.4%	10.1	53.7	34.5	36.0	42.5	45.7	0	0.0%
1900	687	6.7%	10.9	54.1	38.3	39.2	44.6	47.5	0	0.0%
2000	582	5.6%	20.9	57.8	42.0	42.1	47.2	50.0	0	0.0%
2100	408	4.0%	19.0	59.4	43.1	43.6	47.5	51.5	0	0.0%
2200	245	2.4%	22.1	60.9	46.0	46.1	50.4	52.9	1	0.4%
2300	172	1.7%	23.6	71.7	46.5	46.1	50.4	53.6	3	1.7%
----	**10303**	**100.0%**	**10.1**	**73.0**	**34.3**	**35.6**	**45.0**	**49.3**	**24**	**0.2%**

MetroCount Traffic Executive - Opus International Consultants
Speed Statistics by Hour

SpeedStatHour-20 -- English (ENZ)

Datasets:
Site: **[01N01001] Otaki NBD**
Direction: 1 - North bound, A hit first. **Lane:** 0
Survey Duration: 13:23 Sunday, 5 April 2009 => 14:16 Friday, 17 April 2009
File: 01N01001NBD17Apr2009.EC0 (Plus)
Identifier: S4195GQ7 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:
Filter time: **0:00 Friday, 10 April 2009 => 0:00 Saturday, 11 April 2009**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 11100 / 100332 (11.06%)

Speed Statistics by Hour

SpeedStatHour-20
Site: 01N01001.0N
Description: **Otaki NBD**
Filter time: **0:00 Friday, 10 April 2009 => 0:00 Saturday, 11 April 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Vehicles = 11100
Posted speed limit = 60 km/h, Exceeding = 67 (0.60%), Mean Exceeding = 64.62 km/h
Maximum = 101.8 km/h, **Minimum** = 10.0 km/h, **Mean** = 35.6 km/h
85% Speed = 47.9 km/h, **95% Speed** = 52.6 km/h, **Median** = 35.3 km/h
20 km/h Pace = 28 - 48, **Number in Pace** = 6012 (54.16%)
Variance = 129.14, **Standard Deviation** = 11.36 km/h

Hour Bins

Time	Bin		Min	Max	Mean	Median	85%	95%	>PSL 60 km/h	
0000	136	1.2%	36.3	68.5	48.7	48.2	54.4	56.9	3	2.2%
0100	101	0.9%	22.1	66.0	51.0	50.0	58.7	61.9	13	12.9%
0200	91	0.8%	38.5	77.3	52.6	51.5	57.2	60.5	7	7.7%
0300	57	0.5%	25.1	68.4	53.1	52.6	59.0	65.5	8	14.0%
0400	85	0.8%	42.3	68.5	53.1	52.6	57.6	61.9	6	7.1%
0500	217	2.0%	17.3	64.0	49.5	49.7	54.0	57.2	5	2.3%
0600	363	3.3%	20.7	63.8	46.9	47.5	52.6	56.9	6	1.7%
0700	628	5.7%	12.6	64.0	45.1	46.1	51.5	55.1	3	0.5%
0800	896	8.1%	13.3	58.9	40.4	41.4	47.5	50.0	0	0.0%
0900	1032	9.3%	10.6	58.7	34.5	35.6	44.3	47.9	0	0.0%
1000	1057	9.5%	10.4	45.3	27.0	27.0	33.1	37.1	0	0.0%
1100	933	8.4%	10.6	47.8	25.2	24.5	31.3	35.3	0	0.0%
1200	967	8.7%	10.8	56.5	28.5	28.4	36.0	41.0	0	0.0%
1300	995	9.0%	10.4	46.4	26.1	25.9	31.3	34.9	0	0.0%
1400	602	5.4%	10.2	44.0	24.6	24.1	32.4	35.3	0	0.0%
1500	774	7.0%	10.8	56.7	33.6	33.5	43.6	46.8	0	0.0%
1600	582	5.2%	11.8	72.1	43.0	43.9	49.0	51.5	1	0.2%
1700	553	5.0%	18.1	67.5	44.7	45.4	50.8	54.4	4	0.7%
1800	338	3.0%	10.0	72.6	42.8	43.2	49.0	52.2	1	0.3%
1900	254	2.3%	21.7	101.8	46.9	46.8	51.8	54.4	3	1.2%
2000	156	1.4%	20.6	59.8	45.7	46.8	52.2	54.4	0	0.0%
2100	133	1.2%	16.6	66.6	46.0	46.4	51.5	55.1	3	2.3%
2200	83	0.7%	26.8	89.8	49.0	47.9	54.0	56.2	2	2.4%
2300	67	0.6%	34.9	63.9	49.8	49.7	55.1	57.6	2	3.0%
----	11100	100.0%	10.0	101.8	35.6	35.3	47.9	52.6	67	0.6%

MetroCount Traffic Executive - Opus International Consultants

Weekly Vehicle Counts

WeeklyVehicle-18 -- English (ENZ)

Datasets:
Site: **[01N01001SBD] Otaki SBD**
Direction: 3 - South bound. A hit first. **Lane:** 0
Survey Duration: 13:40 Sunday, 5 April 2009 => 14:01 Friday, 17 April 2009
File: 01N01001SBD17Apr2009.ECO (Plus)
Identifier: T3070FAD MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:
Filter time: **13:00 Wednesday, 8 April 2009 => 15:00 Wednesday, 15 April 2009**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 66880 / 108638 (61.56%)

Weekly Vehicle Counts

WeeklyVehicle-18
Site: 01N01001SBD.0S
Description: **Otaki SBD**
Filter time: **13:00 Wednesday, 8 April 2009 => 15:00 Wednesday, 15 April 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Hour	Wed 08 Apr	Thu 09 Apr	Fri 10 Apr	Sat 11 Apr	Sun 12 Apr	Mon 13 Apr	Tue 14 Apr	Averages 1 - 5	Averages 1 - 7
0000-0100	*	35	80	40	59	50	47	53.0	51.8
0100-0200	*	29	48	26	32	30	26	33.3	31.8
0200-0300	*	47	51	39	34	31	32	40.3	39.0
0300-0400	*	66	66	39	30	31	44	51.8	46.0
0400-0500	*	103	57	48	36	30	66	64.0	56.7
0500-0600	*	162	69	72	35	61	195	121.8	99.0
0600-0700	*	329	122	120	75	94	345	222.5	180.8
0700-0800	*	429	135	217	87	138	524	306.5	255.0
0800-0900	*	553	309	423	290	249	509	405.0	388.8
0900-1000	*	539	441	385	504	493	601	518.5	493.8
1000-1100	*	531	677	342	642	**786<**	660	**663.5<**	606.3
1100-1200	*	**594<**	**767<**	**712<**	**735<**	369	**688<**	604.5	**644.2<**
1200-1300	*	586	728	690	748	394	670	594.5	636.0
1300-1400	537	617	702	711	826	811	562	645.8	680.9
1400-1500	609	789	**823<**	688	914	870	755	769.2	778.3
1500-1600	712	**813<**	818	**773<**	1039	883	875	**820.2<**	**844.7<**
1600-1700	625	806	746	764	**1078<**	904	**914<**	799.0	833.9
1700-1800	642	773	543	617	886	1012	753	744.6	746.6
1800-1900	401	520	379	467	675	1028	470	559.6	562.9
1900-2000	263	394	296	526	515	**1077<**	298	465.6	481.3
2000-2100	192	337	215	323	425	684	229	331.4	343.6
2100-2200	136	247	136	201	339	409	139	213.4	229.6
2200-2300	98	203	116	153	173	197	122	147.2	151.7
2300-2400	68	107	65	86	82	84	65	77.8	79.6
Totals									
0700-1900	*	7550	7068	6789	8424	7937	7981	7430.9	7471.3
0600-2200	*	8857	7837	7959	9778	10201	8992	8663.8	8706.6
0600-0000	*	9167	8018	8198	10033	10482	9179	8888.8	8937.9
0000-0000	*	9609	8389	8462	10259	10715	9589	9252.8	9262.2
AM Peak	*	1100	1100	1100	1100	1000	1100		
	*	594	767	712	735	786	688		
PM Peak	*	1500	1400	1500	1600	1900	1600		
	*	813	823	773	1078	1077	914		

*** - No data.**

Weekly Vehicle Counts

WeeklyVehicle-18
Site: 01N01001SBD.0S
Description: **Otaki SBD**
Filter time: **13:00 Wednesday, 8 April 2009 => 15:00 Wednesday, 15 April 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Hour	Wed 15 Apr	Thu 16 Apr	Fri 17 Apr	Sat 18 Apr	Sun 19 Apr	Mon 20 Apr	Tue 21 Apr	Averages 1 - 5	Averages 1 - 7
0000-0100	39	*	*	*	*	*	*	39.0	39.0
0100-0200	23	*	*	*	*	*	*	23.0	23.0
0200-0300	42	*	*	*	*	*	*	42.0	42.0
0300-0400	83	*	*	*	*	*	*	83.0	83.0
0400-0500	88	*	*	*	*	*	*	88.0	88.0
0500-0600	190	*	*	*	*	*	*	190.0	190.0
0600-0700	341	*	*	*	*	*	*	341.0	341.0
0700-0800	518	*	*	*	*	*	*	518.0	518.0
0800-0900	492	*	*	*	*	*	*	492.0	492.0
0900-1000	561	*	*	*	*	*	*	561.0	561.0
1000-1100	600	*	*	*	*	*	*	600.0	600.0
1100-1200	**631<**	*	*	*	*	*	*	**631.0<**	**631.0<**
1200-1300	626	*	*	*	*	*	*	626.0	626.0
1300-1400	620	*	*	*	*	*	*	620.0	620.0
1400-1500	720	*	*	*	*	*	*	720.0	720.0
1500-1600	*	*	*	*	*	*	*	*	*
1600-1700	*	*	*	*	*	*	*	*	*
1700-1800	*	*	*	*	*	*	*	*	*
1800-1900	*	*	*	*	*	*	*	*	*
1900-2000	*	*	*	*	*	*	*	*	*
2000-2100	*	*	*	*	*	*	*	*	*
2100-2200	*	*	*	*	*	*	*	*	*
2200-2300	*	*	*	*	*	*	*	*	*
2300-2400	*	*	*	*	*	*	*	*	*
Totals									
0700-1900	*	*	*	*	*	*	*	*	*
0600-2200	*	*	*	*	*	*	*	*	*
0600-0000	*	*	*	*	*	*	*	*	*
0000-0000	*	*	*	*	*	*	*	*	*
AM Peak	1100	*	*	*	*	*	*		
	631	*	*	*	*	*	*		
PM Peak	*	*	*	*	*	*	*		
	*	*	*	*	*	*	*		

*** - No data.**

MetroCount Traffic Executive - Opus International Consultants
Weekly Vehicle Counts

WeeklyVehicle-17 -- English (ENZ)

Datasets:

Site: **[01N01001] Otaki NBD**
Direction: 1 - North bound, A hit first. **Lane:** 0
Survey Duration: 13:23 Sunday, 5 April 2009 => 14:16 Friday, 17 April 2009
File: 01N01001NBD17Apr2009.EC0 (Plus)
Identifier: S4195GQ7 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: **13:00 Wednesday, 8 April 2009 => 15:00 Wednesday, 15 April 2009**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Default Profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 60157 / 100332 (59.96%)

Weekly Vehicle Counts

WeeklyVehicle-17
Site: 01N01001.0N
Description: **Otaki NBD**
Filter time: **13:00 Wednesday, 8 April 2009 => 15:00 Wednesday, 15 April 2009**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Hour	Wed 08 Apr	Thu 09 Apr	Fri 10 Apr	Sat 11 Apr	Sun 12 Apr	Mon 13 Apr	Tue 14 Apr	Averages 1 - 5	Averages 1 - 7
0000-0100	*	28	136	44	53	52	27	60.8	56.7
0100-0200	*	31	101	35	56	27	27	46.5	46.2
0200-0300	*	41	91	24	37	18	37	46.8	41.3
0300-0400	*	36	57	17	13	15	17	31.3	25.8
0400-0500	*	55	85	30	18	36	29	51.3	42.2
0500-0600	*	112	217	57	34	44	83	114.0	91.2
0600-0700	*	193	363	109	78	95	183	208.5	170.2
0700-0800	*	257	628	199	167	163	397	361.3	301.8
0800-0900	*	0	896	407	316	314	528	434.5	410.2
0900-1000	*	324	1032	326	634	553	**693<**	650.5	593.7
1000-1100	*	**742<**	**1057<**	425	951	**812<**	296	**726.8<**	**713.8<**
1100-1200	*	508	933	**566<**	**957<**	757	290	622.0	668.5
1200-1300	*	840	967	342	**857<**	**710<**	640	**789.3<**	**726.0<**
1300-1400	542	**900<**	**995<**	432	755	697	329	692.6	664.3
1400-1500	622	877	602	617	515	567	675	668.6	639.3
1500-1600	593	898	774	721	765	0	637	580.4	626.9
1600-1700	754	813	582	766	686	425	**706<**	656.0	676.0
1700-1800	723	684	553	**790<**	604	470	643	614.6	638.1
1800-1900	493	870	338	640	386	371	476	509.6	510.6
1900-2000	343	687	254	342	258	232	273	357.8	341.3
2000-2100	214	582	156	200	199	167	212	266.2	247.1
2100-2200	181	408	133	137	157	124	120	193.2	180.0
2200-2300	138	245	83	143	101	85	104	131.0	128.4
2300-2400	76	172	67	70	69	57	75	89.4	83.7
Totals									
0700-1900	*	7713	9357	6231	7593	5839	6310	7306.1	7169.1
0600-2200	*	9583	10263	7019	8285	6457	7098	8331.8	8107.7
0600-0000	*	10000	10413	7232	8455	6599	7277	8552.2	8319.9
0000-0000	*	10303	11100	7439	8666	6791	7497	8902.7	8623.2
AM Peak	*	1000	1000	1100	1100	1000	0900		
	*	742	1057	566	957	812	693		
PM Peak	*	1300	1300	1700	1200	1200	1600		
	*	900	995	790	857	710	706		

*** - No data.**

Appendix E

Survey Data Labour Weekend 2009

OPUS

Video Survey Data - Labour Day Monday (26 October 2009)

13/11/2009

From	To	Northbound flows	Southbound flows	Queue (m) (From MWH)	Pedestrians crossing at controlled crossing	Pedestrians crossing south of controlled crossing	Pedestrians crossing north of controlled crossing	Turns into Arthur St (east)	Turns out of Arthur St (east)	Parking manoeuvres
12:00 p.m.	12:30 p.m.	226	407	0	72	69	56	42	24	24
12:30 p.m.	1:00 p.m.	232	384	30	108	109	89	42	36	34
1:00 p.m.	1:30 p.m.	241	432	0	98	128	86	31	27	25
1:30 p.m.	2:00 p.m.	580	426	900	102	111	106	33	25	35
2:00 p.m.	2:30 p.m.	292	422	2400	91	111	92	27	21	39
2:30 p.m.	3:00 p.m.	209	455	3000	81	96	102	27	27	35
3:00 p.m.	3:30 p.m.	168	458	3600	87	91	73	15	27	24
3:30 p.m.	4:00 p.m.	267	465	3600	72	56	53	4	13	33
4:00 p.m.	4:30 p.m.	156	463	3800	54	43	74	6	13	27
4:30 p.m.	5:00 p.m.	187	504	N/A	46	41	36	7	10	20
5:00 p.m.	5:30 p.m.	77	561	N/A	0	5	25	1	4	18

OPUS

Appendix F

Crash Analysis Data

Otaki Traffic and Transportation Report

Waerenga Road – SH1 (2004-2008)

November 2009

First Street	Distance	D/I	R	Second street or landmark	Crash Number	Date DD/MM/YYYY	Day	Time HHMM	Description of Events	Crash Factors (ENV = Environmental factors)	Road	Natural Light	Weather	Junction	Cntrl	Tot F A T	Inj S E R	M I N
WAERENGA ROAD	100	N		SH 1N	2714115	15/12/2007	Sat	0806	CAR1 EBD on WAERENGA ROAD lost control turning right, CAR1 hit Post Or Pole on right hand bend	CAR1 alcohol test result unknown, too fast entering corner	Dry	Bright	Fine	Unknown	Nil			4
WAERENGA ROAD	10	W		SH 1N	2456177	12/12/2004	Sun	0920	VAN1 WBD on WAERENGA ROAD hit rear of left turning CAR2	VAN1 failed to notice car slowing, attention diverted ENV: entering or leaving other non-commercial	Dry	Bright	Fine	Driveway	Nil			
WAERENGA ROAD	50	W		SH 1N	2656320	02/12/2006	Sat	0400	CAR1 EBD on WAERENGA ROAD lost control turning right, CAR1 hit Post Or Pole on right hand bend	CAR1 alcohol test above limit or test refused, too fast entering corner	Dry	Dark	Fine	Unknown	Nil			
1N/995/5.676	100	N		WAERENGA ROAD	2853559	12/06/2008	Thu	1035	CAR1 NBD on SH 1N hit rear end of CAR2 stop/slow for queue	CAR1 failed to notice car slowing	Wet	Overcast	Heavy Rain	Unknown	Nil			
1N/995/5.676	100	N		WAERENGA ROAD	2855120	15/08/2008	Fri	0820	TRUCK1 SBD on SH 1N hit rear of SUV2 turning right from centre line	TRUCK1 alcohol suspected, misjudged speed of own vehicle ENV: entering or leaving other commercial	Dry	Bright	Fine	Driveway	Nil			
1N/995/5.768		I		WAERENGA ROAD	2451509	27/04/2004	Tue	1420	VAN1 NBD on SH 1N hit CAR2 turning right onto SH 1N from the left	CAR2 failed to give way at give way sign, didnt see/look when required to give way to traffic from another direction ENV: heavy rain	Wet	Overcast	Heavy Rain	T Type Junction	Give Way Sign			

November 2009

OPUS

Pedestrian Crossing – SH1 (2003-2007)

Otaki Traffic and Transportation Report

First Street	D I R	Second street or landmark	Crash Number	Date DD/MM/YYYY	Day	Time HHMM	Description of Events	Crash Factors (ENV = Environmental factors)	Road	Natural Light	Weather	Junction	Cntrl	Tot Inj F A T	S E R	M I N
Distance																
Z FCT CALTEX OTAKI	A	SH 1N	2512385	21/07/2005	Thu	1220	CAR1 EBD on Z FCT CALTEX OTAKI lost control turning right, CAR1 hit Parked Vehicle, Other on right hand bend	CAR1 medical illness (not sudden eg flu) ENV: entering or leaving specialised liquor outlet	Dry	Bright	Fine	Driveway	Nil			1
Z FCT MOBIL	50N	SH 1N/ARTHUR	2712907	13/07/2007	Fri	1900	SUV1 NBD on Z FCT MOBIL hit CAR2 manoeuvring, SUV1 hit Traffic Island, Post Or Pole	SUV1 alcohol test above limit or test refused, stolen vehicle CAR2 intentional collision	Dry	Dark	Fine	Unknown	Nil			1
1N/995/5.45	I	ARTHUR ST	2351086	08/02/2003	Sat	0800	CAR1 NBD on SH 1N sideswiped by TRUCK2 turning left	CAR1 overtaking on left, misjudged intentions of another party TRUCK2 swung wide at intersection	Dry	Bright	Fine	X Type Junction	Give Way Sign			
1N/995/5.458	I	ARTHUR ST	2412593	12/08/2004	Thu	1400	CAR1 WBD on SH 1N hit rear end of CAR2 stop/slow for PEDESTRIAN	CAR1 failed to notice car slowing	Dry	Overcast	Fine	X Type Junction	Give Way Sign			1
1N/995/5.57	120S	ARTHUR ST	2354023	27/08/2003	Wed	1650	VAN1 NBD on SH 1N lost control turning right on right hand bend	VAN1 too fast on straight, lost control when turning, lost control due to road conditions ENV: road slippery (rain), entering or leaving service station	Wet	Overcast	Light Rain	Driveway	Nil			
1N/995/5.608	150S	ARTHUR ST	2754155	25/07/2007	Wed	1240	CAR1 NBD on SH 1N hit CAR2 turning right onto SH 1N from the left	CAR2 failed to give way at driveway, wrong pedal ENV: entering or leaving service station	Dry	Overcast	Fine	Driveway	Nil			

November 2009

OPUS

Pedestrian Crossing – SH1 (Post Construction)

Otaki Traffic and Transportation Report

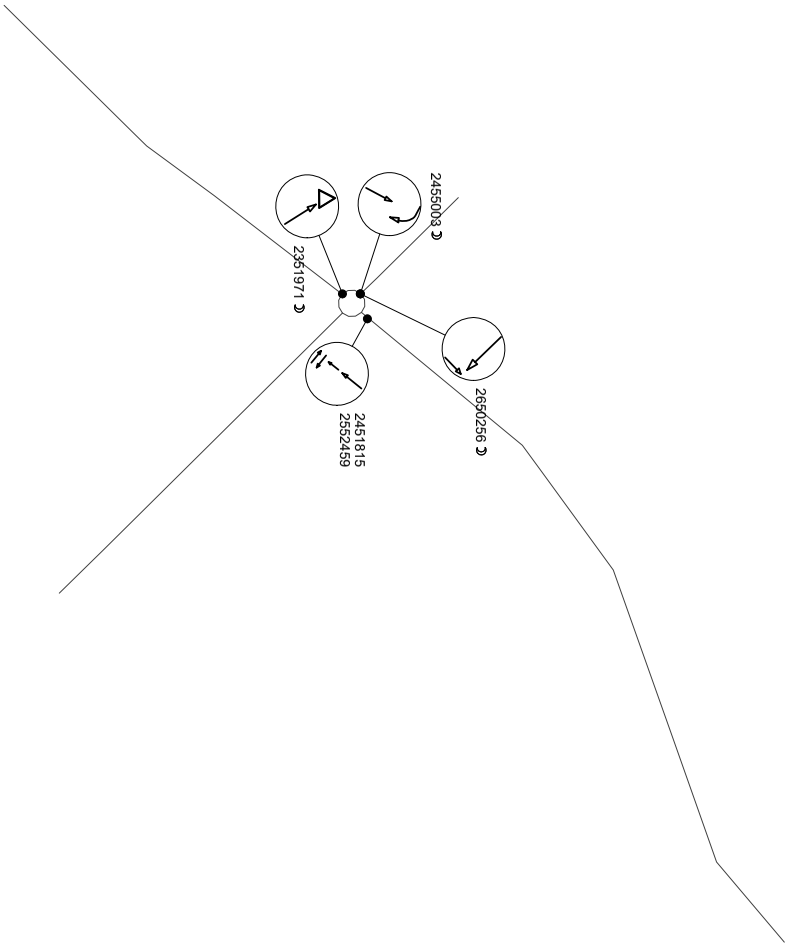
First Street	D I Distance R	Second street or landmark	Crash Number	Date DD/MM/YYYY	Day	Time HHMM	Description of Events	Crash Factors (ENV = Environmental factors)	Road	Natural Light	Weather	Junction	Cntrl	Tot Inj F A T	S E R	M I N
ARTHUR ST	20 W	SH 1N	2911113	29/01/2009	Thu	1630	CAR1 EBD on ARTHUR ST hit MOPED2 turning right onto ARTHUR ST from the left	MOPED2 too fast to give way at intersection, new driver showed inexperience ENV: entering or leaving service station	Dry	Bright	Fine	Driveway	Nil			1
1N/995/5.268	60 S	RAHUI ROAD	2951803	17/01/2009	Sat	1744	CAR1 SBD on SH 1N hit parked veh, CAR1 hit Vehicle	CAR1 too far left/right	Dry	Overcast	Fine	Unknown	Nil			
1N/995/5.308	100 S	MILL ROAD	2912032	09/06/2009	Tue	0904	CAR1 NBD on SH 1N hit SKATEBOARDER2 (Age 11) crossing	SKATEBOARDER2 failed to give way entering roadway not from driveway or intersection	Dry	Overcast	Fine	Unknown	Nil			1
1N/995/5.308	100 S	MILL ROAD	2954828	14/09/2009	Mon	1315	VAN1 SBD on SH 1N hit parked veh, VAN1 hit Parked Vehicle, CAR2 hit Parked Vehicle	VAN1 suddenly swerved to avoid object or for unknown reason, attention diverted by scenery or persons outside vehicle, driver over-reacted	Dry	Overcast	Fine	Unknown	Nil			
1N/995/5.338	120 N	ARTHUR ST	2950853	19/04/2009	Sun	1225	CAR1 NBD on SH 1N hit parked veh, CAR1 hit Parked Vehicle	CAR1 misjudged speed of own vehicle BUS2 parked or stopped not as close a practicable to side of road	Dry	Bright	Fine	Unknown	Nil			
1N/995/5.408	200 S	MILL ROAD	2954636	09/09/2009	Wed	0530	VAN1 NBD on SH 1N lost control; went off road to left, VAN1 hit Traffic Island, Kerb, Parked Vehicle	VAN1 fatigue (drowsy, tired, fell asleep)	Dry	Dark	Fine	Unknown	Nil			
1N/995/5.458	I	ARTHUR ST	2950688	28/01/2009	Wed	1445	CAR1 SBD on SH 1N hit rear end of SUV2 stop/slow for queue	CAR1 following too closely	Dry	Overcast	Fine	T Type Junction	Nil			
1N/995/5.538	80 S	ARTHUR ST	2857391	21/11/2008	Fri	1730	CAR1 SBD on SH 1N hit CAR2 manoeuvring	CAR1 misjudged intentions of another party	Dry	Bright	Fine	Unknown	Nil			
1N/995/5.676	100 N	WAERENGA ROAD	2855120	15/08/2008	Fri	0820	TRUCK1 SBD on SH 1N hit rear of SUV2 turning right from centre line	TRUCK1 alcohol suspected, misjudged speed of own vehicle ENV: entering or leaving other commercial	Dry	Bright	Fine	Driveway	Nil			

November 2009

OPUS

Mill Road – SH1 (2003-2007)

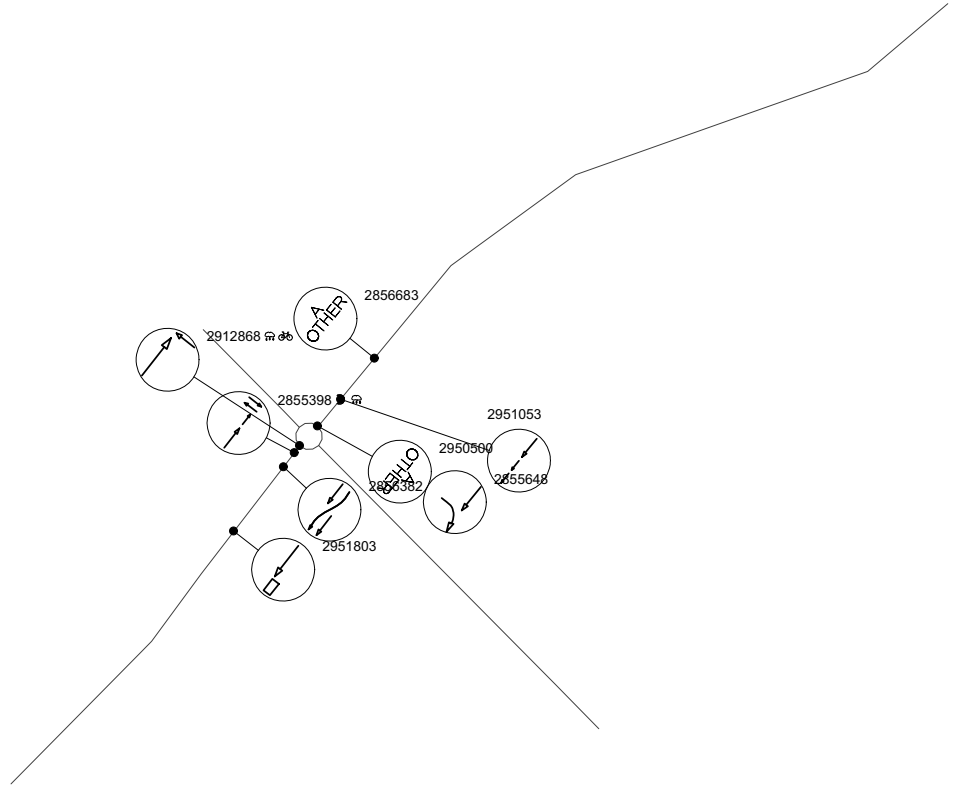
Otaki Traffic and Transportation Report



NZ TRANSPORT AGENCY
WAKA KOTAHI

First Street / Distance	D I R	Second street or landmark	Crash Number	Date DD/MM/YYYY	Day	Time HHMM	Description of Events	Crash Factors (ENV = Environmental factors)	Road	Natural Light	Weather	Junction	Cntrl	Tot Inj F A T	S E R	M I N
Z FCT CALTEX OTAKI	A	SH 1N	2512385	21/07/2005	Thu	1220	CAR1 EBD on Z FCT CALTEX OTAKI lost control turning right, CAR1 hit Parked Vehicle, Other on right hand bend	CAR1 medical illness (not sudden eg flu) ENV: entering or leaving specialised liquor outlet	Dry	Bright	Fine	Driveway	Nil			1
Z FCT SERV STN	A	SH 1N/RAHUI	2351741	14/04/2003	Mon	0845	CAR1 EBD on Z FCT SERV STN hit CAR2 manoeuvring	CAR1 misjudged speed of own vehicle ENV: entering or leaving service station	Dry	Bright	Fine	Unknown	Nil			
1N/995/5.184	I	RAHUI ROAD	2552459	27/05/2005	Fri	1250	CAR1 SBD on SH 1N hit rear end of CAR2 stop/slow for cross traffic	CAR1 following too closely	Dry	Overcast	Fine	Roundabo	Give Way Sign			
1N/995/5.184	I	RAHUI ROAD	2451815	06/05/2004	Thu	1200	CAR1 SBD on SH 1N hit rear end of CAR2 stop/slow for cross traffic	CAR1 alcohol suspected, failed to notice car slowing	Dry	Bright	Fine	Roundabo	Give Way Sign			
1N/995/5.196	I	MILL ROAD	2650256	23/01/2006	Mon	2235	CAR1 EBD on MILL ROAD hit CAR2 crossing at right angle from right	CAR1 alcohol test above limit or test refused, on incorrect side of the island or median, failed to give way at give way sign	Dry	Dark	Fine	Roundabo	Give Way Sign			
1N/995/5.196	I	MILL ROAD	2455003	06/10/2004	Wed	2138	CAR1 NBD on SH 1N hit CAR2 turning right onto SH 1N from the left	CAR2 alcohol test above limit or test refused, failed to give way at give way sign, didnt see/look when required to give way to traffic from another direction	Dry	Dark	Fine	Roundabo	Give Way Sign			
1N/995/5.208	I	MILL ROAD	2351971	14/04/2003	Mon	0030	CAR1 NBD on SH 1N hit obstruction, CAR1 hit Traffic Island, Post Or Pole	CAR1 too fast on straight, inattentive: failed to notice intersection or its stop/give way control	Dry	Dark	Fine	Roundabo	Give Way Sign			

Mill Road – SH1 (Post Construction)



OPUS

First Street	Distance	D I R	Second street or landmark	Crash Number	Date DD/MM/YYYY	Day	Time HHMM	Description of Events	Crash Factors (ENV = Environmental factors)	Road	Natural Light	Weather	Junction	Cntrl	Tot Inj F A T	S E R	M I N
1N/995/5.135	50N		MILL ROAD	2856683	19/12/2008	Fri	1100	CAR1 NBD on SH 1N overtaking TRUCK2	CAR1 overtaking	Dry	Overcast	Fine	Unknown	Nil			
1N/995/5.185		I	MILL ROAD	2950500	04/02/2009	Wed	1530	CAR1 SBD on SH 1N overtaking CAR2	CAR1 misjudged speed of own vehicle CAR2 failed to keep left on straight	Dry	Bright	Fine	Roundabo	Give Way Sign			
1N/995/5.185		I	RAHUI ROAD	2855648	07/09/2008	Sun	1400	CAR1 SBD on SH 1N hit MOTOR CYCLE2 merging from the right	CAR1 failed to give way at give way sign, didnt see/look when required to give way to traffic from another direction	Dry	Bright	Fine	Roundabo	Give Way Sign			
1N/995/5.185		I	RAHUI ROAD	2951053	22/02/2009	Sun	1630	CAR1 SBD on SH 1N hit rear end of SUV2 stop/slow for queue	CAR1 failed to notice car slowing, foot slipped or got caught under pedal	Dry	Bright	Fine	Roundabo	Give Way Sign			
1N/995/5.208		I	MILL ROAD	2855398	11/08/2008	Mon	1815	CAR1 NBD on SH 1N hit rear end of CAR2 stop/slow for cross traffic	CAR1 failed to notice car slowing	Wet	Twilight	Light Rain	Roundabo	Give Way Sign			
1N/995/5.208		I	RAHUI ROAD	2912868	24/09/2009	Thu	0830	CAR1 NBD on SH 1N hit CYCLIST2 (Age 11) crossing at right angle from right	CAR1 failed to give way at give way sign, attention diverted by other traffic, didnt see/look when required to give way to traffic from another direction	Wet	Overcast	Light Rain	Roundabo	Give Way Sign			1
1N/995/5.223	15S		MILL ROAD	2856382	28/09/2008	Sun	1530	TRUCK1 SBD on SH 1N changing lanes/overtaking to right hit CAR2	TRUCK1 misjudged intentions of another party	Dry	Bright	Fine	Roundabo	Give Way Sign			
1N/995/5.268	60S		RAHUI ROAD	2951803	17/01/2009	Sat	1744	CAR1 SBD on SH 1N hit parked veh, CAR1 hit Vehicle	CAR1 too far left/right	Dry	Overcast	Fine	Unknown	Nil			

Parking Assessment

In the Otaki Town Centre area, SH1 and Arthur St are commonly used for on-street parking while three car parking areas located along the Service Lane east of SH1 provide off-street parking. These parking areas are shown in Figure 1. Currently, there are no time restrictions on parking at any of these locations. Table 1, summarizes the parking capacity in each area.

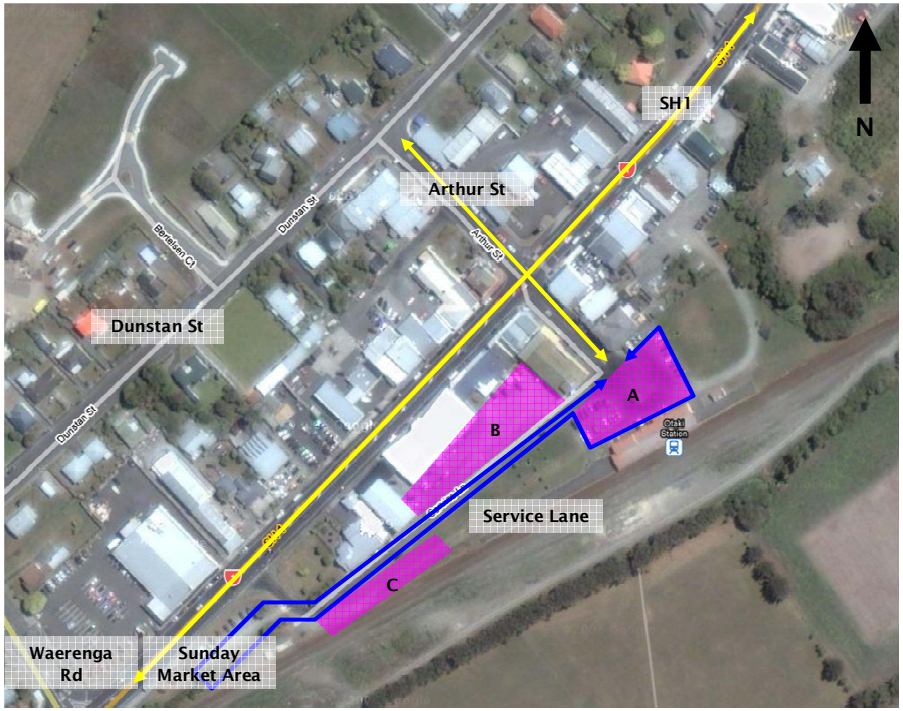


Figure 1 - Current Parking Facilities (Source: Opus Google Earth Pro Licence 2009)

Table 1 - Capacity of Parking Facilities

Location	Number of Parking Spaces
SH1 (between Waerenga Rd and Mill Rd)	96
Arthur St	33
Car Park A (adjacent to the Otaki Railway Station)	75
Car Park B (adjacent to a café and other shops)	56
Car Park C (south end of the service lane) (note this does not include gravel area where market is held)	25

On-street Parking Facilities

State Highway 1

The parking facilities on SH1 between Waerenga Rd and Mill Rd were surveyed. The highway is marked with an edge line to indicate the parking areas; however, no formal parking bays are marked. There are no time restrictions.

There is room for approximately 96 vehicles: 56 on the east side of SH1 and 40 on the west side of SH1.

SH1: Looking south towards Waerenga Rd.

Arthur St

Arthur St is a local road that crosses SH1. It extends from the Otaki Railway Station in the east to Dunstan St in the west.

There are no marked edgelines or parking bays along Arthur St. However there is ample space for parallel parking. On Arthur St there is room for approximately 15 vehicles east of SH1 and 18 vehicles west of SH1. There are no time restrictions on parking on Arthur St.

Arthur St: Looking east towards the railway station.

Dunstan St

Dunstan St is parallel to SH1 and extends from Waerenga Rd in the south to Mill Rd in the north. There are no edgeline or parking space markings along the route. There are no time restrictions on parking on Dunstan St. The parking on this street was observed, but not surveyed.

Dunstan St: Looking south from Arthur St.

Off-street Parking Facilities

Car parks A, B and C are located east of SH1 as shown in Figure 1. These car parks can be accessed from SH1 via Arthur St or the rest area entrance.

Car Park A

Car Park A is adjacent to the Otaki Railway station. It has 75 angled parking spaces, including two bays for mobility impaired users. Parking plans provided by KCDC indicate that this area has been expanded to 157 car parks including 4 bays for mobility impaired users and a motorcycle parking area.

Carpark A (adjacent to the Otaki Railway Station)

Car Park B

Car Park B has 56 marked spaces designed for use by the patrons of the adjacent shops and café. The parking lot has 2 spaces for mobility impaired users and the remaining spaces are a combination of parallel and angled parking bays

Carpark B (adjacent to a café and other shops)

Car Park C

Car Park C is located along the sides of the south end of the Service Lane. Up to 25 vehicles can be parked in this area with a combination of angle and parallel parking bays. There are no disabled parking spaces provided in Car Park C.

A Sunday Market is held on the adjacent parking lot on the first and third weekend of every month. As a result of the Sunday Market being in progress during the survey, the number of spaces in this lot was not surveyed.

Carpark C (south end of the service lane)

Otaki Traffic and Transportation Report

Results

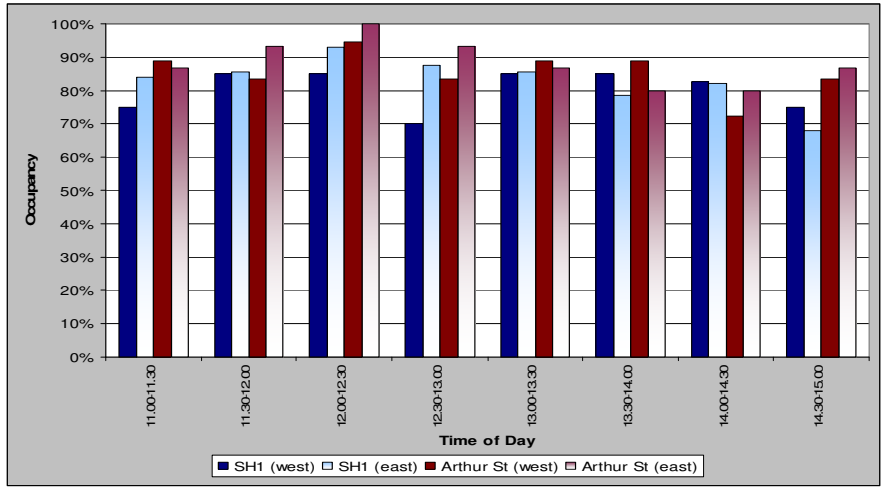


Figure 2 - Percent Occupancy of the On-street Parking on Sunday, 21st September

Table 2 - Parking Availability on Sunday, 21st September

		Time							
		11.00-11.30	11.30-12.00	12.00-12.30	12.30-13.00	13.00-13.30	13.30-14.00	14.00-14.30	14.30-15.00
SH1 (West) (40)	Occupied	30	34	34	28	34	34	33	30
	Available	10	6	6	12	6	6	7	10
	Percent Occupancy	75%	85%	85%	70%	85%	85%	83%	75%
SH1 (East) (56)	Occupied	47	48	52	49	48	44	46	38
	Available	9	8	4	7	8	12	10	18
	Percent Occupancy	84%	86%	93%	88%	86%	79%	82%	68%
Arthur St (West) (18)	Occupied	16	15	17	15	16	16	13	15
	Available	2	3	1	3	2	2	5	3
	Percent Occupancy	89%	83%	94%	83%	89%	89%	72%	83%
Arthur St (East) (15)	Occupied	13	14	15	14	13	12	12	13
	Available	2	1	0	1	2	3	3	2
	Percent Occupancy	87%	93%	100%	93%	87%	80%	80%	87%

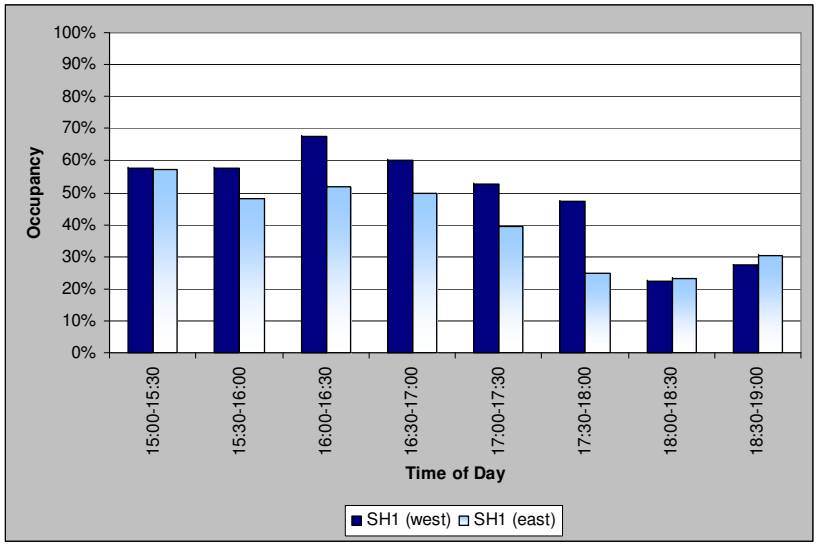


Figure 3 - Percent Occupancy of the On-street Parking on Friday, 24th October

Table 3 - Parking Availability on Friday, 24th October

		Time							
		15:00-15:30	15:30-16:00	16:00-16:30	16:30-17:00	17:00-17:30	17:30-18:00	18:00-18:30	18:30-19:00
SH1 (West)	Occupied	23	23	27	24	21	19	9	11
	Available	17	17	13	16	19	21	31	29
	Percent Occupancy	58%	58%	68%	60%	53%	48%	23%	28%
SH1 (East)	Occupied	32	27	29	28	22	14	13	17
	Available	24	29	27	28	34	42	43	39
	Percent Occupancy	57%	48%	52%	50%	39%	25%	23%	30%

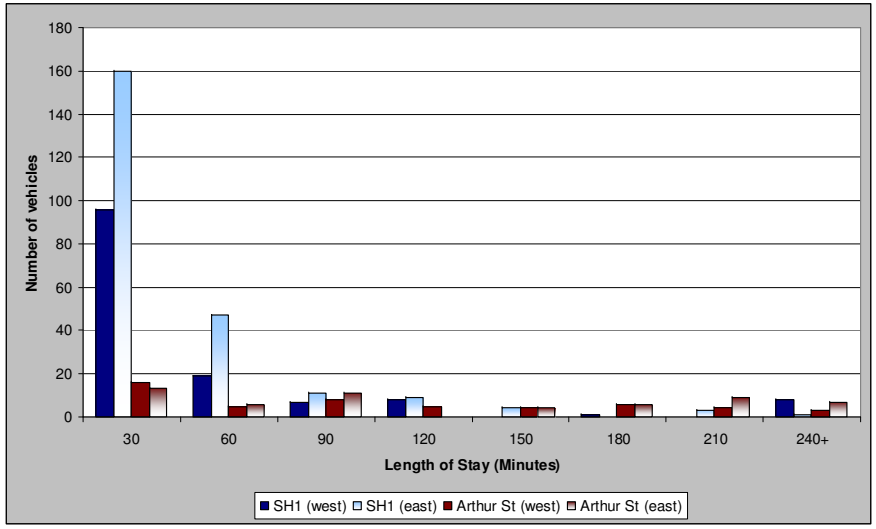


Figure 4 - Length of Stay of Vehicles Parking On-Street on Sunday, 21st September

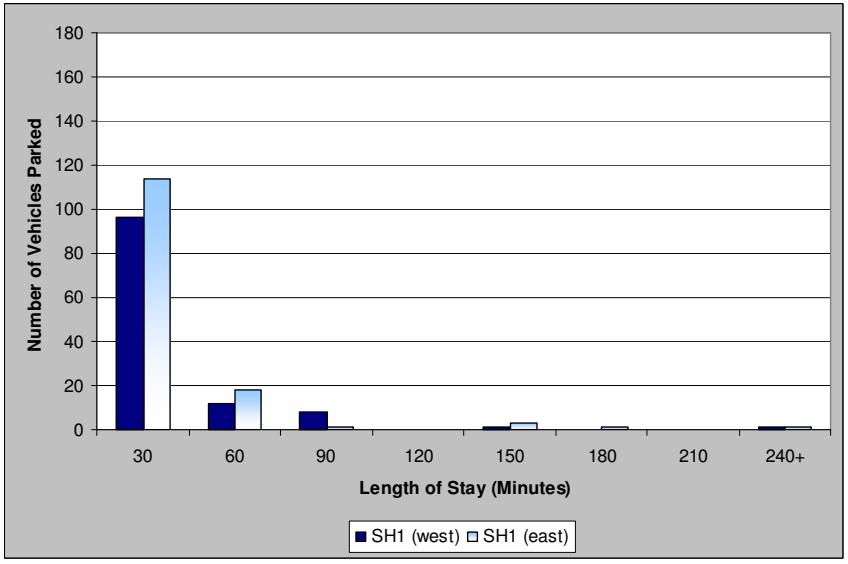


Figure 5 - Length of Stay of Vehicles Parking On-Street on Friday, 24th October

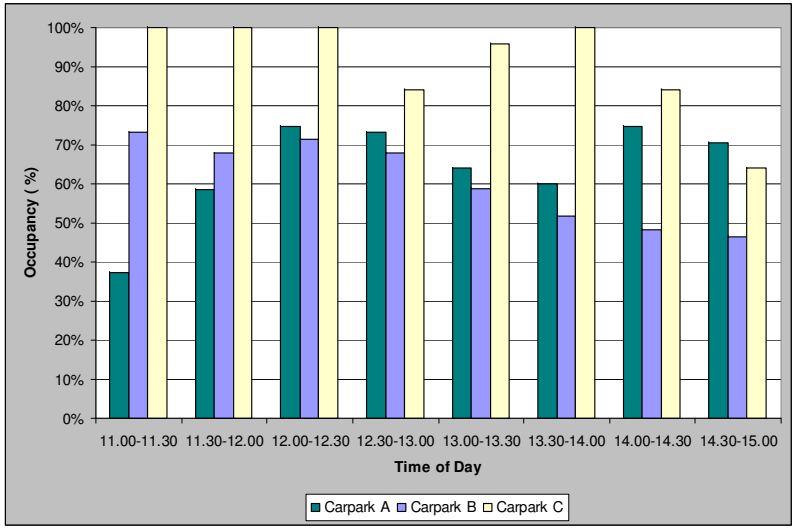


Figure 6 - Percent Occupancy of the Off-street Parking

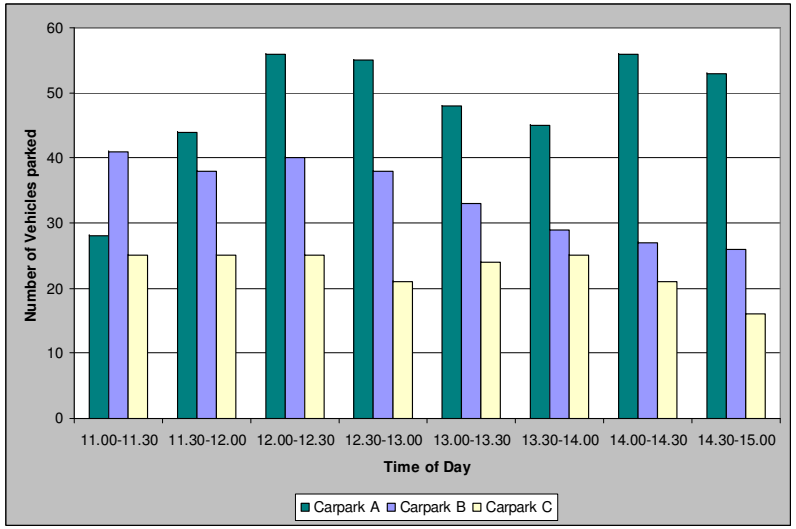


Figure 7 - Number of Vehicles Utilising the Off-street Parking

Otaki Traffic and Transportation Report

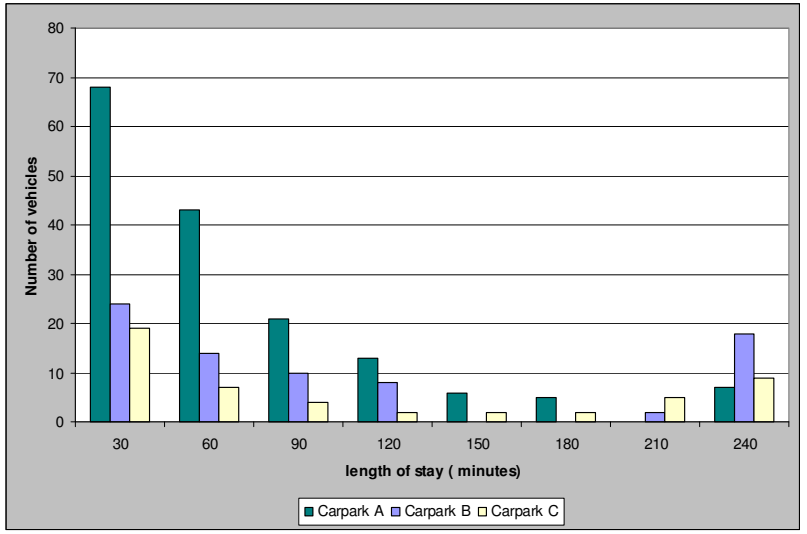


Figure 8 - Length of Stay of Vehicles Parking Off-Street

Appendix H

Travel Time Assessment

Travel Time Assessment

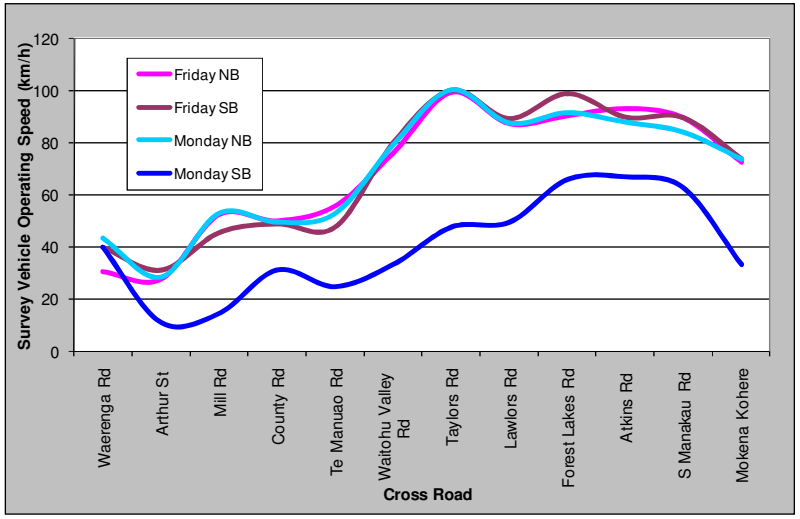


Figure 1 - Average Travel Speed on SH1(2008)

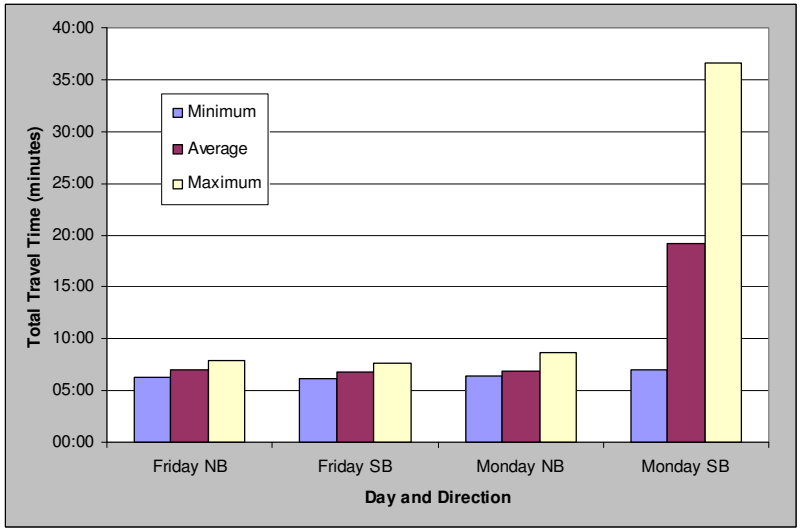


Figure 2 - Total Travel Time on SH1 (2008)

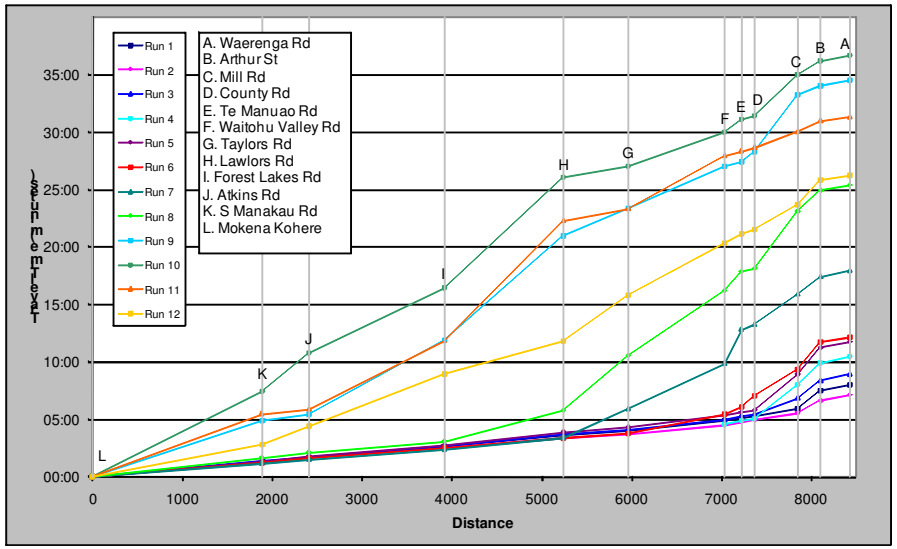


Figure 3 - Southbound Monday Travel Time on SH1 (2008)

Table 1 - Southbound Travel Times (2009)

Time	Route Position (from Mill Road/Rahui Road/SH1 Intersection) (RP995/5.191)	Length of queue (km)	Time (min) from end of queue to Mill/Rahui Rd	Comments
10:00am	RP995/5.191	0	0	
10:30am	RP995/5.191	0	0	
11:00am	RP995/5.191	0	0	Traffic starting to build up in Otaki (11:15am)
11:30am	RP995/5.191	0	0	
12:00pm	RP995/5.191	0	0	
12:30pm	RP995/5.191	0	0	
1:00pm	RP995/5.156	0.03	1	
1:30pm	RP995/5.191	0	0	
2:00pm	RP995/4.291	0.90	5	
2:30pm	RP995/2.791	2.40	11	
3:00pm	RP995/2.191	3.00	12	

3:30pm	RP995/1.591	3.60	16	
4:00pm	RP995/1.591	3.60	15	
4:30pm	RP995/1.391	3.80	14.50	
5:00pm	RP995/5.191	0	0	Traffic completely died down
5:30pm	RP995/5.191	0	0	Passing lane closure removed
5:30pm	RP995/5.191	0	0	Passing lane closure removed
6:00pm	RP995/5.191	0	0	

Appendix I

Traffic Volume Assessment

Traffic Volume Assessment

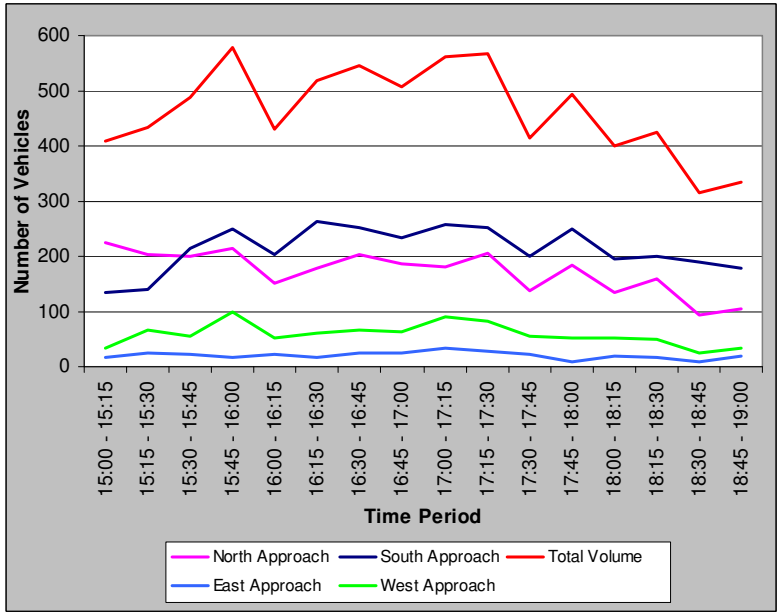


Figure 1 - SH1 and Mill Rd/Rahui Rd Volumes for Friday, 24 October (2008)

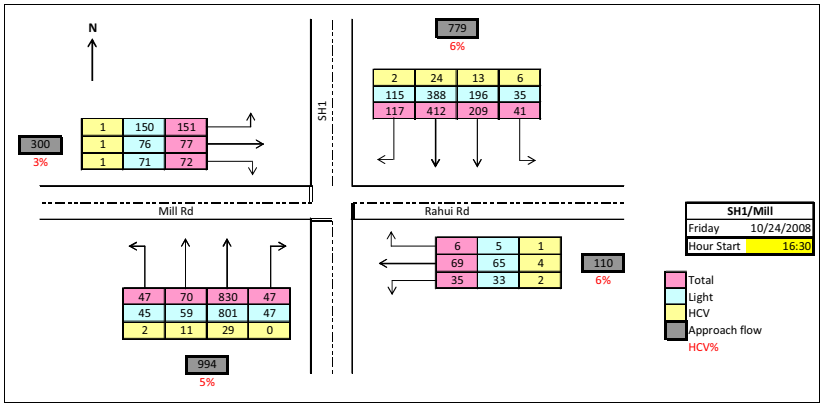


Figure 2 - Friday, 24 October Peak Hour Volumes (2008)

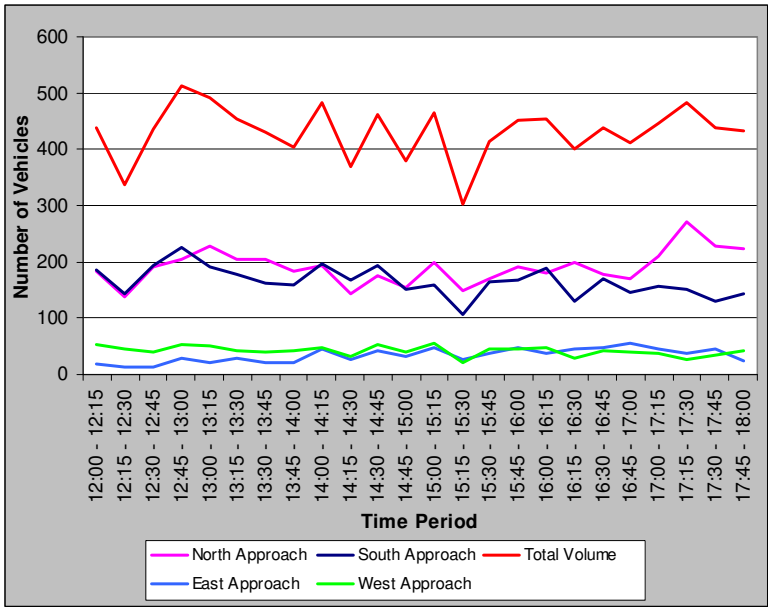


Figure 3 - SH1 and Mill Rd/Rahui Rd Volumes for Monday, 27 October (2008)

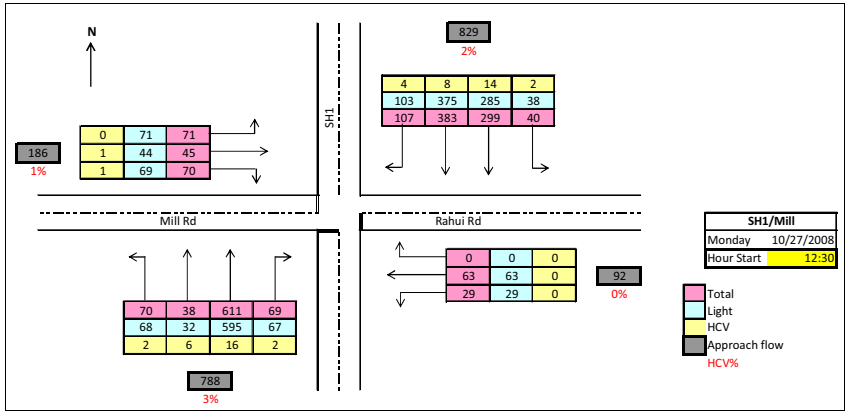


Figure 4 - Monday, 27 October Peak Hour Volumes (2008)

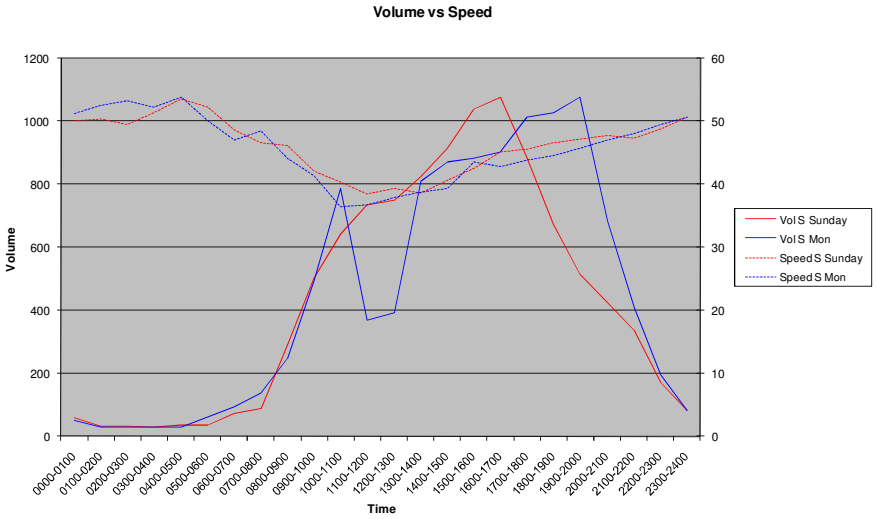


Figure 5 – Easter 2009 Volume vs Speed plots (Southbound)

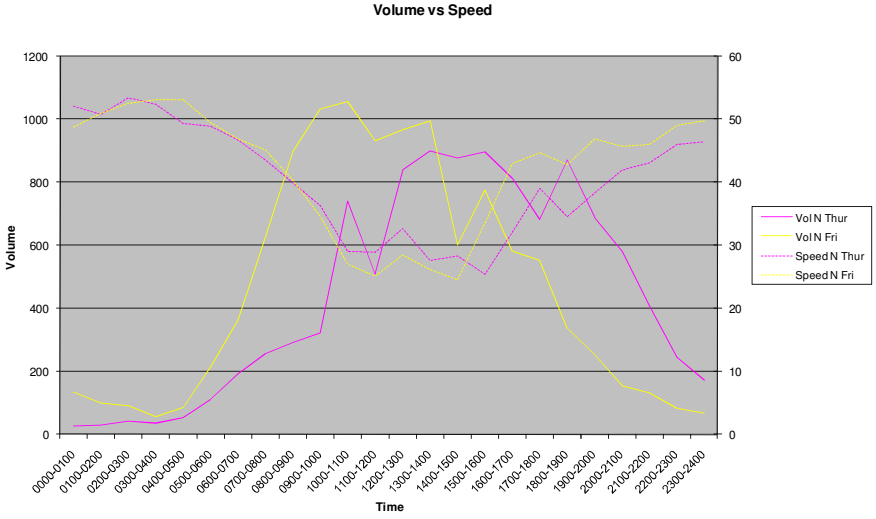


Figure 6 - Easter 2009 Volume vs Speed plots (Southbound)

Table 1 - Easter 2009 Traffic Volumes

	EASTER Weekend							
	Thursday		Friday		Sunday		Monday	
Time	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
0000-0100	28	35	136	80	53	59	52	50
0100-0200	31	29	101	48	56	32	27	30
0200-0300	41	47	91	51	37	34	18	31
0300-0400	36	66	57	66	13	30	15	31
0400-0500	55	103	85	57	18	36	36	30
0500-0600	112	162	217	69	34	35	44	61
0600-0700	193	329	363	122	78	75	95	94
0700-0800	257	429	628	135	167	87	163	138
0800-0900	0	553	896	309	316	290	314	249
0900-1000	324	539	1032	441	634	504	553	493
1000-1100	742	531	1057	677	951	642	812	786
1100-1200	508	594	933	767	957	735	757	369
1200-1300	840	586	967	728	857	748	710	394
1300-1400	900	617	995	702	755	826	697	811
1400-1500	877	789	602	823	515	914	567	870
1500-1600	898	813	774	818	765	1039	0	883
1600-1700	813	806	582	746	686	1078	425	904
1700-1800	684	773	553	543	604	886	470	1012
1800-1900	870	520	338	379	386	675	371	1028
1900-2000	687	394	254	296	258	515	232	1077
2000-2100	582	337	156	215	199	425	167	684
2100-2200	408	247	133	136	157	339	124	409
2200-2300	245	203	83	116	101	173	85	197
2300-2400	172	107	67	65	69	82	57	84
TOTAL One Way	**10303**	**9609**	**11100**	**8389**	**8666**	**10259**	**6791**	**10715**
TOTAL Two Way	**19912**		**19489**		**18925**		**17506**	
Peak Hour	1300-1400	1500-1600	1000-1100	1400-1500	1100-1200	1600-1700	1000-1100	1900-2000
Peak Hour Volume	900	813	1057	823	957	1078	812	1077

Table 2 - Typical Weekend 2009 Traffic Volumes

	NORMAL Weekend (FEB 12-16)									
	Thursday		Friday		Saturday		Sunday		Monday	
Time	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
0000-0100	58	37	53	53	91	82	58	52	26	36
0100-0200	38	28	41	28	54	38	47	41	21	19
0200-0300	28	45	30	39	39	58	43	29	12	25
0300-0400	38	68	34	71	31	65	20	30	29	50
0400-0500	30	93	40	72	42	81	24	43	40	56
0500-0600	66	179	76	170	72	95	44	40	76	179
0600-0700	161	298	192	304	137	144	71	89	179	400
0700-0800	415	505	398	444	272	218	143	171	427	498
0800-0900	593	565	572	520	492	393	286	267	615	547
0900-1000	609	528	633	539	711	508	446	442	585	495
1000-1100	567	529	709	558	993	649	689	650	582	492
1100-1200	599	546	710	576	885	757	719	733	567	526
1200-1300	539	558	668	594	828	757	720	769	594	484
1300-1400	491	542	669	700	734	834	681	800	546	514
1400-1500	565	569	733	719	746	805	785	807	626	590
1500-1600	583	690	774	830	634	889	735	892	555	678
1600-1700	616	703	841	854	678	970	825	1002	645	641
1700-1800	539	569	815	769	611	818	714	888	526	611
1800-1900	471	387	812	582	455	555	541	634	458	343
1900-2000	362	247	538	441	333	405	342	534	254	228
2000-2100	240	181	355	304	223	387	233	395	173	158
2100-2200	133	147	252	226	165	260	194	258	129	98
2200-2300	84	120	178	162	226	197	128	142	88	92
2300-2400	78	49	101	97	170	113	63	82	56	39
TOTAL One Way	**7903**	**8183**	**10224**	**9652**	**9622**	**10078**	**8551**	**9790**	**7809**	**7799**
TOTAL Two Way	**16086**		**19876**		**19700**		**18341**		**15608**	
Peak Hour	1600-1700	1600-1700	1600-1700	1600-1700	1000-1100	1600-1700	1600-1700	1600-1700	1600-1700	1500-1600
Peak Hour Volume	616	703	841	854	993	970	825	1002	645	678

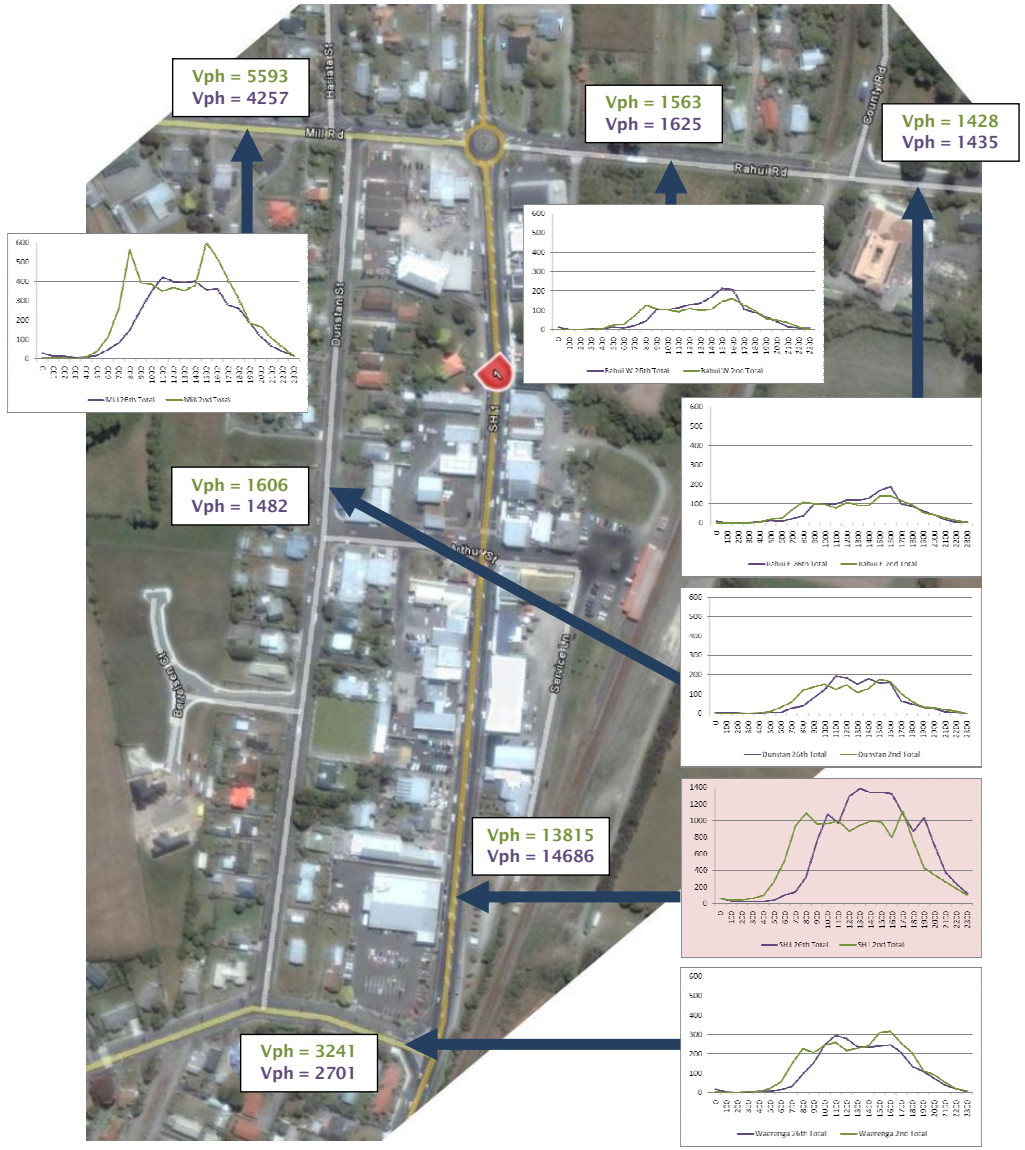


Figure 7 – Labour Day, 26 October Traffic Flow Profiles (2009)

Note that all of the flow graphs have the same scale except for the SH1 graph

Labour Day Monday – 26 October = ——— Typical Monday – 2 November = ———

Appendix J

Pedestrian Assessment

Pedestrian Assessment (2007)

Marked Pedestrian Crossing

The survey work recorded both the actual number of pedestrians using the marked pedestrian crossing as well as the actual number of times that the crossing was specifically used – and therefore what caused vehicles to stop at the marked pedestrian crossing (e.g. 4 people may have crossed at the same time thereby requiring a vehicle to only stop once).

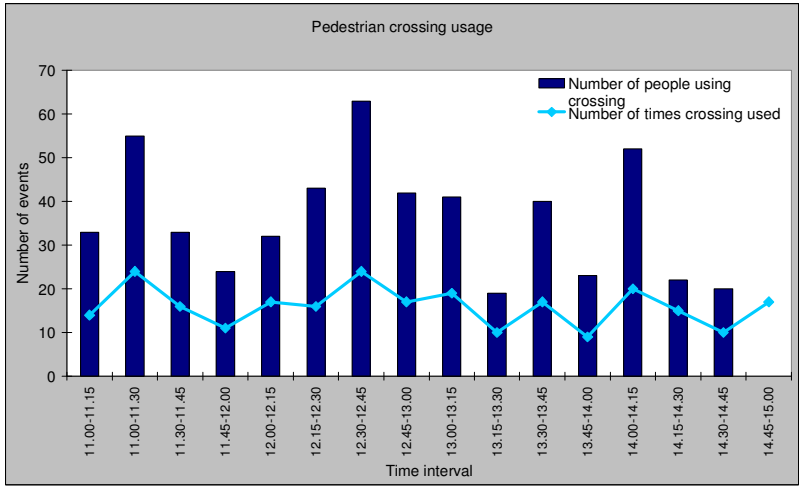
Table 1 provides a summary of crossing movements with a detailed breakdown by 15 minute periods shown in Figure 1.

Table 1 - Pedestrian Crossing Movements

Total number of people using crossing	Total number of times crossing used	Average number of people using crossing each time	Average crossing use (seconds)
582	256	2.2	56

As indicated in Figure 1, pedestrian crossing movements fluctuated throughout the survey, with the total number of people using the crossing in each 15 minute period exceeding 50 people on three separate occasions.

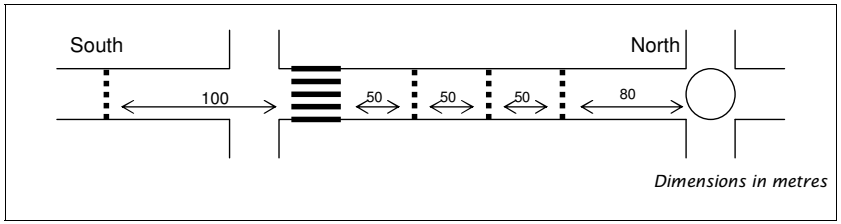
Figure 1 - Pedestrian Crossing Movements over SH1 at Pedestrian Crossing (June 2007)



Beyond the Marked Pedestrian Crossing

Other pedestrian movements recorded over the survey length of road were undertaken at several locations along the route (split into sections), as shown in Figure 2 below.

Figure 2 - Pedestrian Survey Lengths



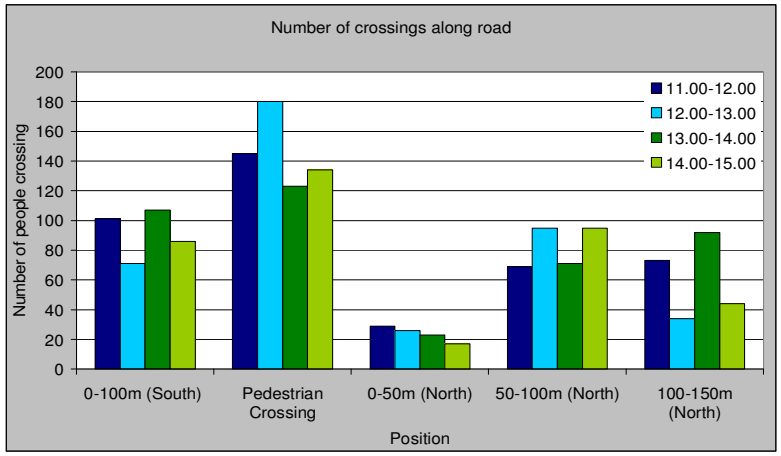
Pedestrian movements over these sections are summarised in Table 2.

Table 2 - Summary of Pedestrian Crossing Movements

	South of the crossing (0-100m)	At the Pedestrian crossing	North of the crossing (0-50m)	North of the crossing (50-100m)	North of the crossing (100-150m)
Average hourly No. of pedestrians	91	146	24	83	61
Peak hourly flow	107	189	39	106	100

Pedestrian crossing movements were similar over each of the four hour periods for the each of the different survey lengths (see Figure 3). The survey indicates the low level of pedestrian crossing movements some 50 metres north of the actual crossing (Note, the pedestrian movements south of the crossing and the Arthur Street intersection are over a 100 metre length.)

Figure 3: Pedestrian Crossing Movements over SH1 at Crossing Location (June 2007)



Appendix K

Sidra Outputs

MOVEMENT SUMMARY

Site: Otaki RAB Friday

Labour Weekend Friday PM flows (2008)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South	SH1 South										
1	L	49	4.3	0.146	8.0	LOS A	1.0	7.4	0.46	0.64	42.2
2	T	938	4.4	0.664	6.2	LOS A	8.3	60.2	0.65	0.58	42.0
3	R	50	2.1	0.667	10.8	LOS B	8.3	60.2	0.67	0.74	40.9
Approach		1036	4.3	0.664	6.5	LOS B	8.3	60.2	0.64	0.59	41.9
East	Rahui Rd										
4	L	36	5.7	0.155	8.3	LOS A	0.7	5.4	0.54	0.80	42.1
5	T	72	5.8	0.155	6.8	LOS A	0.7	5.4	0.54	0.67	42.3
6	R	6	16.7	0.156	11.8	LOS B	0.7	5.4	0.54	0.88	40.1
Approach		115	6.4	0.155	7.6	LOS B	0.7	5.4	0.54	0.72	42.1
North	SH1 North										
7	L	43	14.6	0.264	8.4	LOS A	2.2	16.0	0.51	0.67	42.1
8	T	647	6.0	0.417	5.8	LOS A	4.1	30.2	0.53	0.54	42.5
9	R	122	1.7	0.417	10.3	LOS B	4.1	30.2	0.54	0.74	40.8
Approach		811	5.8	0.417	6.6	LOS B	4.1	30.2	0.53	0.58	42.2
West	Mill Rd										
10	L	157	0.7	0.514	11.7	LOS B	3.9	27.8	0.79	0.97	39.1
11	T	80	1.3	0.514	10.6	LOS B	3.9	27.8	0.79	0.94	39.3
12	R	75	1.4	0.514	15.3	LOS B	3.9	27.8	0.79	1.01	37.3
Approach		313	1.0	0.514	12.3	LOS B	3.9	27.8	0.79	0.98	38.7
All Vehicles		2275	4.5	0.667	7.4	LOS A	8.3	60.2	0.62	0.64	41.6

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout LOS Method: Same as Signalised Intersections.
Roundabout Capacity Model: SIDRA Standard.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Otaki RAB Friday 1-lane

Labour Weekend Friday PM flows (2008)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South	SH1 South										
1	L	49	4.3	0.146	8.0	LOS A	1.0	7.4	0.46	0.64	42.2
2	T	938	4.4	0.664	6.2	LOS A	8.3	60.3	0.65	0.58	42.0
3	R	50	2.1	0.667	10.8	LOS B	8.3	60.3	0.67	0.74	40.9
Approach		1036	4.3	0.665	6.5	LOS B	8.3	60.3	0.65	0.59	41.9
East	Rahui Rd										
4	L	36	5.7	0.160	9.8	LOS A	1.1	8.1	0.70	0.80	41.0
5	T	72	5.8	0.160	8.3	LOS A	1.1	8.1	0.70	0.75	41.5
6	R	6	16.7	0.160	13.3	LOS B	1.1	8.1	0.70	0.84	39.2
Approach		115	6.4	0.160	9.0	LOS B	1.1	8.1	0.70	0.77	41.2
North	SH1 North										
7	L	43	14.6	0.265	8.4	LOS A	2.2	16.5	0.52	0.67	42.1
8	T	647	6.0	0.420	5.8	LOS A	4.3	31.3	0.54	0.54	42.4
9	R	122	1.7	0.420	10.3	LOS B	4.3	31.3	0.55	0.74	40.8
Approach		811	5.8	0.420	6.6	LOS B	4.3	31.3	0.54	0.58	42.1
West	Mill Rd										
10	L	157	0.7	0.594	17.9	LOS B	6.7	47.0	0.98	1.14	34.9
11	T	80	1.3	0.594	16.9	LOS B	6.7	47.0	0.98	1.13	35.0
12	R	75	1.4	0.595	21.6	LOS C	6.7	47.0	0.98	1.05	33.8
Approach		313	1.0	0.594	18.5	LOS C	6.7	47.0	0.98	1.12	34.7
All Vehicles		2275	4.5	0.667	8.3	LOS A	8.3	60.3	0.66	0.67	40.8

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout LOS Method: Same as Signalised Intersections.
Roundabout Capacity Model: SIDRA Standard.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Otaki RAB Labour Mon

Labour Weekend Monday flows (2008)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South	SH1 South										
1	L	75	2.9	0.136	7.6	LOS A	1.0	6.8	0.44	0.61	42.3
2	T	698	3.4	0.525	5.7	LOS A	5.6	40.1	0.53	0.53	42.5
3	R	74	2.9	0.526	10.3	LOS B	5.6	40.1	0.54	0.75	41.0
Approach		847	3.3	0.525	6.3	LOS B	5.6	40.1	0.53	0.56	42.3
East	Rahui Rd										
4	L	31	0.0	0.135	8.1	LOS A	0.6	4.3	0.54	0.80	42.1
5	T	68	0.0	0.135	6.6	LOS A	0.6	4.3	0.54	0.67	42.4
6	R	1	0.0	0.134	11.3	LOS B	0.6	4.3	0.54	0.88	40.2
Approach		100	0.0	0.135	7.1	LOS B	0.6	4.3	0.54	0.71	42.3
North	SH1 North										
7	L	43	5.0	0.321	7.8	LOS A	2.7	19.6	0.49	0.66	42.2
8	T	733	3.2	0.390	5.6	LOS A	3.6	26.2	0.49	0.53	42.7
9	R	115	3.7	0.390	10.2	LOS B	3.6	26.2	0.49	0.74	40.9
Approach		891	3.4	0.390	6.3	LOS B	3.6	26.2	0.49	0.56	42.4
West	Mill Rd										
10	L	76	0.0	0.268	8.1	LOS A	1.5	10.4	0.60	0.80	41.7
11	T	48	2.2	0.269	7.2	LOS A	1.5	10.4	0.60	0.70	41.6
12	R	75	1.4	0.268	11.9	LOS B	1.5	10.4	0.60	0.84	39.5
Approach		200	1.1	0.268	9.3	LOS B	1.5	10.4	0.60	0.79	40.8
All Vehicles		2039	3.0	0.526	6.6	LOS A	5.6	40.1	0.52	0.59	42.2

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout LOS Method: Same as Signalised Intersections.
Roundabout Capacity Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: Otaki RAB Labour Mon 1-lane

Labour Weekend Monday flows (2008)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South	SH1 South										
1	L	75	2.9	0.731	8.8	LOS A	11.0	79.5	0.80	0.68	41.3
2	T	698	3.4	0.733	7.3	LOS A	11.0	79.5	0.80	0.65	41.3
3	R	74	2.9	0.735	12.0	LOS B	11.0	79.5	0.80	0.71	40.0
Approach		847	3.3	0.733	7.8	LOS B	11.0	79.5	0.80	0.66	41.2
East	Rahui Rd										
4	L	31	0.0	0.178	10.8	LOS B	1.4	9.6	0.81	0.87	40.2
5	T	68	0.0	0.178	8.9	LOS A	1.4	9.6	0.81	0.83	40.8
6	R	1	0.0	0.179	13.6	LOS B	1.4	9.6	0.81	0.82	38.7
Approach		100	0.0	0.178	9.6	LOS B	1.4	9.6	0.81	0.84	40.6
North	SH1 North										
7	L	43	5.0	0.782	10.3	LOS B	13.9	99.9	0.88	0.75	40.6
8	T	733	3.2	0.782	8.8	LOS A	13.9	99.9	0.88	0.72	40.9
9	R	115	3.7	0.783	13.5	LOS B	13.9	99.9	0.88	0.75	39.0
Approach		891	3.4	0.782	9.5	LOS B	13.9	99.9	0.88	0.73	40.6
West	Mill Rd										
10	L	76	0.0	0.317	9.9	LOS A	2.5	17.9	0.81	0.87	40.3
11	T	48	2.2	0.316	8.8	LOS A	2.5	17.9	0.81	0.84	40.5
12	R	75	1.4	0.318	13.4	LOS B	2.5	17.9	0.81	0.83	38.5
Approach		200	1.1	0.317	11.0	LOS B	2.5	17.9	0.81	0.85	39.6
All Vehicles		2039	3.0	0.783	8.9	LOS A	13.9	99.9	0.83	0.72	40.7

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout LOS Method: Same as Signalised Intersections.
Roundabout Capacity Model: SIDRA Standard.

Appendix L

Pedestrian Crossing Delay Calculations

Otaki Traffic and Transportation Report

Pedestrian Crossing Delay Calculations

The New Zealand Pedestrian Crossing Facilities Calculation Spreadsheet predicts the pedestrian and motorist delay and the transport economic efficiency of the various pedestrian facilities. This spreadsheet was applied to crossing on SH1 in Otaki near Arthur Street. As inputs, the spreadsheet requires:

- Hourly pedestrian volumes for a 5 hour period (with adults and sensitive pedestrians separately);
- Traffic volumes in each direction and again for a 5 hour period;
- Carriageway widths;
- Number of lanes;
- Average and 15th percentile walking speed for adult and sensitive pedestrians; and
- The pedestrian crash history.

Pedestrian and Traffic Volumes
The traffic and pedestrian volumes used for the assessment are based on a typical Sunday, using data collected on 10 June 2007. Only 4 hours of data was collected, but the spreadsheet requires 5 hours, therefore an average was entered for the fifth hour.

The traffic volumes in the southbound direction ranged from 698 to 893 vehicles per hour while in the northbound direction the demand range between 473 and 630 vehicles per hour. The pedestrian volume ranges from 123 to 180 pedestrians per hour crossing at the marked crossing. Pedestrian that crossed at locations other than the marked crossing were not included. Since no data on whether the pedestrians were children, adults or elderly was collected, It was assumed that all pedestrians were adults for this assessment.

The default walk speeds of 1.2m/s for 15th percentile adult pedestrians and 1.5m/s for average adult pedestrians were used along with the default vehicle occupancy rate of 1.2 people per vehicle.

NPV of Delay at Zebra Crossing
Based on the pedestrian and traffic volumes the Pedestrian Crossing Facilities Calculation Spreadsheet predicts a NPV of $310,000 for motorist delay at a zebra crossing in Otaki. There is no delay cost to pedestrians since it is assumed they are able to immediately cross the road.

As a sensitivity test the traffic and pedestrian volumes from Monday of the Labour Day weekend (26 October 2009) were also used to calculate the NPV of the motorist delay at the zebra crossing. (An average of 512 vehicles per hour northbound, average of 883 vehicles per hour southbound, and average of 162 pedestrians per hour crossing at the zebra crossing.) These volumes correspond to a NPV motorist delay of $378,000. However, based on site observations and the queue length, this model may not be accurately representing the costs associated with the extensive delays in Otaki on holiday weekends. These delays may be the result of a combination of the zebra crossing and side friction caused by the high pedestrian activity in the area.

NPV of Delay at Pedestrian Signal
The total NPV of delay at a pedestrian signal is formed by two components: pedestrian delay and motorist delay. The average pedestrian delay was calculated by using SIDRA to model a mid-block pedestrian crossing with the 2007 pedestrian and vehicular volumes (same volumes as used above). With optimum cycle time selected, SIDRA selects a 100 second cycle which results in an average delay of 5.1 seconds per vehicle and 37.8 seconds per pedestrian. When factored by the traffic volume and vehicle occupancy this results in a pedestrian delay of 1.9 hours/hour and a vehicle occupant delay of 2.3 hours/hour. The forecast NPV of these delays are $184,000 and $219,000 for pedestrians and vehicle occupants respectively. If a longer cycle time was used the average delay to vehicles could be reduced even further, however this would result in longer delays for pedestrians which may reduce the pedestrian compliance at the signals.

Appendix M

NZTA Temporary Traffic Management Plan

OPUS

TRAFFIC MANAGEMENT PLAN

Traffic Management Plan Reference	*FH 2030*			
	For Office Use Only			
Organisation	**Contractor** *FH*	**Client** *NZTA*		
Contract Name/Number	*Hybrid TNZ 497N*	**RCA Consent Reference**		
Location	**Road Name(s)** *SH1 Otaki ROB*	**Road Level (LV, 1, 2, 3)** *Level 2*	**Speed Limit** *50*	**From RP** *995/5.00*
				From RP *995/5.255*
Description of Activity	*Traffic Management of Peak Holiday Flows*			
Work Programme	**Monday 26th October 09**			
Proposed/ Restricted Work Hours	*Approx 9am to 8pm, TBC, dependant on traffic volumes*			
Traffic Details (Main Route)	**AADT** *13875*	**Peak Hour Flow**		

Proposed Traffic Management Method	**Active** STAGE 1 It is proposed to close the passing lane south bound on State Highway One at 9am, this will ensure least disruption to the travelling motorist during site installation. The delay trigger length (time) will be monitored and recorded and once the pre determined delay lengths (time) has been meet Stage 2 of the Management plan will be put into action, STAGE 2 The closure of Mill Road at Dunstan Street for the east bound traffic, traffic will be diverted down Dunstan St to Waeranga Road and re enter the Network at this safe merging point, This site will be monitored during this time to ensure additional delays are not experienced at this merge. If delays on the diversion route do build to an unacceptable level, the closure of Mill Road will be temporarily lifted to allow the diversion route to clear. Arthur Street will be monitored to ensure no additional delays are being created by the extra volume of vehicles entering or exiting Arthur Street. If additional delays are created by these vehicles on Arthur Street then stage 3 will be implemented. It should be noted that traffic volumes through this detour route have historically been low and with the merging lane for south bound vehicles it is not expected to create delays through the detour route. STAGE 3 Arthur St will be closed at SH1 to all traffic wishing to enter or exit. These closures will be removed as soon as the delays have reduced below the pre determined delay trigger length, (time). The closures will be managed by T/C staff onsite and to provide positive TTM to the motorists through the diversion route. The passing lane will be closed from 9am at Otaki South Bound as per the standard long weekend management plan.
	Unattended ▪ *N/A*
	Night ▪ *N/A*

Proposed Speed Restrictions	▪ *N/A*
Positive Traffic Management Measures	▪ *All Signs and Layouts to comply with COPTTM* ▪ *Advance warning signs to be installed on all side roads.* ▪ *Manual T/C onsite to monitor flows, to assist with positive TTM if required.*
Contingency Plans	▪ **If delays occur, Positive TTM measures will be implemented to manage situation.** ▪ **TMC to be advised of any delays / issues.** ▪ **Emergency services to be notified.**
Public Notification	▪ *As per contract requirements* ▪ *Letter drop to residents* ▪ *As per Risk assessment.*
Personal Safety	▪ *Dayglo jackets must be worn.* ▪ *All visitors must be inducted to site.* ▪ *All personnel to have a safety briefing. Hazards to be identified, and documented.* ▪ *All personnel to wear appropriate Personal Protection Equipment* ▪ *T/C to ensure that any persons entering site are correctly inducted and have appropriate PPE.*
On-Site Monitoring	**Attended:** *Constant* **Unattended:** *N/A* **Overnight:** *N/A* **Other times:** *N/A*
Other Information	

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Layout Diagrams	▪ *FH TMP 2030.2/.3*	
EED Applicable?	*27/28/30/31/32/33*	
Traffic Controllers	**Name (STMS) Paul Wronski** **Cert No:**	**Phone (24 hours)** *0276943572*
	Name (TC) **TBA** **Cert No:**	**Phone (24 hours)** TBA
TMP prepared accurately to represent site conditions and submitted by	**Contractor/Applicant** *Darren Varcoe* **Cert No:** *2371*	**Date** *13th September 09*
Requires Amendment	**Engineer** **Cert No:**	**Date**

This TMP is Approved on the Following Basis

1. To the best of the approving Engineer's judgment this TMP conforms to the requirements of Transit New Zealand's Code of Practice for Temporary Traffic Management.
2. This plan is approved on the basis that the ***activity, the location and the road environment have been correctly represented by the applicant***. Any inaccuracy in the portrayal of this information is the responsibility of the applicant. The STMS for the activity is reminded that it is the STMS's duty to "Postpone, cancel or modify operations due to the adverse traffic, weather or other conditions that affect the safety of this site" (reference A4.5).

Approving Engineer:

Name and Certificate Number

Signature

Acceptance by TMC	**TMC:** **Cert No:** **Signature:**	**Date**

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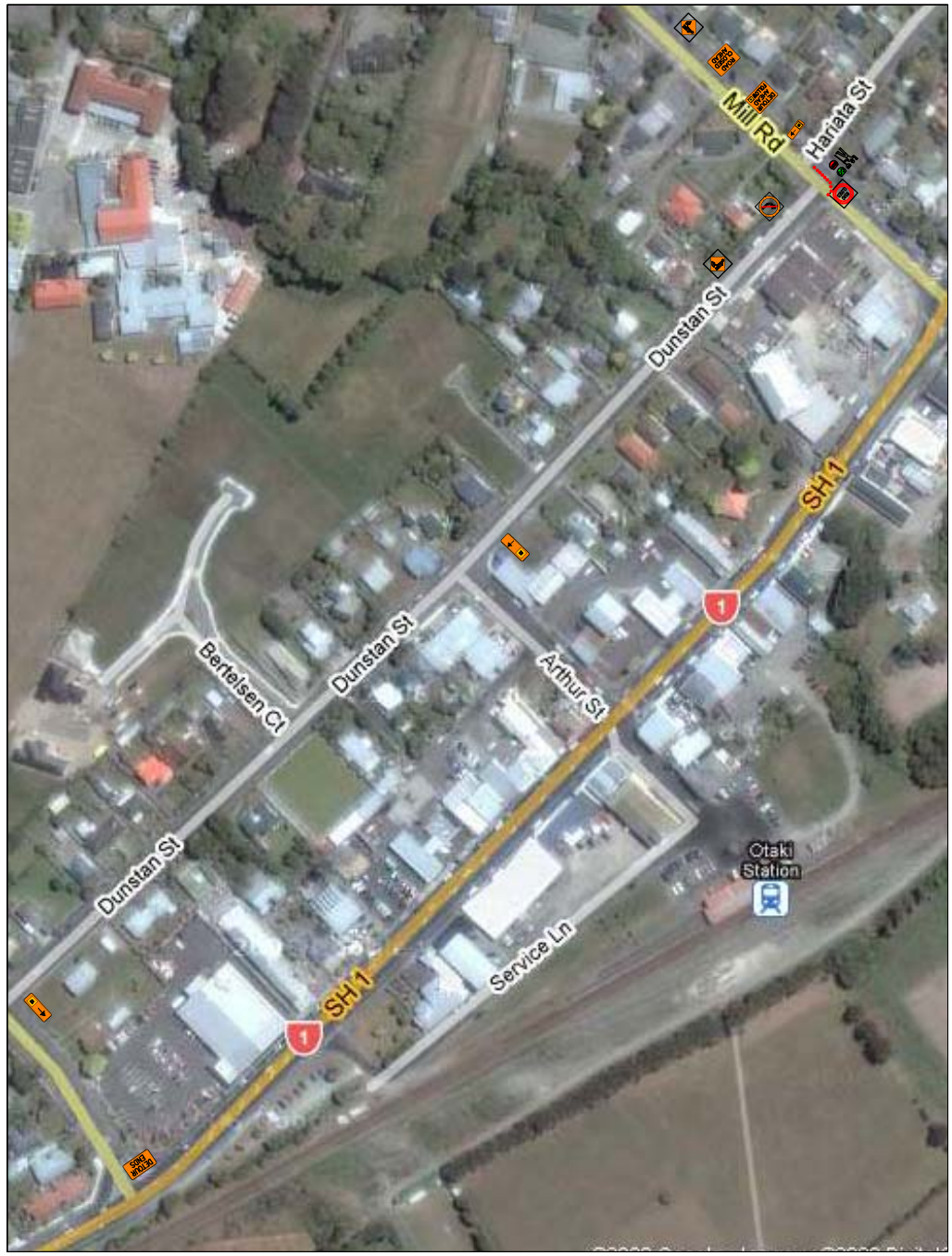
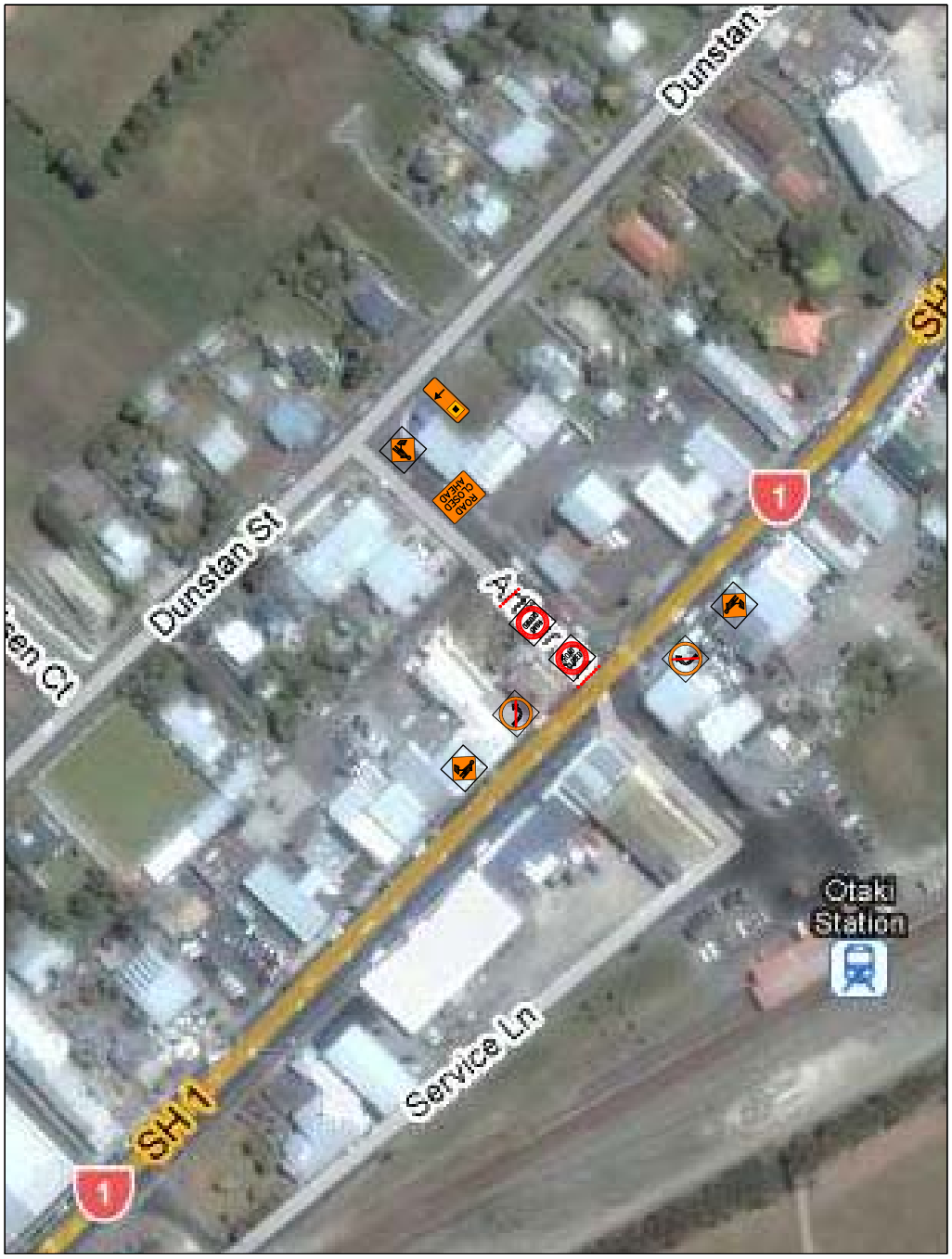


Fulton Hogan

MANAGEMENT OF TRAFFIC THROUGH OTKAI ROB

STAGE 2

STMS:	
Date of Work:	
Client:	NZTA
Drawing No:	FH 2030.2
Drawn By:	Darren Varcoe
Date:	



Fulton Hogan

MANAGEMENT OF TRAFFIC THROUGH OTKAI ROB

STMS:	
Date of Work:	
Client:	NZTA
Drawing No:	FH 2030.3
Drawn By:	Darren Varcoe
Date:	

STAGE 3

Appendix N

Opus Temporary Traffic Management Plan

November 2009

OPUS

TRAFFIC MANAGEMENT PLAN

Traffic Management Plan Reference				
	For Office Use Only			
Organisation	**Contractor** Opus International Consultants	**Client** NZTA		
Contract Name/Number	Otaki Parking Restriction Trial 327PN	**RCA Consent Reference**		
Location	**Road Name(s)** SH1 (Otaki)	**Road Level (LV, 1, 2, 3)** Level 2	**Speed Limit** 50km/h	**From RP** 995/5.19 **To RP** 995/5.77
Description of Activity	Temporary closure of all on-street parking on the LHS side of SH1 (southbound) in Otaki			
Work Programme	Monday 1 June 2009 (Queens Birthday)			
Proposed/ Restricted Work Hours	0500 - 2100			
Traffic Details (Main Route)	**AADT** 17,360	**Peak Hour Flow**		
Proposed Traffic Management Method	**Active:** Refer attached drawings.			
	Unattended: Refer attached drawings.			
	Night: Refer attached drawings.			

Proposed Speed Restrictions	Not applicable
Positive Traffic Management Measures	Not applicable
Contingency Plans	Not applicable
Public Notification	The following notification is proposed: • Consultation with Otaki community group • Letter drop to all affected businesses • Advertisements in the local and regional newspapers • VMS (refer attached drawings)
Personal Safety	All monitoring personnel on site to wear hi-visibility clothing.
On-Site Monitoring	**Attended:** by STMS and NZTA/KCDC/Opus staff where appropriate to ensure compliance with the parking restrictions. **Unattended:** **Overnight:** **Other times:**
Other Information *(eg. delay calcs, EED issues, temporary speed issues, etc)*	Not applicable

Layout Diagrams	Refer attached drawings.	
EED Applicable?	N	**Attached:** N
Traffic Controllers	**Name (STMS)** **Cert No:**	**Phone (24 hours)**
	Name (TC) **Cert No:**	**Phone (24 hours)**
TMP prepared accurately to represent site conditions and submitted by	**Contractor/Applicant** Sam Thornton **Cert No:** 30188	**Date**
Requires Amendment	**Engineer** **Cert No:**	**Date**

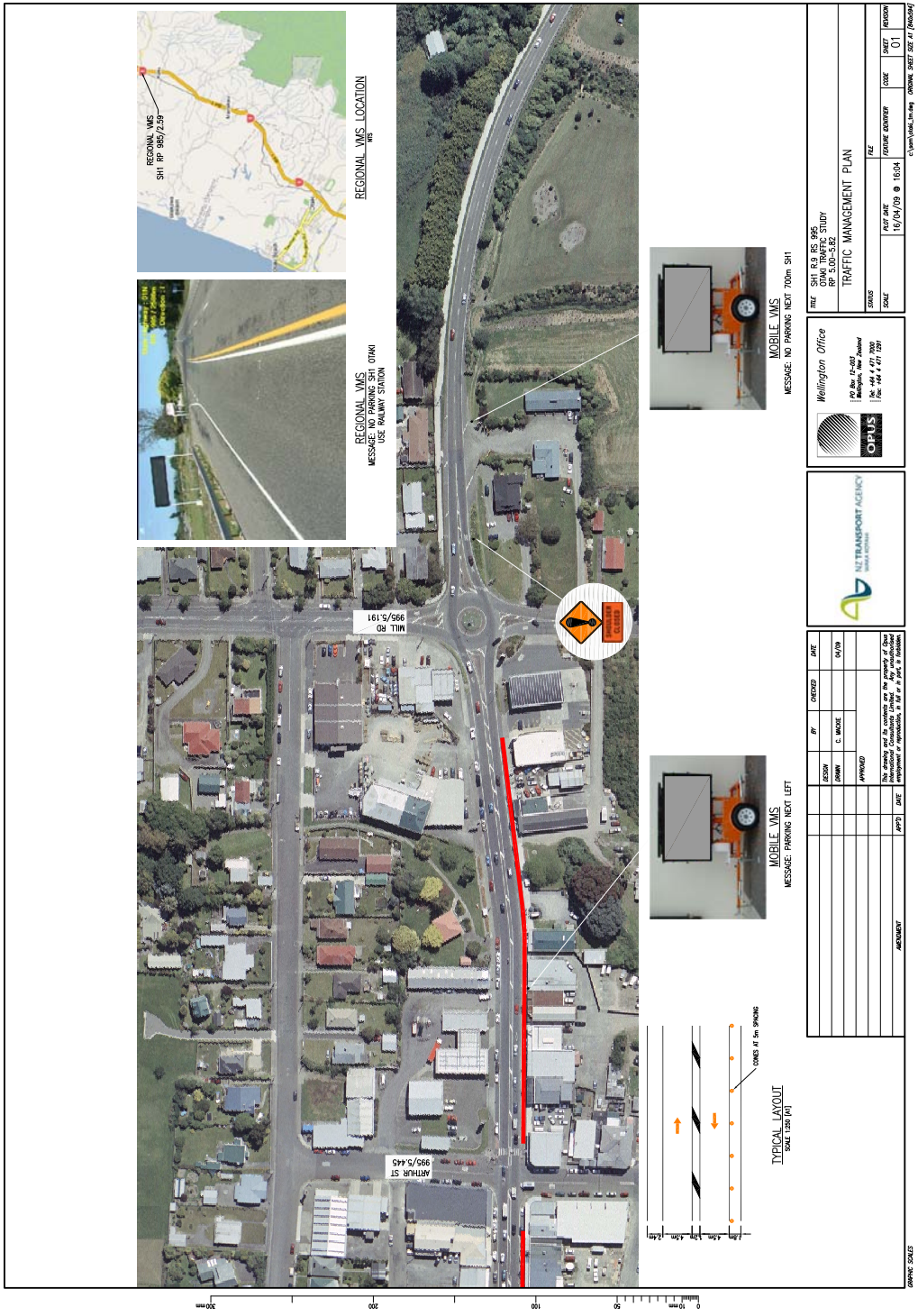
This TMP is Approved on the Following Basis

1. To the best of the approving Engineer's judgment this TMP conforms to the requirements of Transit New Zealand's Code of Practice for Temporary Traffic Management.
2. This plan is approved on the basis that the ***activity, the location and the road environment have been correctly represented by the applicant.*** Any inaccuracy in the portrayal of this information is the responsibility of the applicant. The STMS for the activity is reminded that it is the STMS's duty to "Postpone, cancel or modify operations due to the adverse traffic, weather or other conditions that affect the safety of this site" (reference A4.5).

Approving Engineer: .....
(Name and Certificate Number)

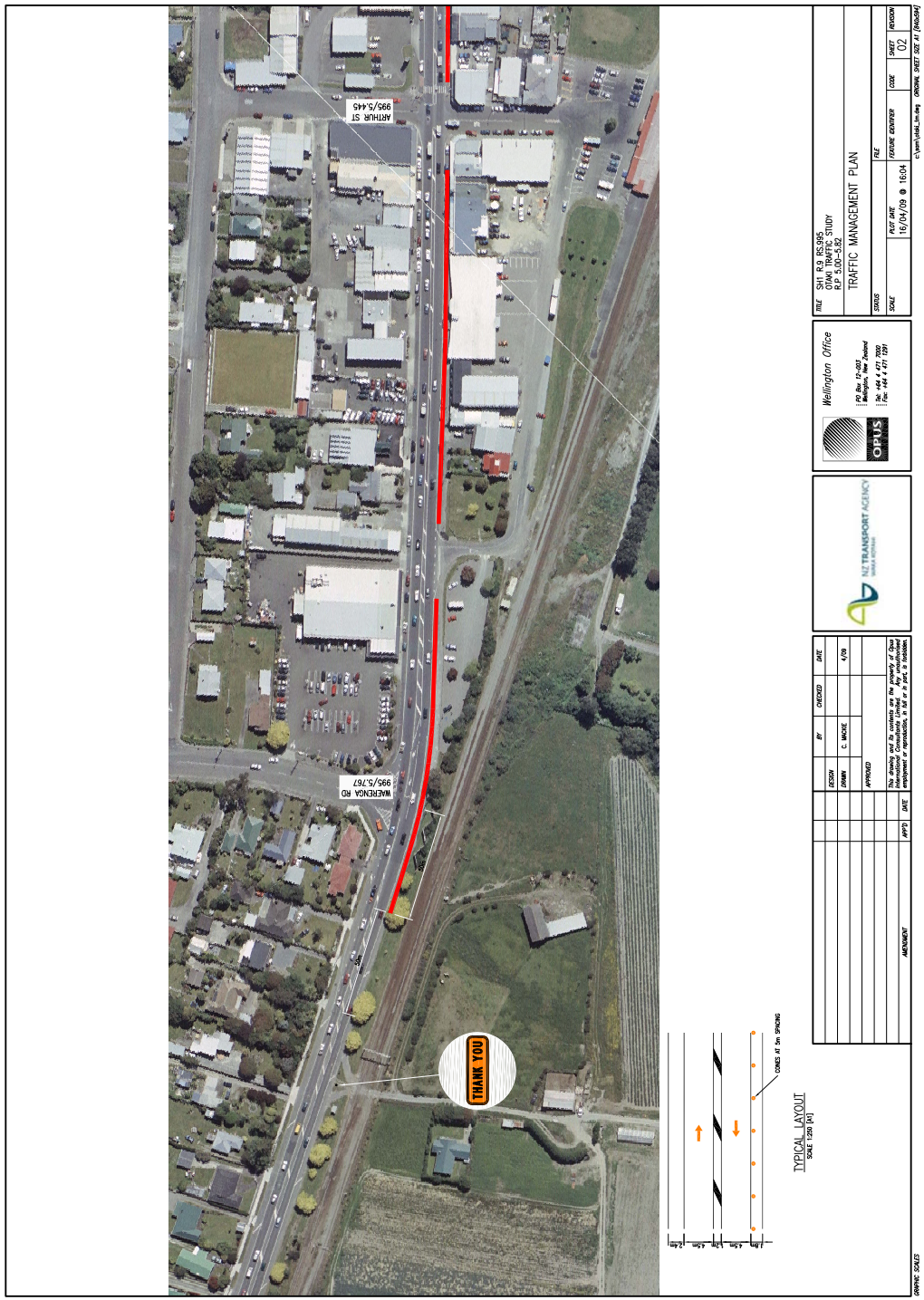
.....
(Signature)

Acceptance by TMC	**TMC:** ..... **Cert No:** ..... Signature:	**Date:** .....

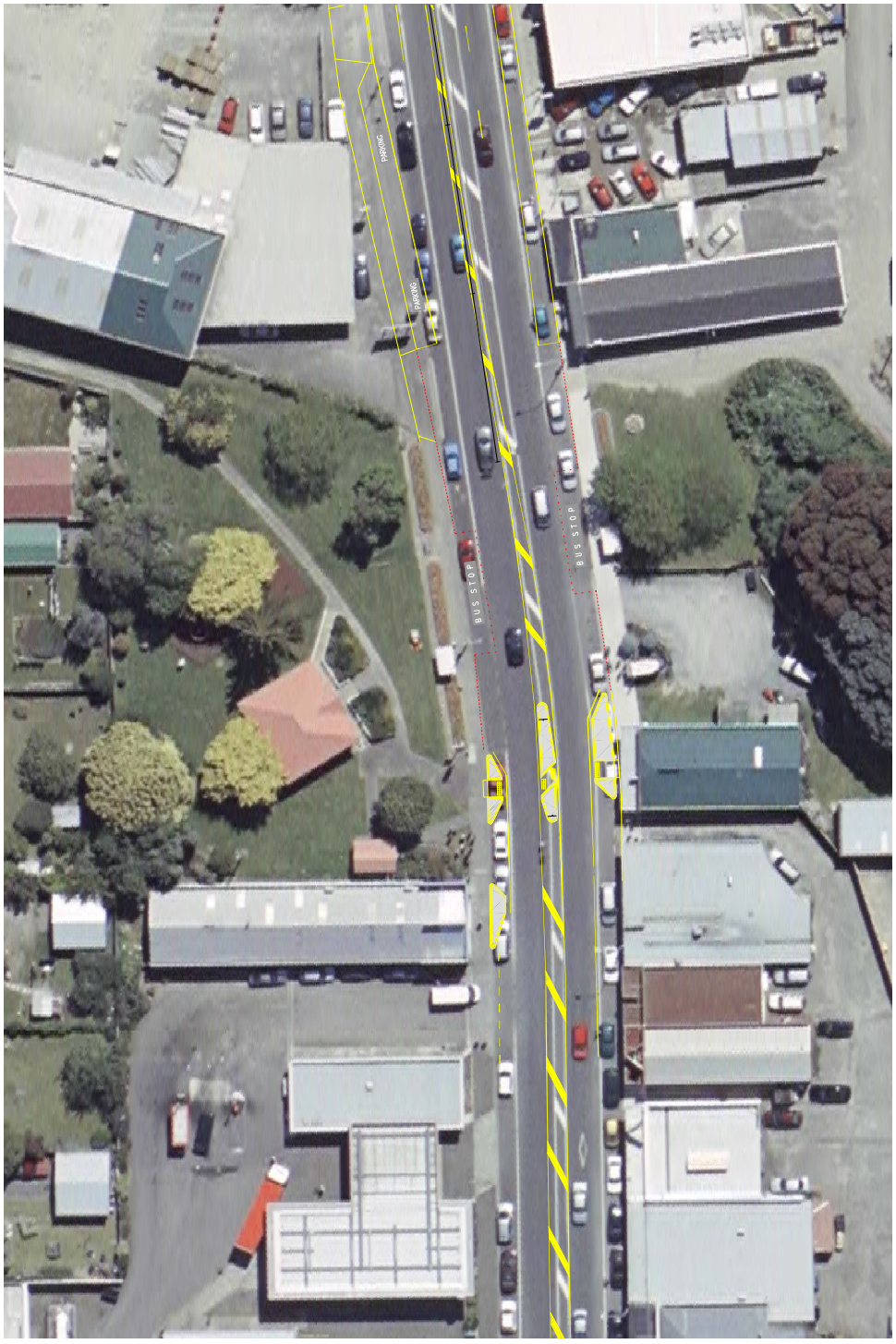


Appendix O

Bus Stop Improvements



OPUS



Appendix P

Waerenga Road Safety Improvements

OPUS

Appendix Q

Signalised Pedestrian Crossing

SCALE 1:250 (A1) 1:500 (A3)
PROPOSED SIGNALISED PEDESTRIAN CROSSING
12 NOVEMBER 2009

OPUS