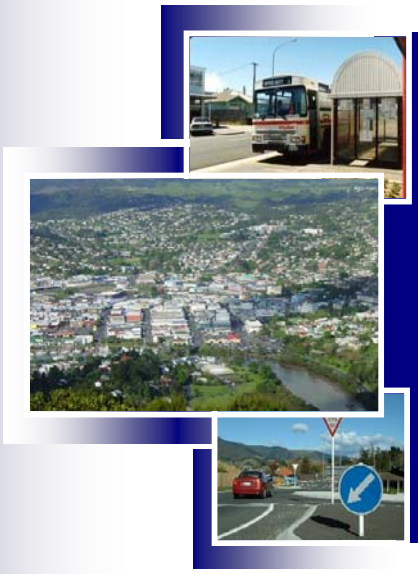
Tasman District Council

Nelson City Council



Nelson-Tasman Transportation Model Building Report

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1. INTRODUCTION

In 2005/06 Gabites Porter were commissioned to build a transport model for the Nelson and Tasman urban areas with a base year of 2001. The model was used as part of a wider study examining the present and future needs in the study area with emphasis on the Nelson to Brightwater corridor.

In 2009, Nelson City Council and Tasman District Council commissioned an update to 2006 data. This report documents that update to 2006 base year.

This report details the transportation model relationships and assumptions and is a reference to document the model's replication of the Nelson-Tasman transport network. The transport model replicates the Nelson-Tasman transport network and forms the basis for project analysis.

The model is fully capable of meeting any demands placed on it of a strategic nature and because it has been validated to local traffic counts it is suitable for any future detailed project analysis involving NZTA.

1.1 Objectives

The objectives of **this report** are to document model inputs, outputs, and assumptions for:

- Land use;
- Trip generation;
- Trip distribution;
- Trip assignment;
- Model convergence: and
- Model validation.

It documents the key building blocks of the main tool used in this study; the 2006 Nelson-Tasman Public Transportation Model.

1.2 Summary of the Model

Table 1 provides a brief overview of the Nelson-Tasman urban area transportation model.

Summary of the Nelson-Tasman Transportation Model 2006	Table 1
Element	**Comment**
Geographic Coverage	The study area covered the Nelson City and Tasman District urban areas. From Hira in the east, to Tophouse in the South, and Motueka in the west.
Periods	Traffic for each of the peak period models is reported in hourly traffic volumes. The generation models have been calibrated separately for each time period and month period. The Nelson-Tasman model comprises three discrete models covering an average weekday: • Morning Peak: 0700 to 0900 (Hour reported: 0800-0900) • Inter Peak: 0900 to 1600 (Hour reported: 1200-1300) • Evening Peak: 1600 to 1800 (Hour reported: 1700-1800) • 24 Hour Period: values factored from the individual peaks to represent an average weekday.
Network Detail	The road network used is derived from the Council GIS representation of the road centerlines.
External Traffic	The model has been validated using NZTA counts at external points as close as possible to the study area boundary.
Vehicle Types	Vehicle types used in the model include cars, heavy (HCV) and light (LCV) commercial vehicles.
Software Platform	The model has been developed using TRACKS, which is the proprietary land use and transport planning software developed, maintained and marketed by Transportation and Traffic Systems Ltd. It has been assumed that the reader is familiar with the software, and has read the User Manual as this includes the theoretical background to the algorithms, and hence the models.
Modelling Techniques	This is a four-step model comprising vehicle driver trip generation, distribution and assignment. The current four steps are outlined below: 1. Private/internal Trip generation. Private Trip productions are calculated from 20 Household Categories of 1, 2, 3, 4, 5+ persons by 0, 1, 2, 3+ cars calibrated directly from the 1991 Auckland Home Interview Survey (HIS) from the whole of Auckland. Trip Attractions and commercial vehicle generations are calculated from regression derived equations using the Australian and NZ Standard Classification major industry groups and again using HIS data. Existing land use data was obtained from Statistics New Zealand March 2001 Census. 2. Trip distribution. Trip ends are formed into origin/destination matrices using a standard gravity model. A function of travel time is used for spatial separation. 3. Mode Split. Person trips are converted into car driver, car passenger, public transport and cycling/walking trips. 4. Assignment. Assignment of trips to the network uses an incremental time slice process. This does not have the convergence issues associated with an equilibrium assignment, and permits intersection delays to be directly calculated during the assignment process. Intersection delays are calculated by movement using algorithms in ARR123 (SIDRA) and Tanner's queuing theory extended by Fisk and Tan, and later by Gabites Porter.

1.3 Study Approach

A transportation model for a given time period comprises a group of linked mathematical formulae that approximate the traffic network and the general behaviour of drivers using it. It is accepted that the analysis may not take into account extremes of human behaviour, nor will it reflect all the subtle complexities of the transport system. Nevertheless the model that has been developed is capable of identifying the more significant factors and is adequate to test adjustments to the road network and land use system, which are likely to show the greatest benefit in relation to their costs.

Three period models, described in **Table 2** were developed to undertake the analysis detailed in the study objectives. Each period however is more suited to analysis with the following applications in mind.

Model Periods — **Table 2**

Model	Application	Validation	Multi-Modal
Morning Peak Generation 0700-0900 hrs One hour peak: 0800-0900	• Central Area Access • Intersection performance • Design issues • Site specific issues • Public transport assessment	YES	YES
Inter Peak Generation 0900-1600 One hour peak: 1200-1300	• Intersection performance • Design issues • Site specific issues • CBD design • Public transport assessment	YES	YES
Evening Peak Generation 1600-1800 One hour peak: 1700-1800	• Intersection performance • Design issues • Site specific issues	YES	NO
24 Hour model Factored off the three Peak Period models	• Reporting overall traffic levels • Not used in funding applications as the factored model is not validated	N/A	NO

These models have the same basic zone system and network structure, but clearly are designed to address different questions.

Modelling necessitates a series of compromises because of the constraints of current techniques, or because data is not available by which to utilise the techniques, or because recourses are not available at the time. Nevertheless, a model is a 'living' tool, which has and should continue to be improved incrementally over the years, as needs dictate and resources permit.

1.4 Report Content

This report, as its title suggests, is designed as a technical document. It is intended to be a reference volume of how the transportation model was built and contains all the information necessary to completely build the analytical system. It highlights the

assumptions made, the techniques adopted, and the relationship used. As well, it demonstrates the extent to which the model used was validated.

The report is intended to be of interest to transportation planners and engineers. It is unashamedly technical and uses jargon without apology.

2. MODEL OVERVIEW

2.1 Model Form

Planning of a land use transport system requires that the system can be adequately modelled and the effects of any change can be reliably forecast. A useful method is to build mathematical models that simulate travel behaviour. The land use and traffic modelling used for this model update comprised five sequential stages. That is, trip generation, trip distribution, mode split, trip assignment and validation:

1. Trip End Generation. The generation of trip ends for each sub area (zone) within the study area. The trip ends were generated according to the pattern of households and employment activity, and then allocated accordingly. The model was based on vehicle trips, rather than person trips. As a result, the modal split phase was inherent in the trip end generation rather than following the distribution stage.

2. Trip Distribution. The conversion of trip ends to trips distributed within the study area according to a function and travel time.

3. Mode Split. The conversion of person trips into car driver, car passenger, public transport, and cycling/walking trips.

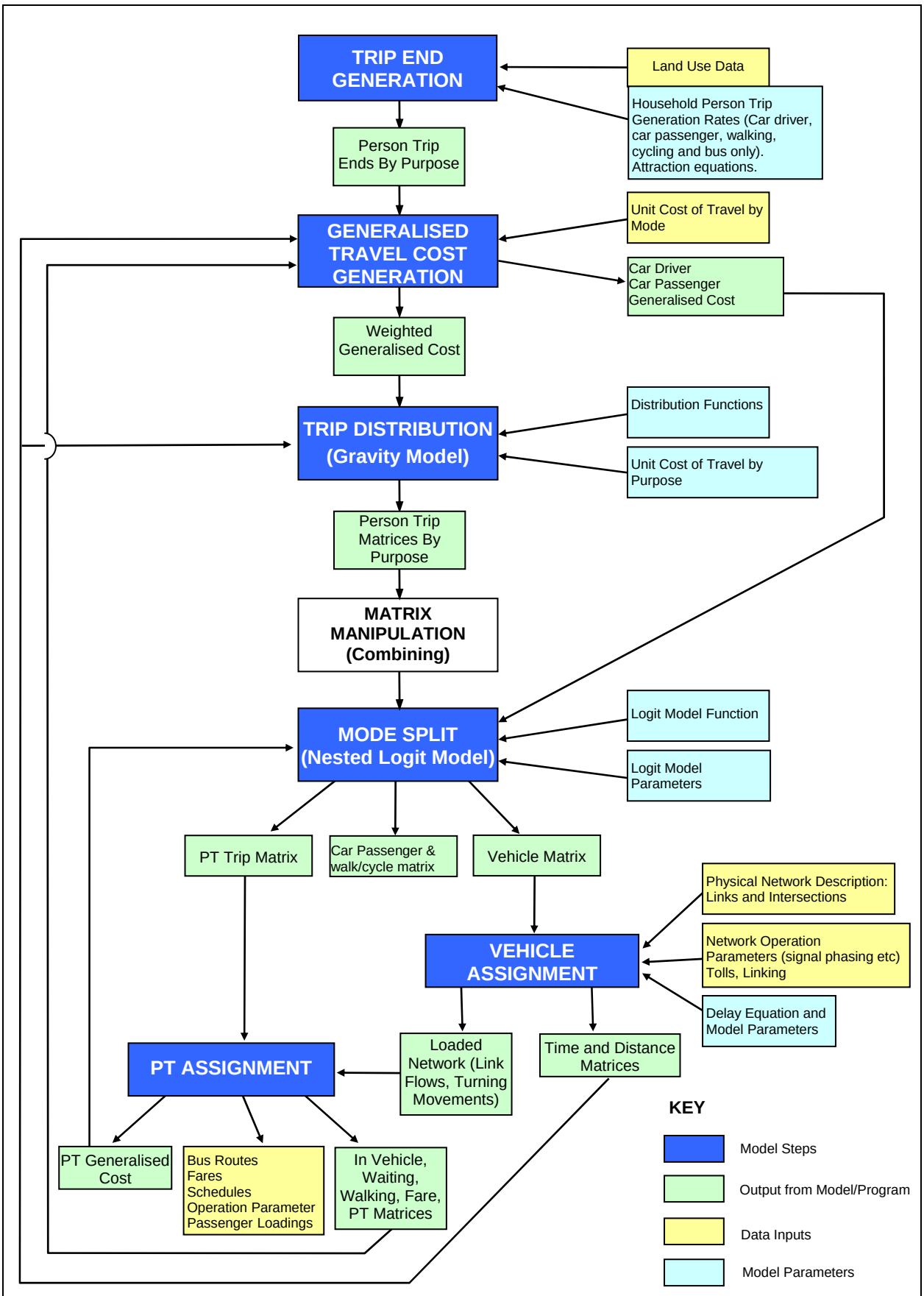
4. Trip Assignment. The loading of trips between zones onto the road network as traffic flows.

5. Validation. The final stage of the process where the model is checked against observed traffic data to ensure the model is accurately reflecting actual travel behaviour.

The relationships between the different components are summarised schematically in **Figure 1**. Evaluation and operational impacts of particular projects will be the subject of later reports for Council decision making and funding.

There is an iterative process where the interzonal times and distances which result from the assignment phase feed back into the trip distribution and mode split phases. The process can be started by assuming times and distances as initial impacts to distribution, or by assuming initial trips as input to assignment. In any event, the assignment/distribution loop is repeated until there is little or no change in the vehicle hours and vehicle kilometres of travel between iterations. Note that this will only occur if there is sufficient capacity in the network. As the mode split depends on weighted generalised costs, which are in turn dependant on the mode split, there is an iterative loop of the formation of generalised cost and the mode split phase.

Please note that as the PM peak model is a 3-step model it does not include the mode split and public transport assignment components in **Figure 1**.



2006 Nelson-Tasman Transportation Model Gabites Porter	**Person Trip Model Components**	**Figure 1**

2.2 The Study Area

The 2006 Nelson-Tasman Transportation Model covers the area from Hira in the east, to Tophouse in the south, and Motueka in the west, which is unchanged from the 2001 model.

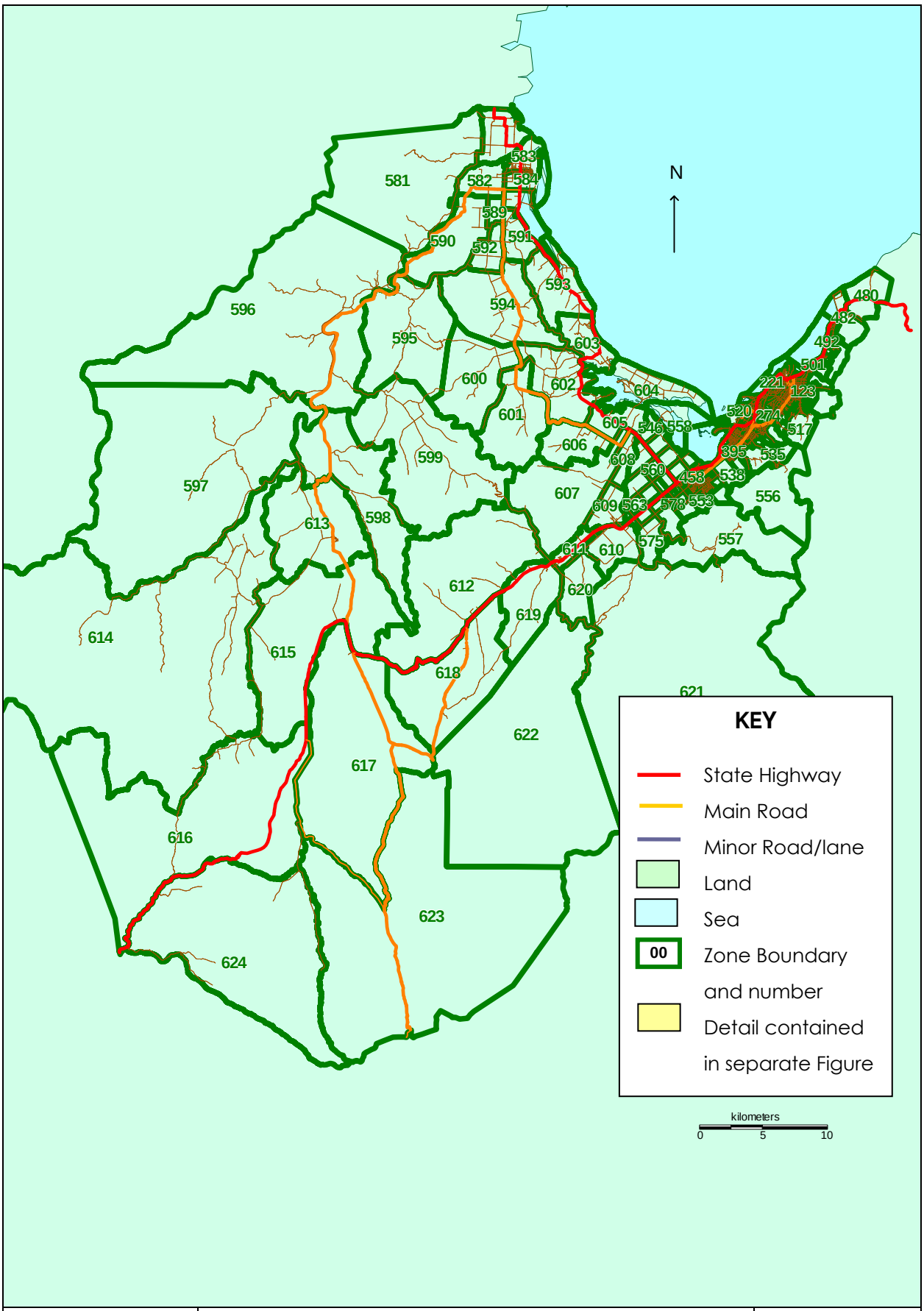
The analysis procedures used in this study required that the study area be divided into a number of smaller areas or zones. These zones were set up to be of approximately similar size (in terms of the amount of activity within them).

The zone system adopted for this study is shown in **Figure 2** through **Figure 8**. Some of the zones contain more than one centroid. These were built into the model to allow for possible zone boundary refinement in the future. These figures also show the locations and identities of the external points to the model, and the extent of the transport network.

Where possible it follows NZ Statistics meshblock boundaries, combining them to create homogeneous zones. The meshblock to zone lookup table is contained in **Appendix One** and is consistent with that from the 2001 model.

The zone system consists of a total of 650 zones consisting of the following:

- 485 internal land use zones
- 107 Nelson CBD parking zones
- 52 spare zones for future model refinement
- 6 external zones



2006 Nelson-Tasman Transportation Model	**2006 Model Zones**	**Figure 2**
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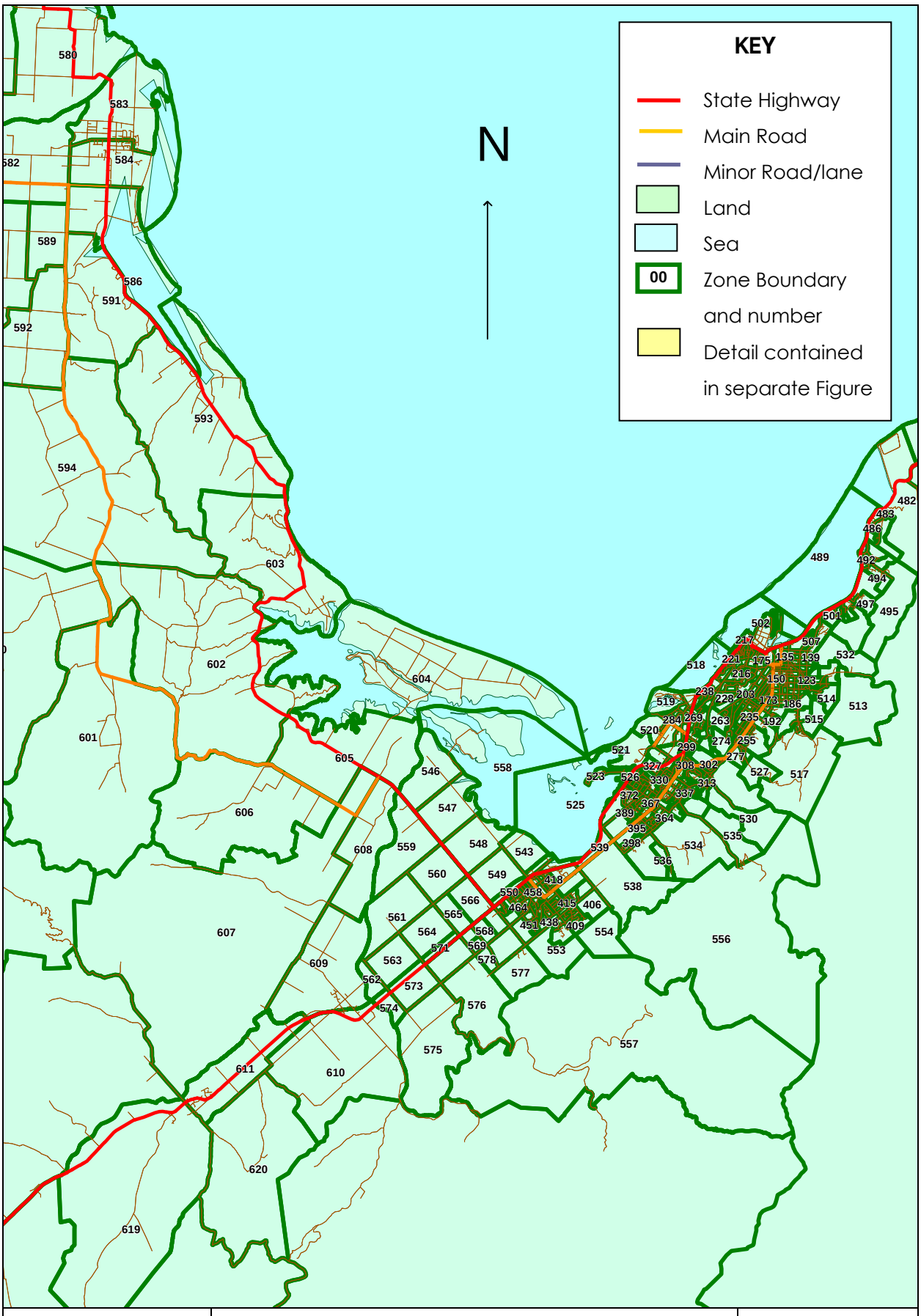

2006 Nelson-Tasman Transportation Model	**2006 Nelson and Tasman Zones**	**Figure 3**
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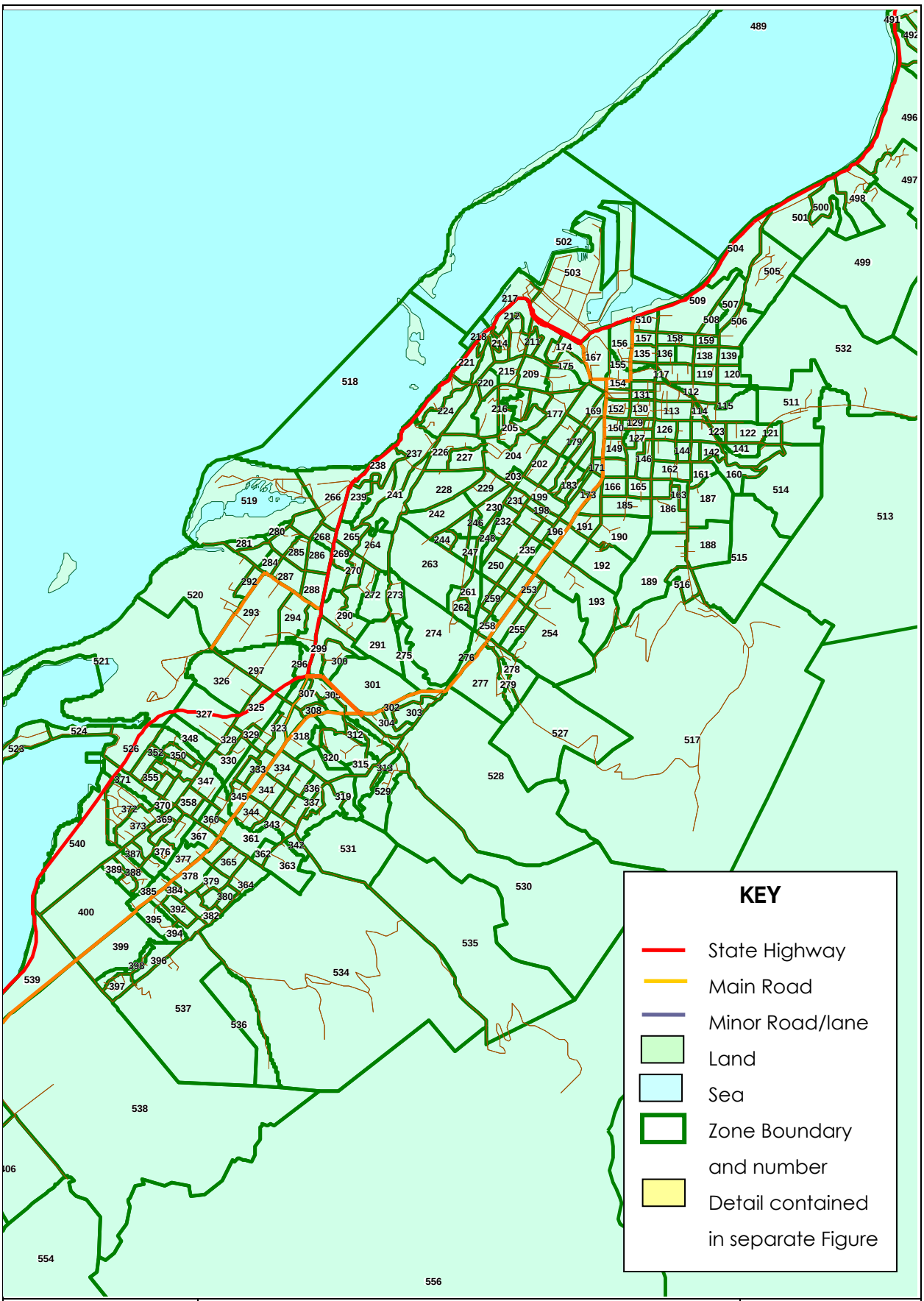

2006 Nelson-Tasman Transportation Model	**2006 Nelson Zones**	**Figure 4**
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2006 Nelson-Tasman Transportation Model	**2006 Nelson CBD Zones**	**Figure 5**
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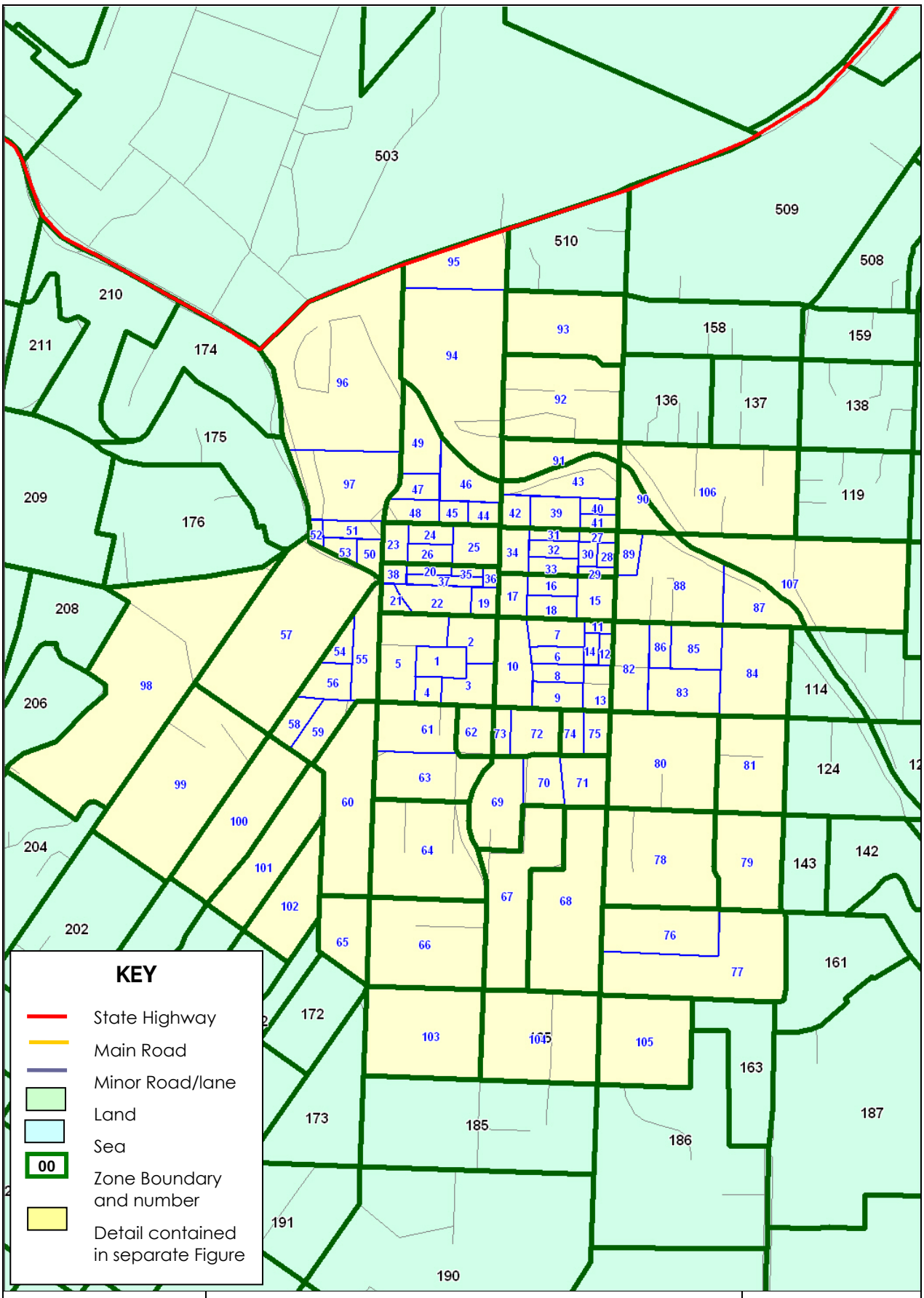

2006 Nelson-Tasman Transportation Model	**2006 Nelson Parking Zones**	**Figure 6**
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2006 Nelson-Tasman Transportation Model	**2006 Stoke Zones**	**Figure 7**
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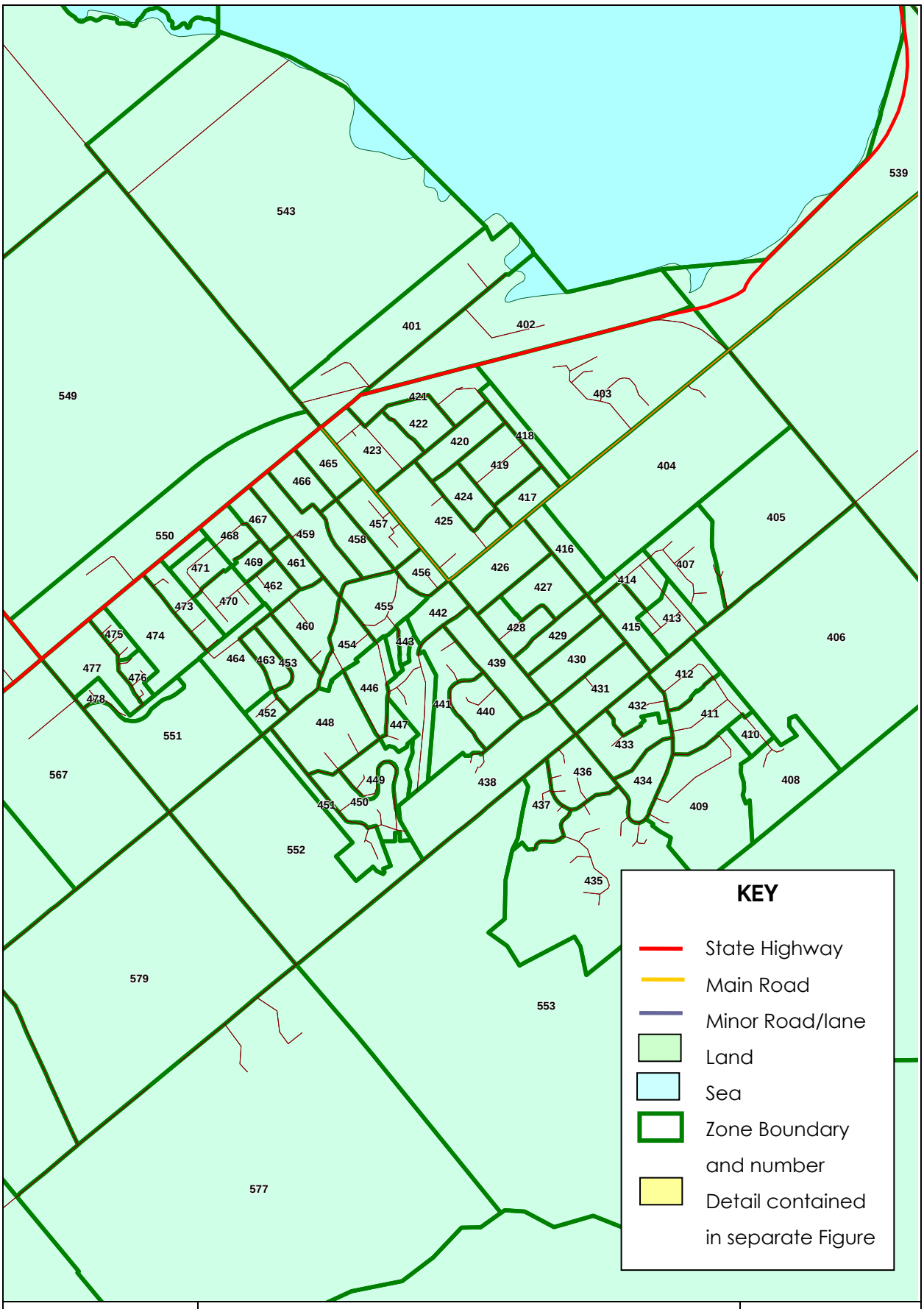


2006 Nelson-Tasman Transportation Model	**2006 Richmond Zones**	**Figure 8**
Gabites Porter		

2.3 The Road Network

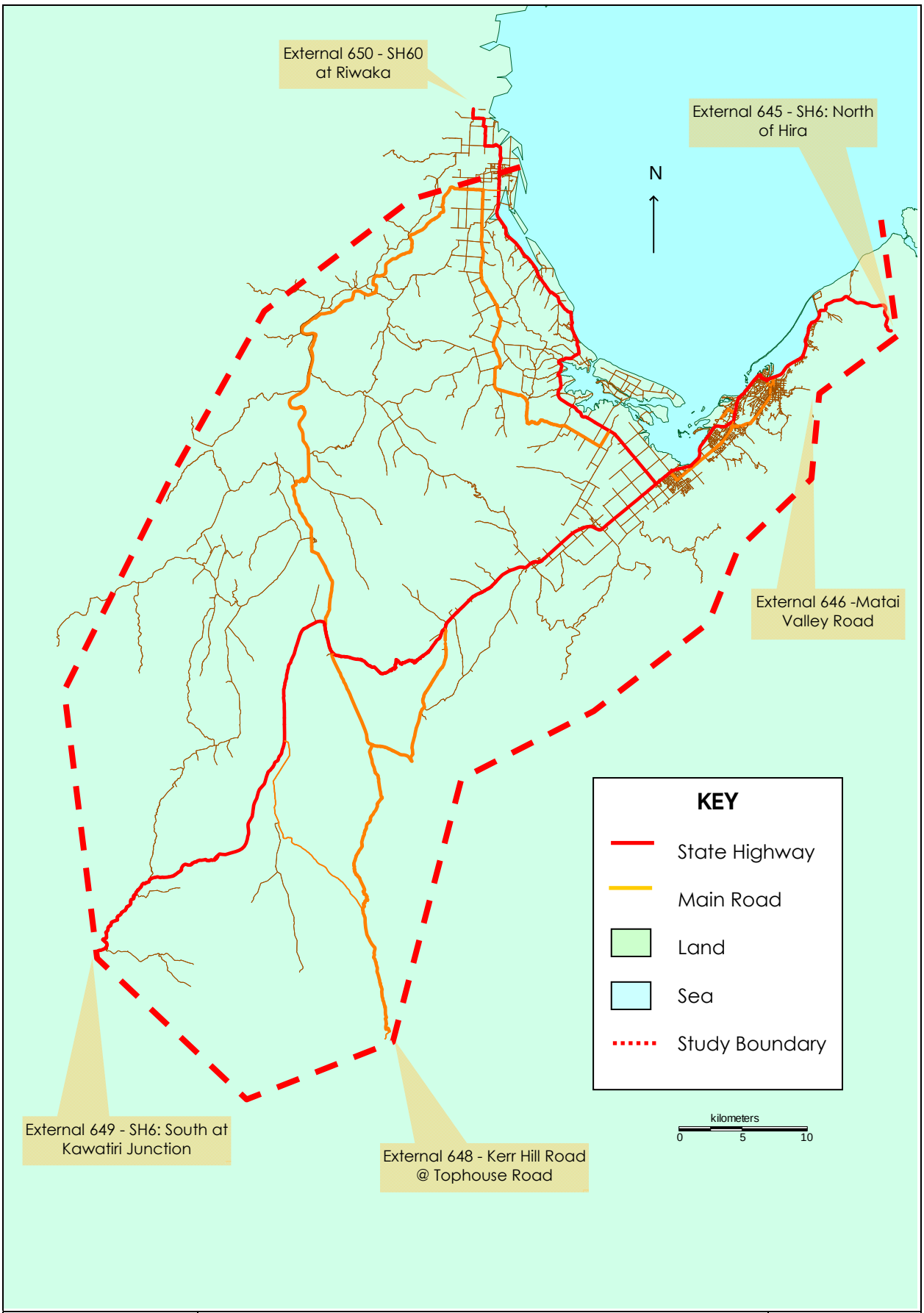
The road network used for the study is a subset of the overall road system. It includes all major and minor arterials and selected collector and local roads, carefully chosen to allow for public transport routes to be allocated. Those roads which are included are shown in **Figure 9**, and **Figure 10** and have been mapped to closely match the council's GIS.

Because the network is a true representation of a road, then the distances are calculated directly from the co-ordinate data. This removes the need to manually code distances and also removes the potential for coding errors.

All other components of network coding were prepared from visual inspection or from the Council's set of aerial photos, for example:

- Link lanes
- Link free flow speeds
- Approach controls
- Approach lanes

All roundabouts and priority intersections were coded into the network. One of the features of TRACKS is the ease of intersection coding, whereby only the lane disciplines are required for priority intersections. Conflicting movements are internally identified from the geometry of the network.



2006 Nelson-Tasman Transportation Model	**Model Area Road Network**	**Figure 9**
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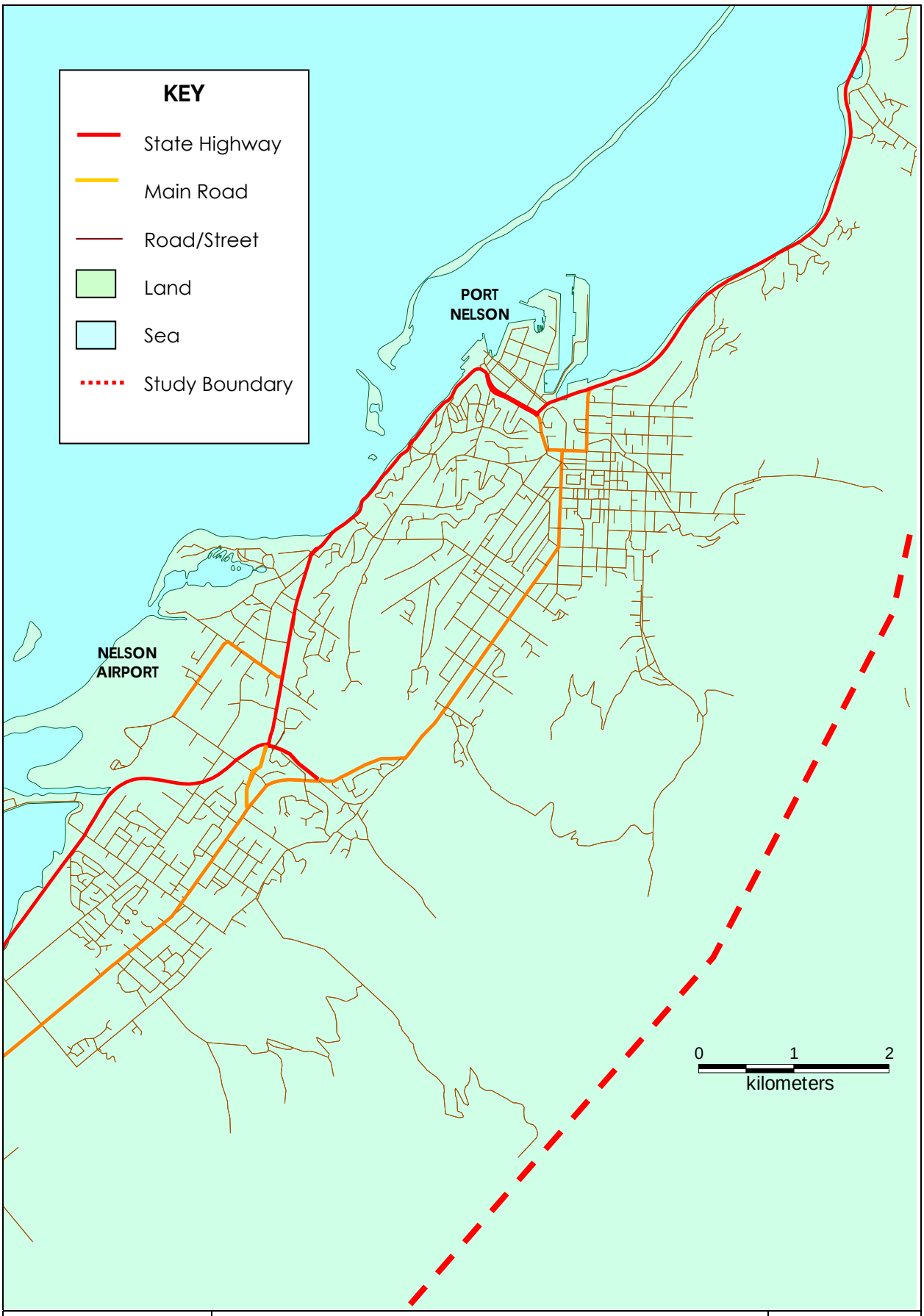


2006 Nelson-Tasman Transportation Model	**Model Road Network – Nelson City**	**Figure 10**
Gabites Porter		

3. EXISTING LAND USE AND TRAFFIC DATA

3.1 Existing Land Use (2006)

Key land use variables used in the model, were compiled from 2006 Census meshblock level to traffic zone level. **Table 3** summarises the land use variables used and the 2006 land use totals that apply to the study area. The zonal land use values used for the model are included in **Appendix Two**.

Land Use 2006			Table 3
Main Land Use Categories	**Description of Land Use Categories**	**Code**	**Study Area Totals 2006**
Residential	**Total Households**	HH	30,771
	Total Population		**79,866**
Employment[1]	Agricultural	AGR	2,937
	Manufacturing	MAN	4,739
	Wholesale	WHO	2,005
	Retail	RET	5,210
	Office	OFF	5,787
	Education	EDU	2,507
	Community	COM	7,936
	Total Jobs	TOT	34,572
Educational	School Roll	SCH	15,023
	Tertiary Roll	TER	1,533

There are 51,680 cars in the network and 30,771 households, which brings the Average Number of Vehicles per household (**VEH/HH**) to 1.68. There are 79,866 people in the study area and 30,771 households, which yields an Average Persons per Household (**PER/HH**) of 2.595.

[1] At the workplace meshblock the number of jobs available are represented by ANZSIC classification

3.2 Existing Transport Data

This section summarizes the main features of transport in the Nelson-Tasman area. Data was sourced from:

- Nelson City Council. This included weekly directional traffic reports at key locations generated from the council's tube count traffic monitoring programme; travel time survey data; indicative bus patronage data;
- Tasman District Council. This included weekly non-directional traffic reports at key locations generated from the council's tube count traffic monitoring programme;
- NZTA. This data included traffic counts for all NZTA count sites from 1996 to 2006;
- Statistics New Zealand. This data included Journey to Work analysis for the 2006 Census; and
- Land Transport Safety Authority. This included mode split data from 1997/1998 Travel Survey for Tasman District Council and Nelson City Council. This data was extracted directly from the survey database as the report had grouped Nelson and Tasman together with Marlborough.

Traffic count data was used to build traffic assignment profiles. This process is described in **Section 10.2**. They were also used in the validation process for the 2006 Morning, Inter, and Evening Peak models. The validation process is described in **Section 12.1**. The AADT counts were used to build an understanding of how traffic levels have changed in the study area over the past few years. While not used in the construction of the 2006 model traffic growth measurements are important for comparing future traffic volumes projections against modelled projections should a future transport model be built.

The Journey to work and Travel Survey data was used to analyse mode choice and how this has changed over the past decade. Its principle use is in the construction of a 4-Step Public Transportation Model so is included here for completeness.

An analysis of the results shows that the Nelson/Tasman transport system is characterised by:

- Steady annual growth in traffic along key routes;
- Seasonal traffic fluctuation with higher traffic volumes occurring during summer months than winter months; and
- Varying daily traffic profiles depending on location.

AADT History along State Highway 6 is illustrated in **Figure 11**. AADTs have been indexed to 2006 to represent the year from which land use was derived. A weighted average of three sites was used to give an indication of how traffic levels have changed through the study area. Overall, the results show a steady growth between 2002 and 2006. Traffic levels along SH6 were 108% of 2001 levels in 2006.

When analysing trends in traffic growth it is best to use a time period of at least 5 years and longer if possible. This is because changes between years can produce extreme variance, which results in misleading growth estimates. These extremes can be counter balanced if a longer time period is used.

While traffic growth is not used directly in the construction of the 2006 transport model they add to the general understanding of traffic in the region. Their main use will be in the testing of future transport models. Modelled results generated from landuse

projections must be compared against estimations of traffic growth from measured AADTs to ensure the future model meets expectations.

Census journey to work data is illustrated in **Figure 12**. It shows the breakdown of mode for journey to work trips for the 2006 census in Tasman and Nelson. The most popular mode choice was private vehicle driver at 71% for Nelson and 73% for Tasman.

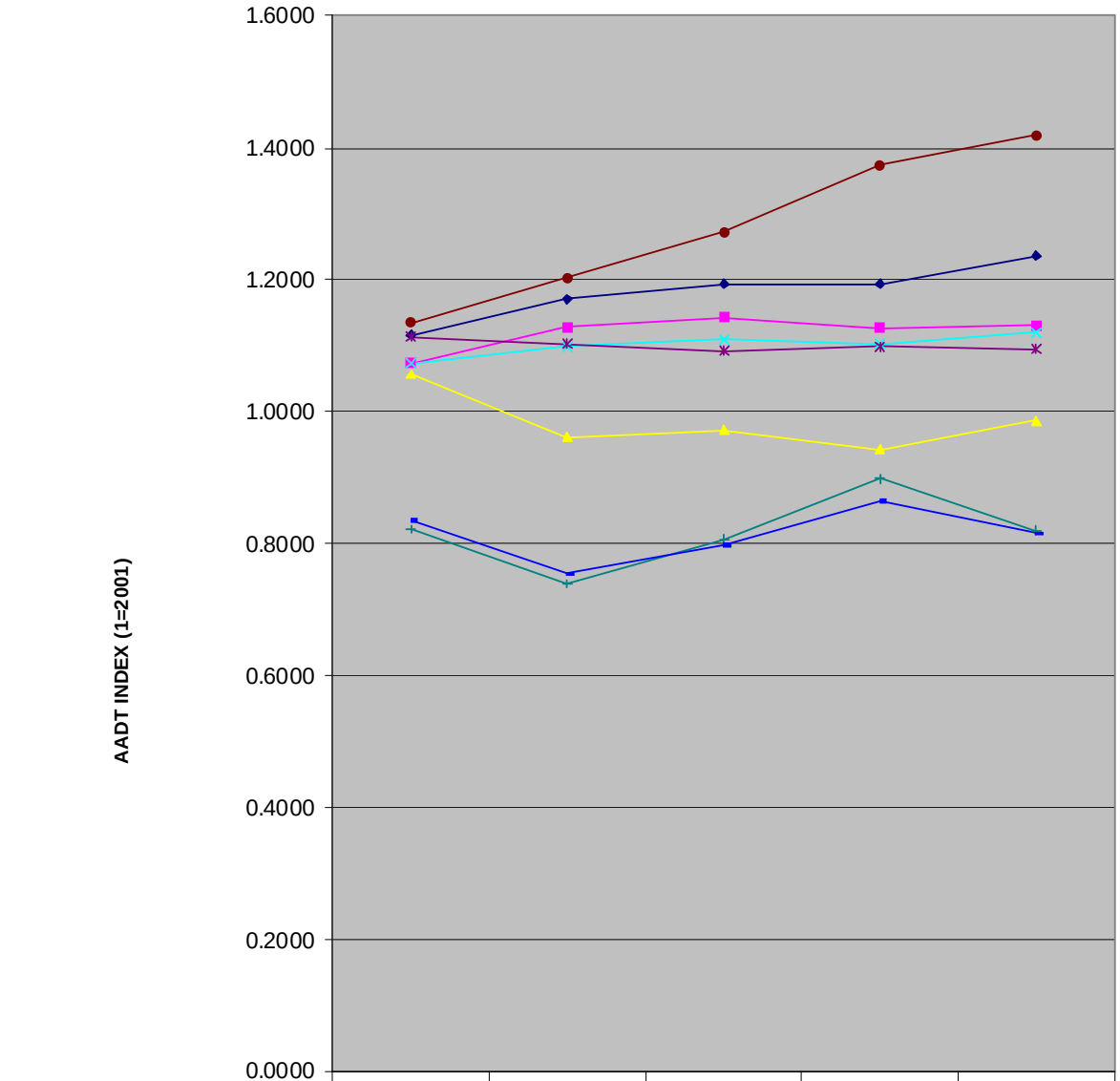
Cycling and walking was more popular in Nelson than in Tasman, as would be expected with greater distances in Tasman to travel to destinations.

Mode choice from the 1997/1998 National Travel Survey for the Nelson and Richmond urban centres is illustrated in **Figure 13**. The data was sourced directly from the Survey database because the original document had aggregated the results for all of Tasman, Nelson, and Marlborough to improve the statistical credibility.

The most popular mode choice was Vehicle Driver at 53% while the least popular choice was bussing at 1%. Walking trips accounted for 18% of all trip legs and cycling accounted for 3%.

This survey's main strength is that it covered all modes and trip purposes relevant for the construction of a 2006 transport model. However, it also had weaknesses that could not be resolved in the time available:

- The data was gathered seven/eight years before the model year of 2006; and
- The number of responses with the Nelson and Richmond areas to the survey may have been too low to yield a credible result.



	2002	2003	2004	2005	2006
Hira - Telemetry	1.1144	1.1705	1.1941	1.1937	1.2354
Nelson Nth	1.0738	1.1285	1.1431	1.1260	1.1307
Basin Reserve	1.0568	0.9605	0.9709	0.9418	0.9872
Stoke - Telemetry	1.0729	1.0988	1.1082	1.1024	1.1200
Richmond 3 Bros	1.1140	1.1034	1.0927	1.0974	1.0936
Brightwater	1.1346	1.2024	1.2721	1.3738	1.4179
Eighty Eight Vly Stm Bridge	0.8221	0.7376	0.8054	0.8980	0.8191
Spooners Hill Higgins Cul	0.8347	0.7532	0.7980	0.8641	0.8141

2006 Nelson-Tasman Transportation Model	**AADT Growth on SH6 2002-2006**	**Figure 11**
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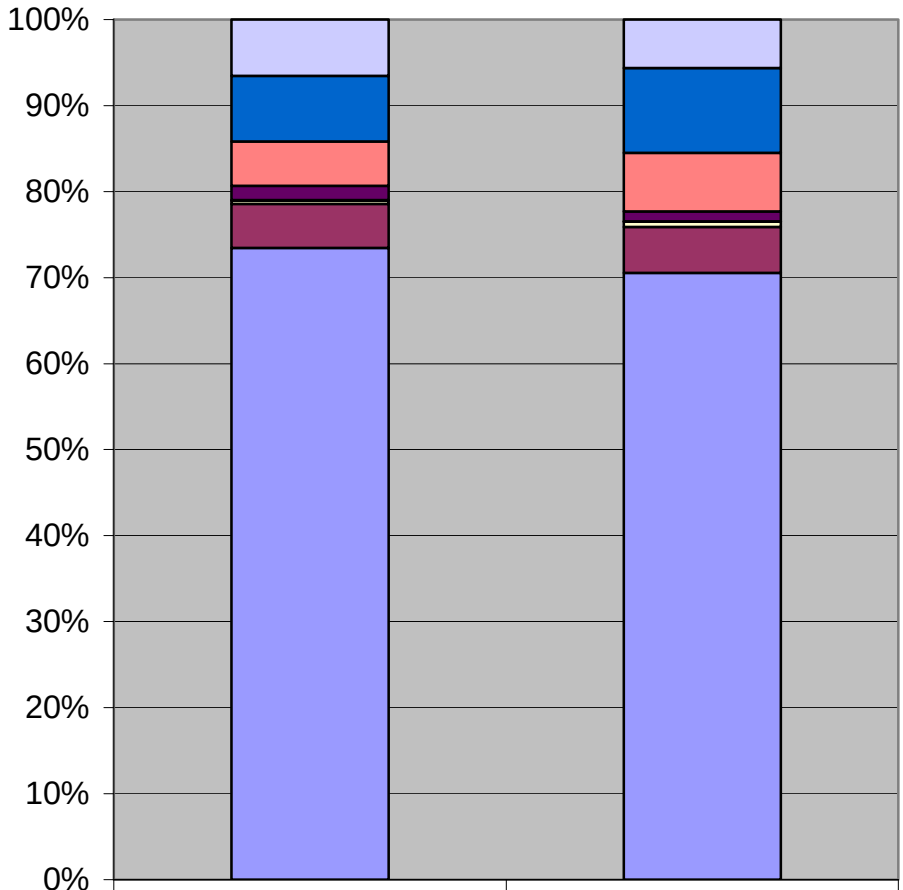
Journey to work mode



	Tasman	Nelson
Other	6.5%	5.7%
Walk	7.6%	9.8%
Bicycle	5.2%	6.8%
Motor Cycle	1.6%	1.2%
Train	0.1%	0.1%
Public bus	0.4%	0.6%
Passenger in car/truck	5.1%	5.3%
Drive	73.4%	70.6%

2006 Nelson-Tasman Transportation Model	**2006 Census Journey to Work**	**Figure 12**
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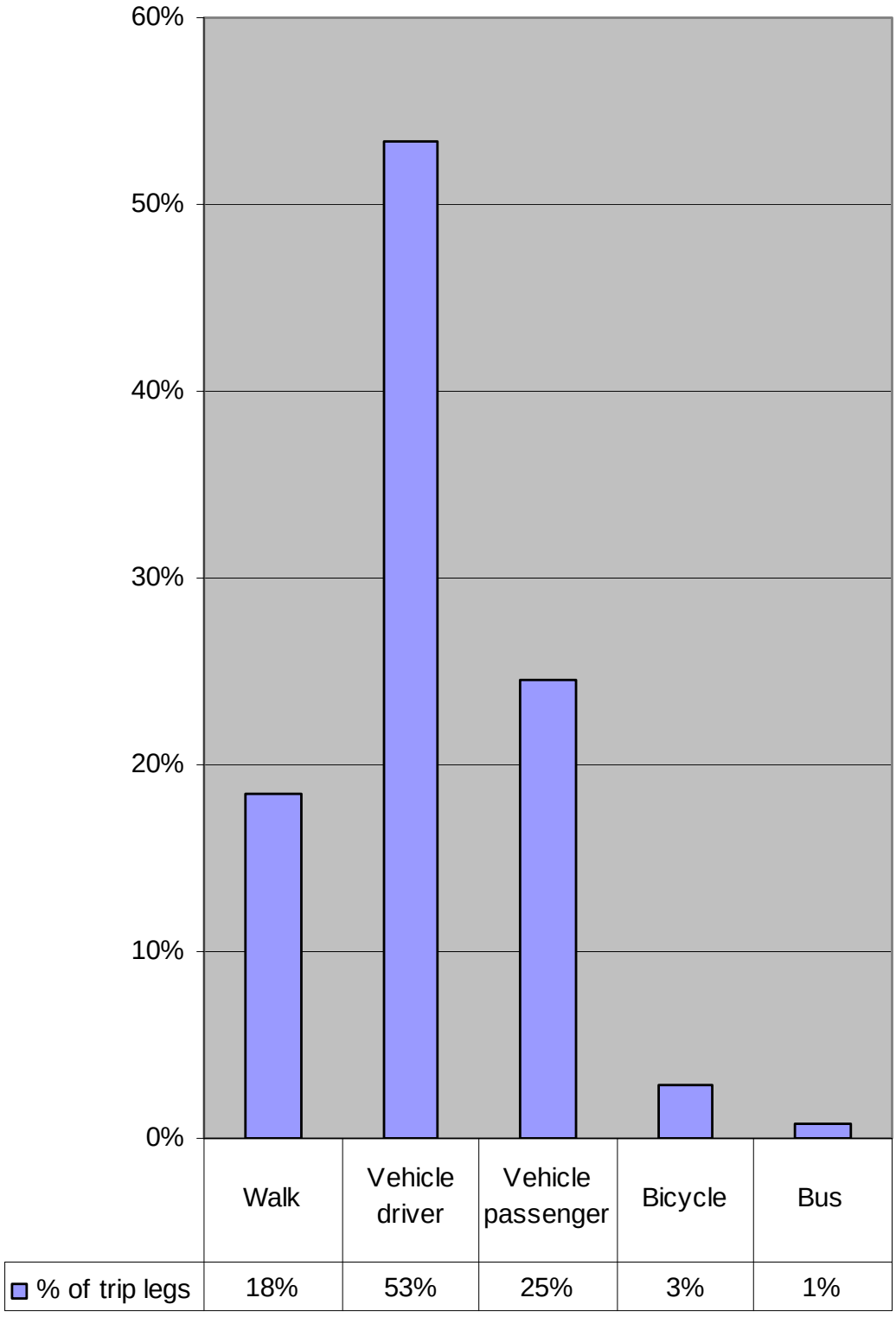

2006 Nelson-Tasman Transportation Model	**1997/1998 National Travel Survey – Nelson and Richmond**	**Figure 13**
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4. TRIP END GENERATION

Trip end generation is divided into three main categories: private, commercial and external. Note that the External traffic is made up of private non-commercial traffic as well as Heavy Commercial Vehicles (HCV).

4.1 Household Category Curves

In line with recent NZ transportation models, a 'category model' approach to trip end generation was adopted. For the category model the two variables of persons per household and vehicle availability per household were used to determine the total number of vehicle trips made within the study area on an average weekday.

Without conducting a Household Interview Survey (HIS) specifically for Nelson-Tasman* it was necessary to use the Auckland HIS data. This survey is the most recent accepted Household Interview Survey available at this time. It has been shown to be readily transported from one area to another within New Zealand and has been successfully used in other models throughout the country.

Twenty categories were used – five person categories by four vehicle availability categories. The curves describing the percentage of households within each category for a specific household composition are shown on **Figure 16**. Trip productions are calculated from 20 household categories of 1, 2, 3, 4, and 5+ persons by 0, 1, 2, 3+ cars calibrated directly from the 1991 Auckland HIS.

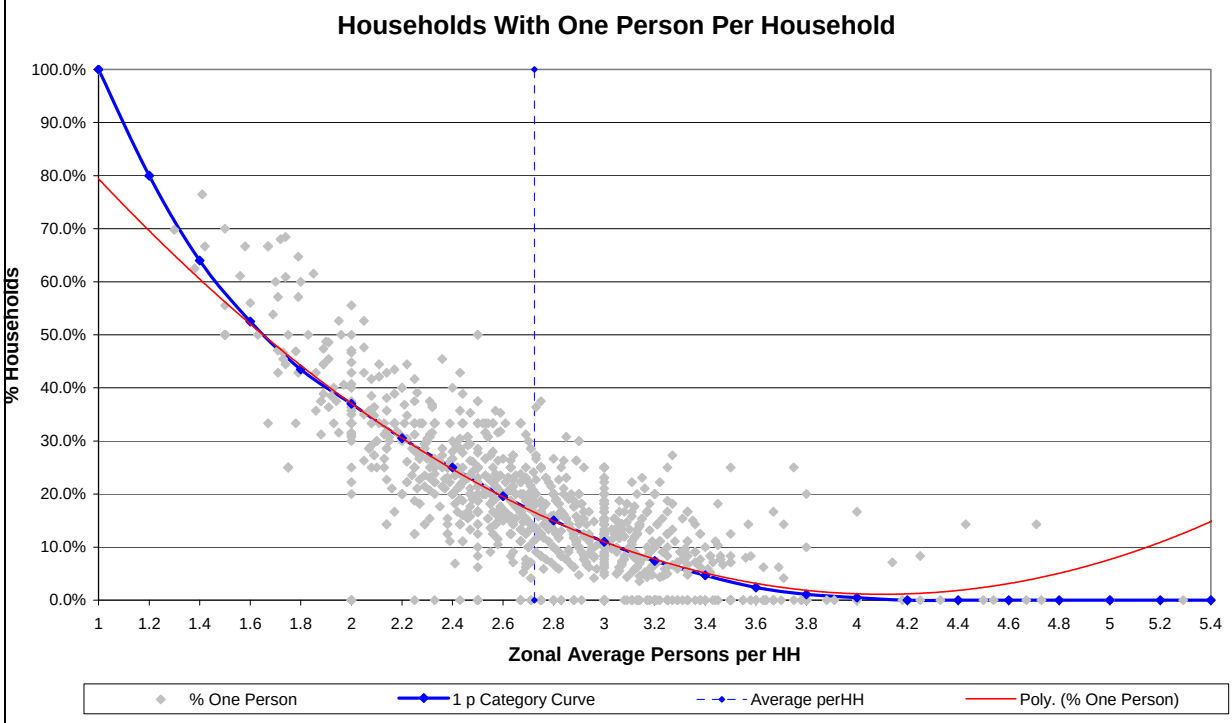
To indicate the measure of the fit the category curves have to the observed household data, the observed proportion of households (at meshblock level) in each category was compared to the curve calculated for each category. An r^2 value and coefficient of correlation were obtained for each category indicating the fit. The results are contained in **Table 4**.

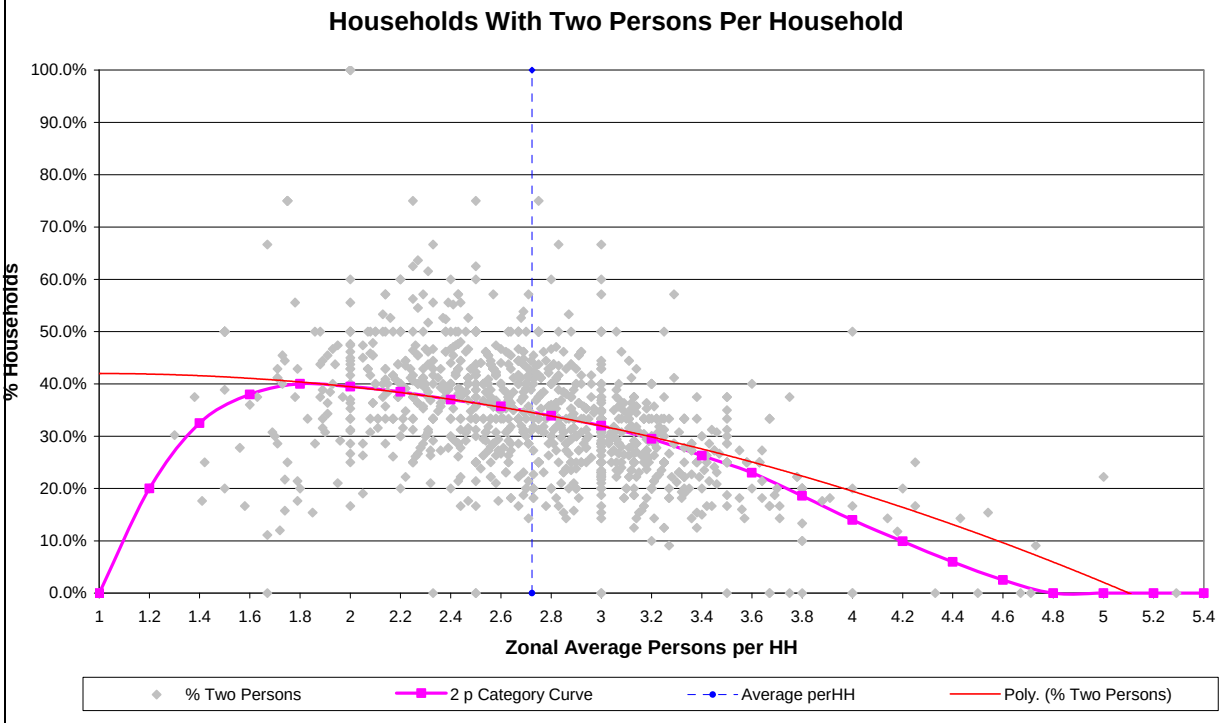
Measure of Fit – Household Category Curves					Table 4
Persons per Household	**1**	**2**	**3**	**4**	**5+**
r^2	0.70	0.24	0.14	0.37	0.57
Correl. Coeff.	0.84	0.49	0.39	0.60	0.75
Cars per Household	**0**	**1**	**2**	**3+**	
r^2	0.92	0.54	0.52	0.66	
Correl. Coeff.	0.96	0.74	0.72	0.81	

These curves are calibrated with persons per household, or vehicles per household plotted against the proportion of households in that category. These are subject to the constraints that the sum of proportions at any point must equal 1.0, and that when multiplying out the proportions for each category the average for the category was maintained. Each of the category curves and associated survey data is shown in **Figure 14** and **Figure 15**. A curve of best fit for the data (shown in red) has been included to show the closeness of fit each category curve has to the best possible solution.

Person category curves are included as **Figure 14** and vehicle category curves as **Figure 15**. A plot of all of the category curves is summarized in **Figure 16.**

* A prohibively expensive exercise





2006 Nelson-Tasman Transportation Model	**Person Category Curves**	**Figure 14**
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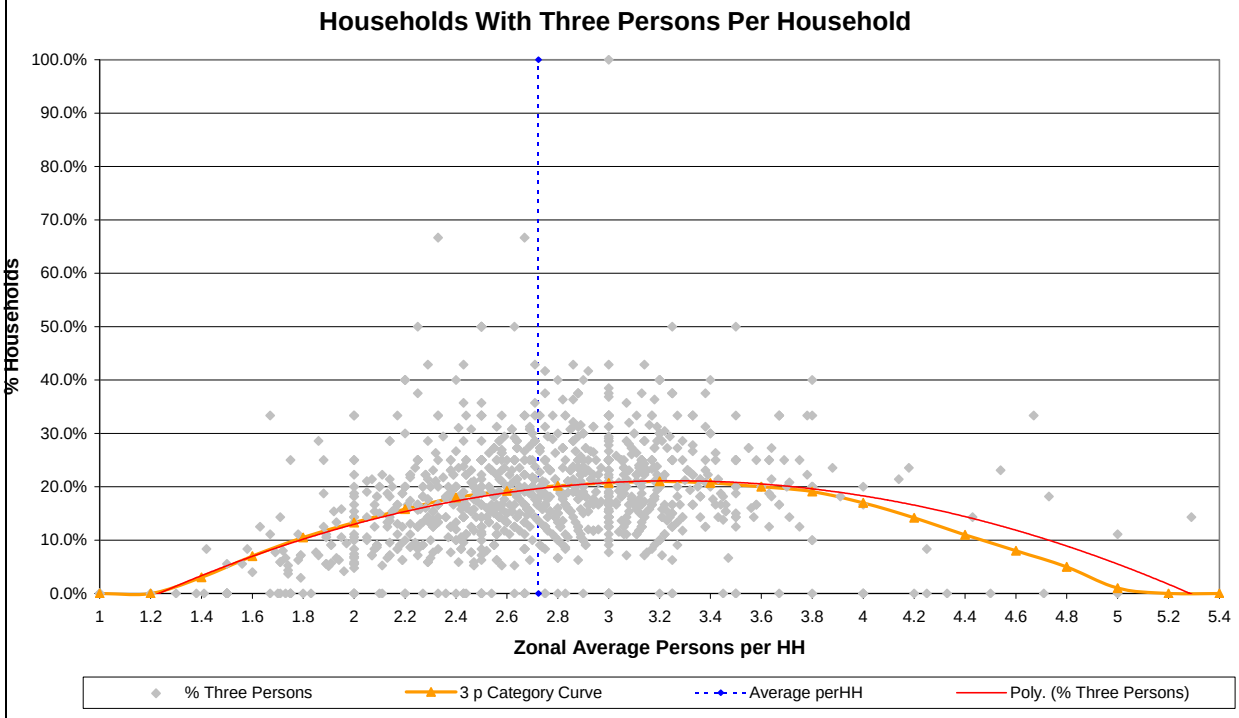
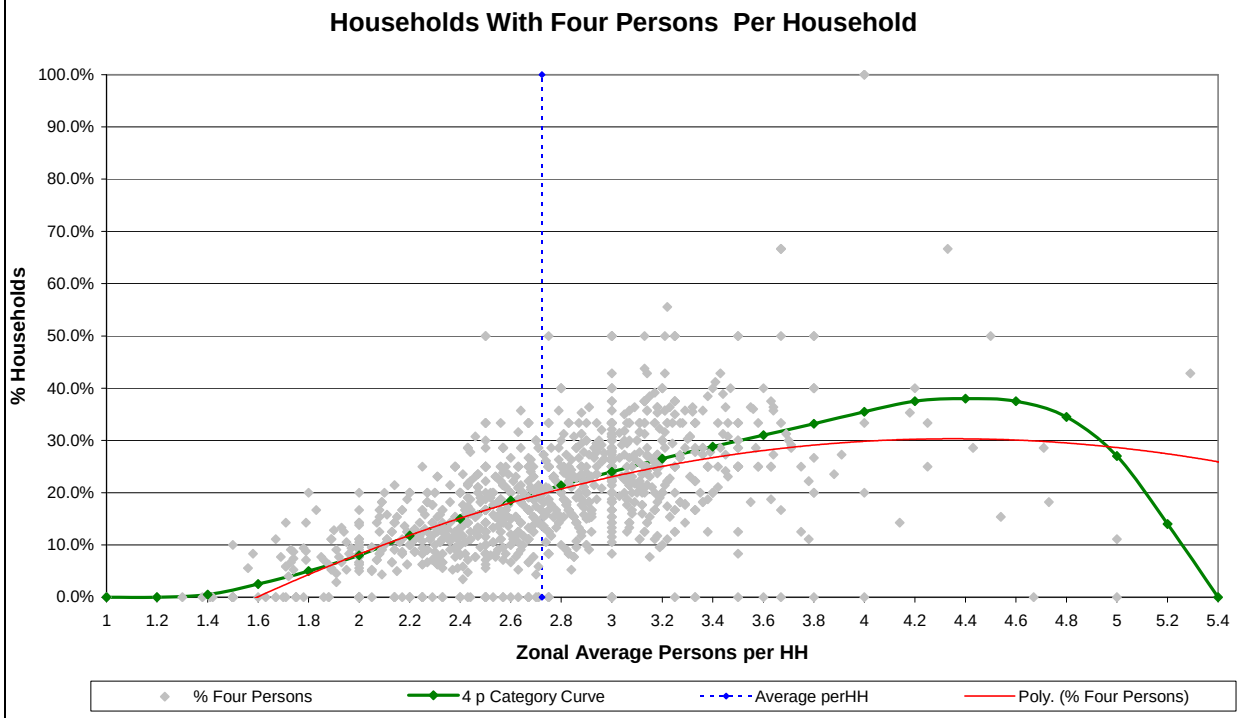
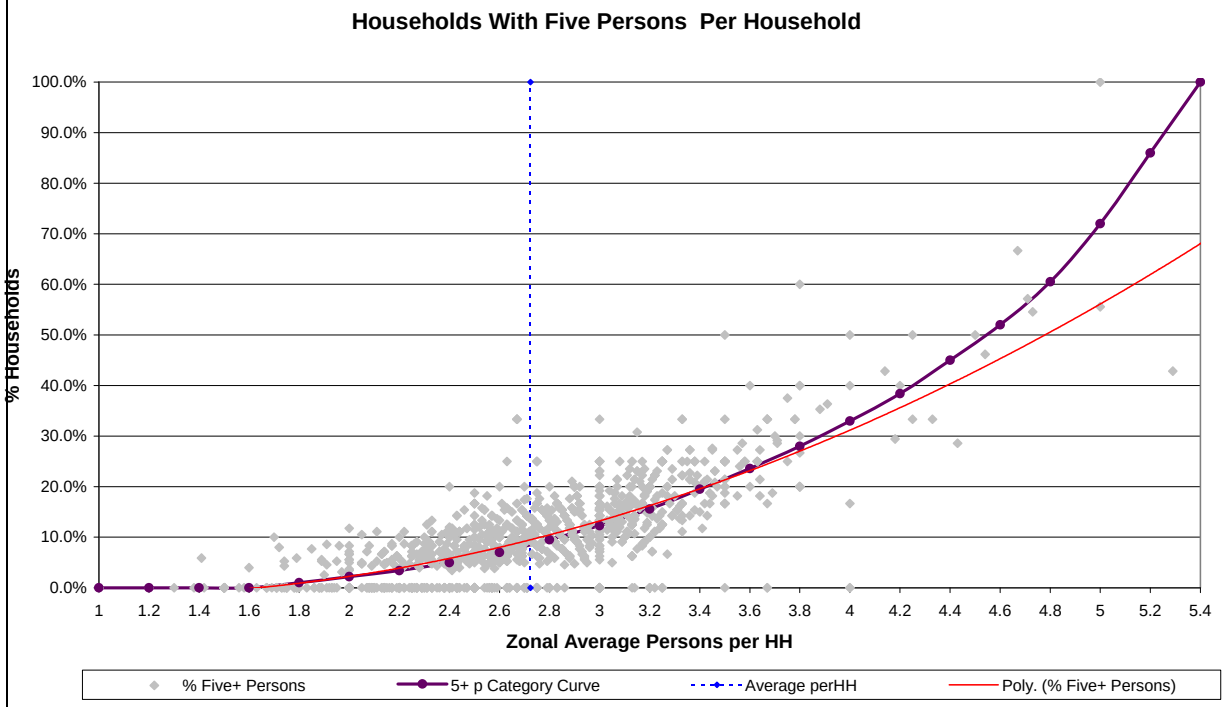
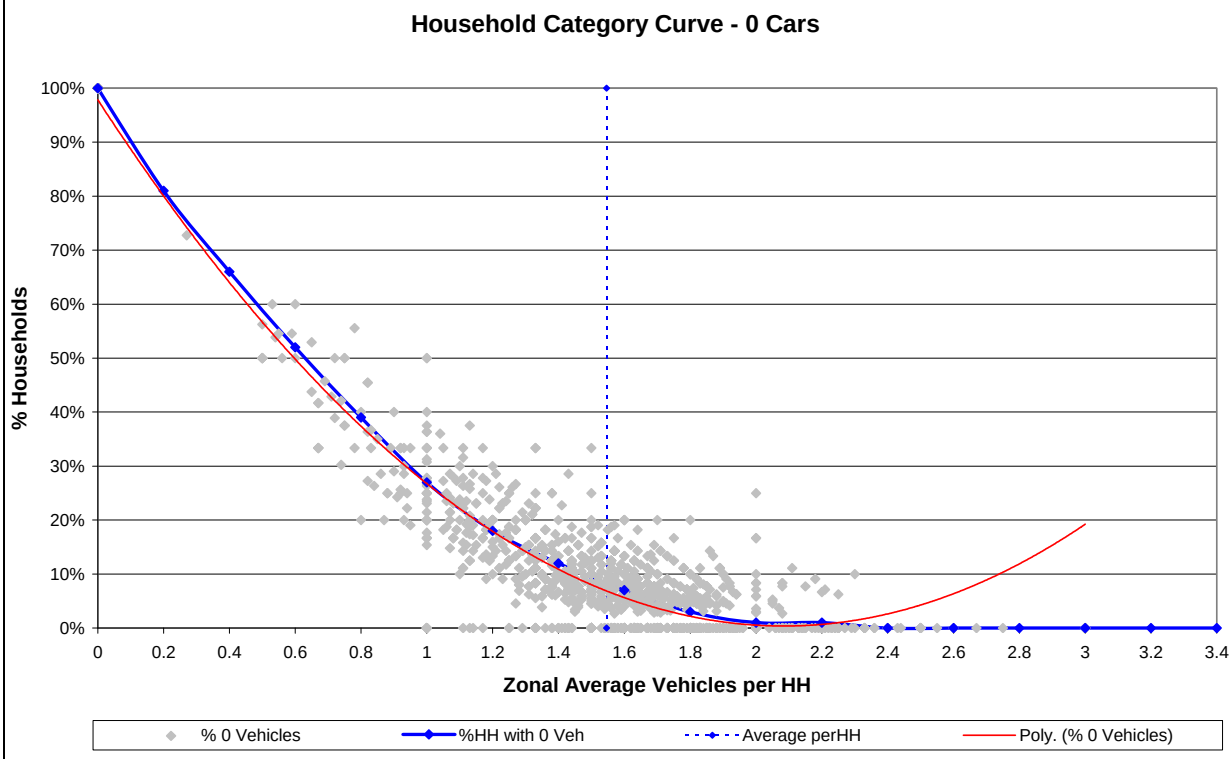


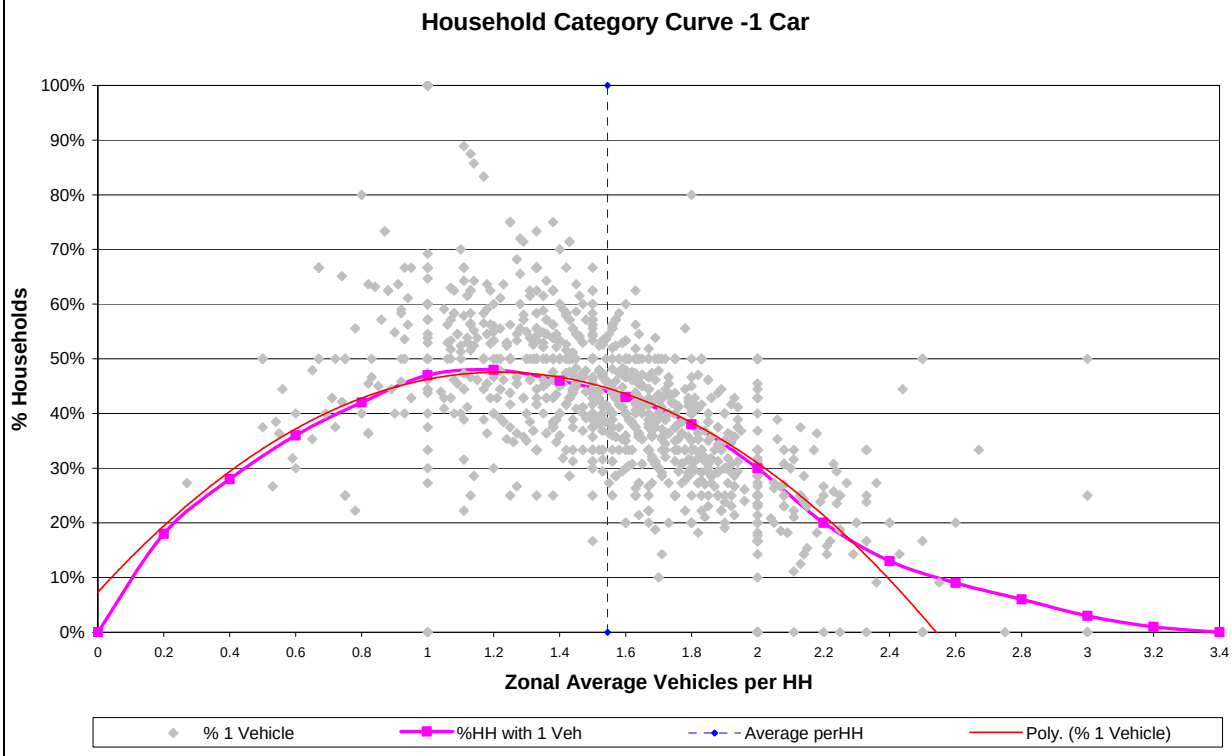


2006 Nelson-Tasman Transportation Model	**Person Category Curves**	**Figure 14 Continued**
Gabites Porter		

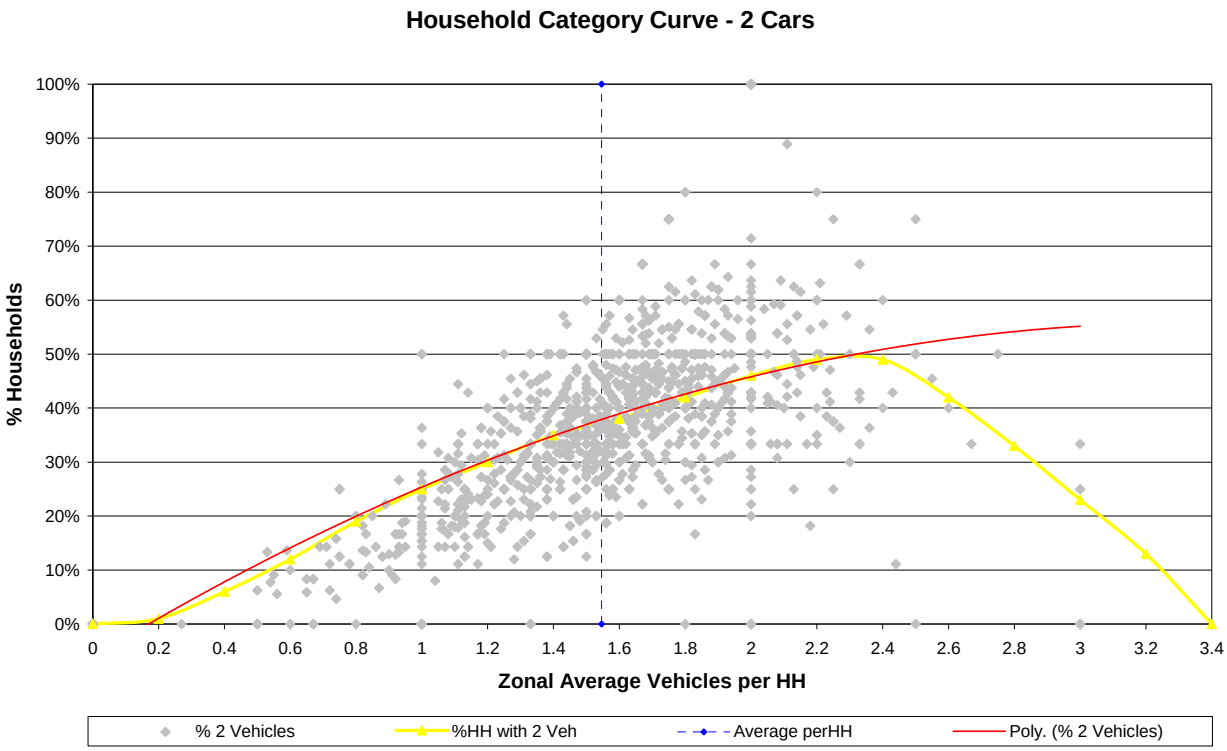


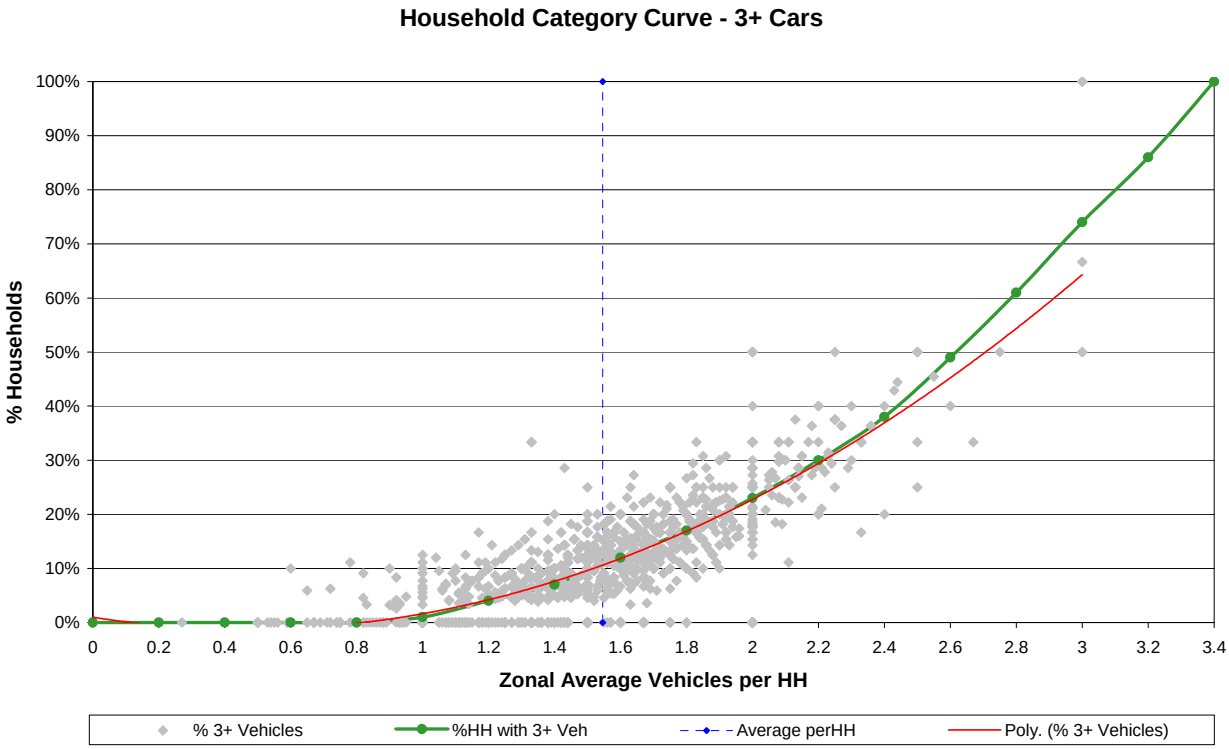
2006 Nelson-Tasman Transportation Model	**Person Category Curves**	**Figure 14 Continued**
Gabites Porter		



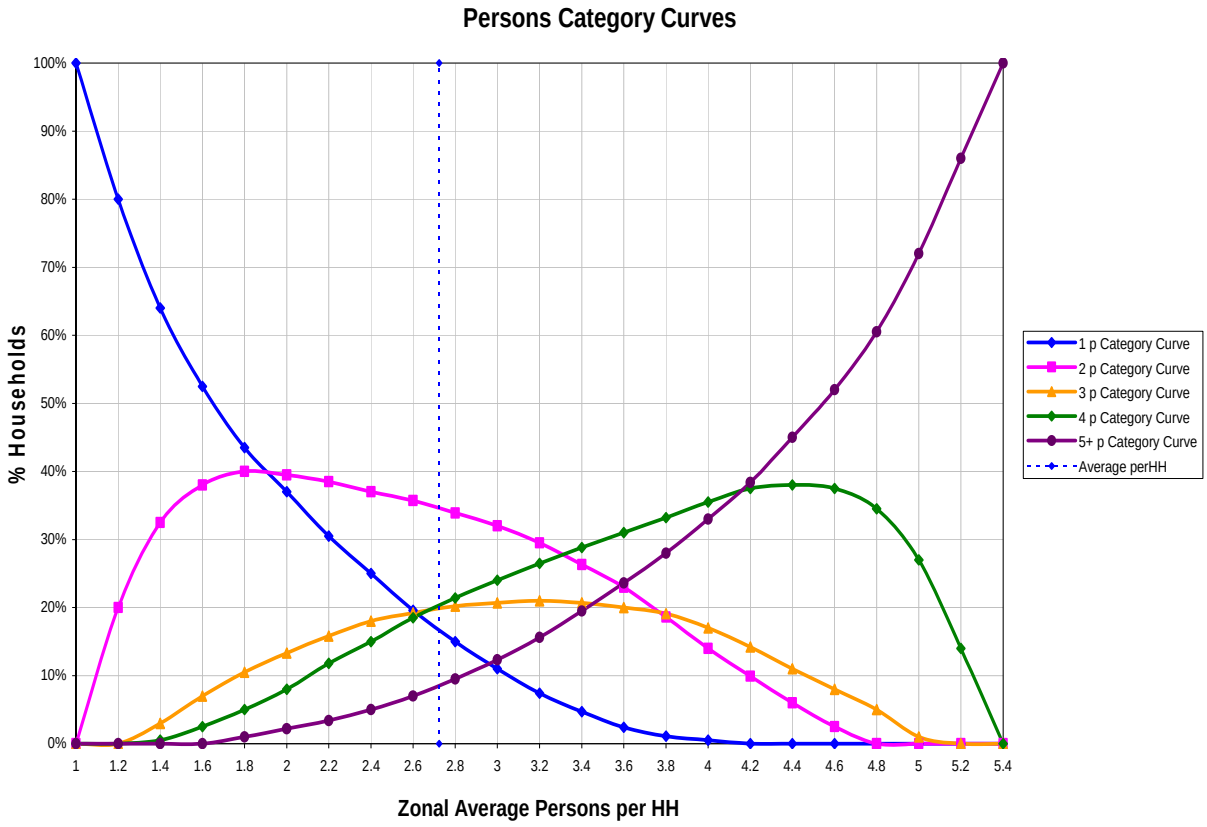


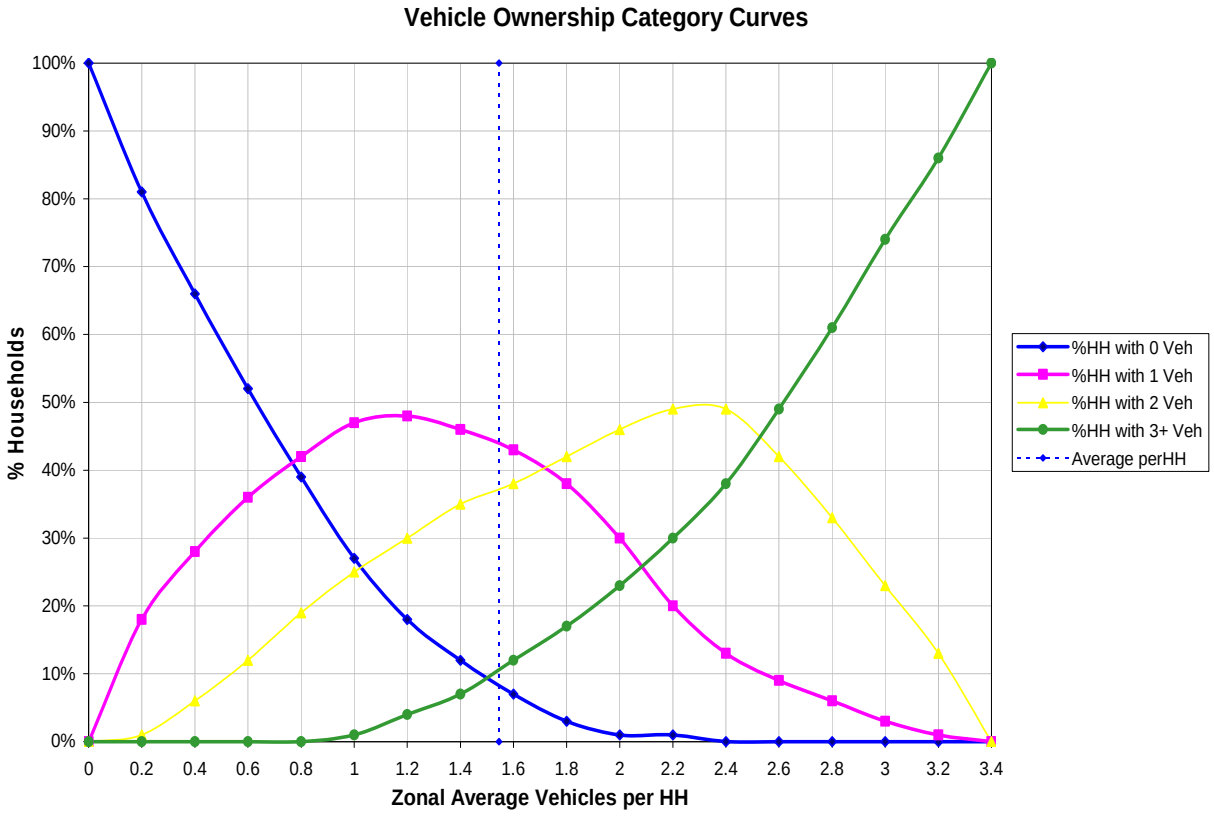
2006 Nelson-Tasman Transportation Model	**Vehicle Category Curves**	**Figure 15**
Gabites Porter		





2006 Nelson-Tasman Transportation Model	**Vehicle Category Curves**	**Figure 15 Continued**
Gabites Porter		





2006 Nelson-Tasman Transportation Model	**Summary Household Category Curves**	**Figure 16**
Gabites Porter		

Although the data shows a wide scatter in some categories, the curves reproduce area-wide average values reasonably well considering the two constraints indicated. The following tables indicate that over the entire area the calculated category curves reproduce the overall proportion of households in each category well.

Persons/HH and Cars/HH Proportions					Table 5
Persons per Household	**1**	**2**	**3**	**4**	**5+**
% Observed Total HH's	18.9%	33.7%	18.1%	18.8%	10.5%
% Calculated Total HH's	19.4%	34.1%	18.4%	19.0%	9.0%
Cars per Household	**0**	**1**	**2**	**3+**	
% Observed Total HH's	9.4%	42.1%	36.6%	12.0%	
% Calculated Total HH's	11.3%	42.1%	35.9%	10.6%	

The assumption inherent in the use of these surveys is that the two variables (persons/HH and cars/HH) are not highly cross-correlated. Certainly, experience has shown that persons and cars are not as highly correlated as employees and cars. The coefficient of correlation value in the study was 0.18 which indicates a negligible level of cross-correlation.

The second reason for adopting these variables was the need to have categories that can be readily forecast, of which persons and cars are reasonably straightforward.

The number of households in each of the twenty categories for a zone depend on the average persons per household and cars per household giving a combined probability, $\rho_{i,j}$, where i and j are category model variables.

e.g. $\rho_{1,3+} = \rho_1 \times C_{3+}$

where

$\rho_{1,3+}$ = proportion of households in category 1 person, and 3+ cars

ρ_1 = proportion of households with one person

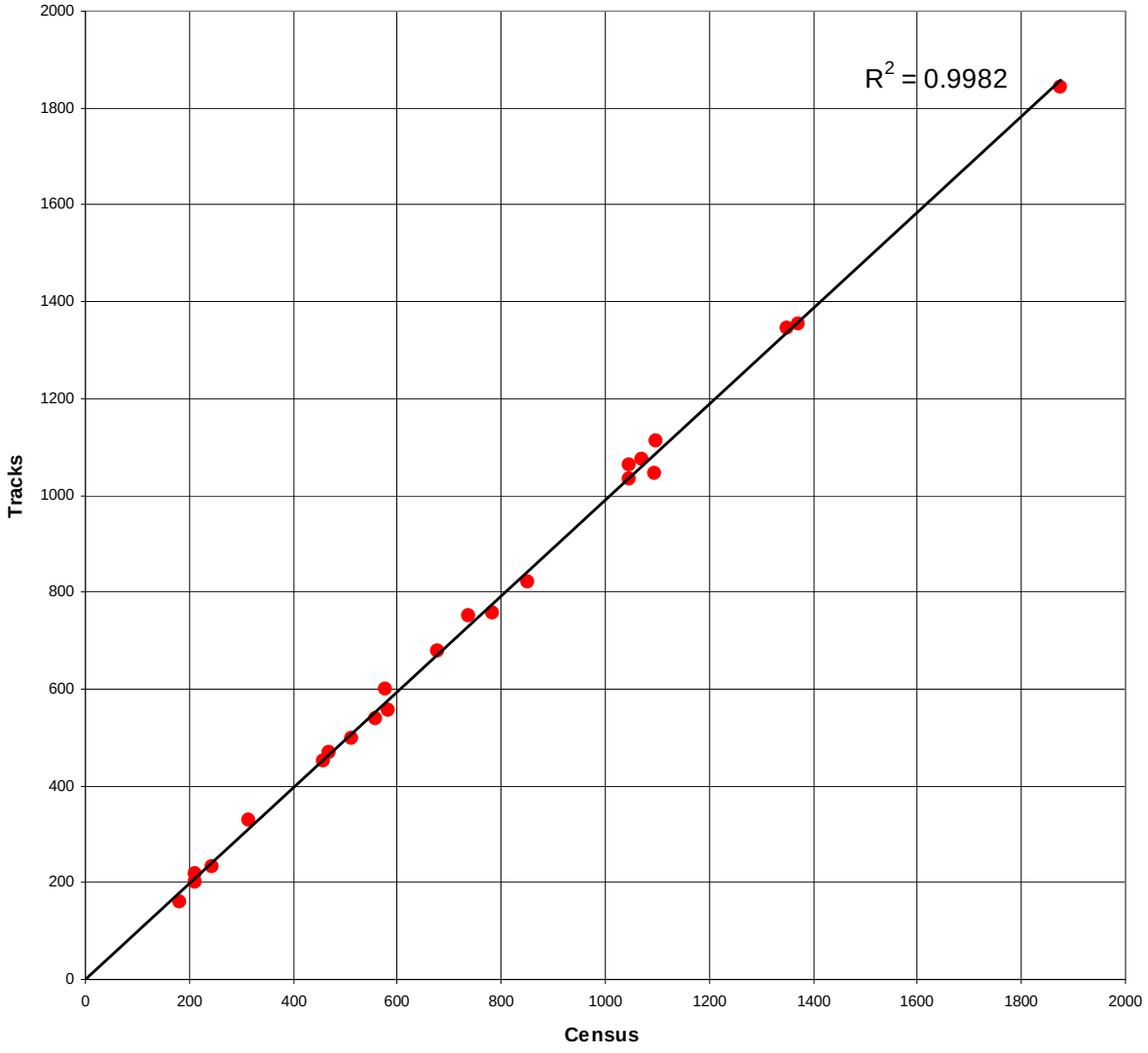
C_{3+} = proportion of households with 3+ cars.

Tests over censuses from 1971 to 1991 have shown these curves to be temporally stable in Christchurch and Dunedin. There is an argument that the Home Based Work purpose should use employees and cars, rather than persons and cars. This option was tested, and did not give materially different results. It was therefore discarded for three reasons:

1. As there are a significant number of persons who are employed on a part-time basis, the variable is no longer easily defined.
2. Forecasting employment is more difficult than category model variables.
3. The trip generation phase can use the same data files.

For all internal zones the average number of vehicles and persons per household were provided in the land use zone files for 2006.

In order to ensure that the category curves accurately predict the distribution of the 20 household types in the study area, a comparison has been made between the AM Peak trip productions produced by the actual Nelson census household distribution and the trips produced by the model curves. This was undertaken based on 2001 census data and does not need to be reviewed given the tight fit against the curves. **Figure 17** shows the correlation to be excellent.



2006 Nelson-Tasman Transportation Model Gabites Porter	**Correlation Between Model and Census Household Distribution**	**Figure 17**

4.2 Private Trip End Productions

The private trips that were divided into the following separate purposes are contained in **Table 6**.

Trip Purposes	Table 6
Trips purpose	**Trip direction**
HBW = Home Based Work	HTW = Home to Work
	WTH = Work to Home
HBE = Home Based Education	HTE = Home to Education
	ETH = Education to Home
HBB = Home Based Business	HTB = Home to Business
	BTH = Business to Home
HBO = Home Based Other	HTO = Home to Other
	OTH = Other to Home
NHB = Non Home Based	

Experience has shown that where possible 'from home' and 'to home' trips should be modelled separately in order to preserve the directionality of the trips. This is particularly important in the interpeak period where these purposes are of similar order and in the evening peak that is more diverse than the morning peak.

Home Interview Survey (HIS) Data

The category model used for trip private generation is based on a home interview survey which had a sample size of approximately 10000 households. The trip rates were derived by finding the total number of households in each category and the total number of car driver trips in each category and dividing one by the other

i.e:

$$rate_c = \frac{\Sigma T_c}{\Sigma HH_c}$$

Productions for both 'home to' and 'to home' trip ends are generated using the category model and are later attracted to the trip destinations. The attractions are scaled to the number of productions such that a balanced number of trip ends can be matched in the trip distribution phase of the planning process. Subsequently, 'to home' trips are later transposed such that the destination of these trips pertains to the household and the origins pertain to other elements in the model.

4.2.1 Morning Peak Private Trip End Productions

Private car driver trip ends were produced by using the 'category model' derived from the Auckland Home Interview Survey (HIS) data. The rates have been fine-tuned in the validation process to match Nelson-Tasman traffic demand. Note these figures are for person trips.

The morning peak period generation is for the two hours for trips beginning between 7am and 9am. Generation was carried out as 'Home to' and 'to Home' purposes to reflect the tidal movement of trips.

Note that the resulting two hour trip matrix may later be converted to a one hour 8am-9am matrix (by multiplying by 0.560) when the total trip matrix is formed.

The trip rates used are shown in **Table 7** and **Table 8**.

Morning Peak Period 'Home To' Trip End Production Rates By Purpose And Category Model							Table 7
Category	Persons /HH	Cars/ HH	Trip Purpose				
			HTW	HTE	HTB	HTO	NHB
1	1	0	0.1290	0.0193	0.0402	0.0347	0.0056
2	1	1	0.3034	0.0197	0.0428	0.0460	0.0568
3	1	2	0.5462	0.0491	0.0545	0.0637	0.0673
4	1	3+	0.2944	0.0486	0.0358	0.0574	0.1014
5	2	0	0.2050	0.1960	0.0535	0.0601	0.0216
6	2	1	0.4357	0.0736	0.0864	0.1479	0.1976
7	2	2	0.9910	0.0318	0.0734	0.0880	0.1768
8	2	3+	1.1964	0.0305	0.0774	0.0167	0.0300
9	3	0	0.0572	0.7037	0.0925	0.1070	0.0884
10	3	1	0.5503	0.5182	0.1238	0.2388	0.4208
11	3	2	0.9104	0.3363	0.0694	0.2221	0.5924
12	3	3+	1.5326	0.1489	0.1415	0.1156	0.2714
13	4	0	0.0323	1.4999	0.1390	0.1967	0
14	4	1	0.6237	1.1108	0.0734	0.4332	0.5164
15	4	2	1.0133	1.0309	0.1028	0.3287	0.5346
16	4	3+	1.3154	0.4940	0.2346	0.2668	0.6768
17	5+	0	0.4966	2.4262	0.3382	0	0
18	5+	1	0.6856	1.6628	0.0921	0.2683	0.5344
19	5+	2	0.7501	1.7652	0.0640	0.4132	0.6826
20	5+	3+	1.4205	1.2145	0.2579	0.4447	0.8172

Morning Peak Period 'To Home' Trip End Production Rates By Purpose And Category Model						Table 8
Category	Persons /HH	Cars/ HH	Trip Purpose			
			WTH	ETH	BTH	OTH
1	1	0	0	0	0.0015	0.0011
2	1	1	0.0675	0	0.0061	0.0081
3	1	2	0	0	0.0116	0.0122
4	1	3+	0	0	0	0
5	2	0	0	0	0	0.0150
6	2	1	0.0300	0	0.0180	0.0294
7	2	2	0.0690	0	0.0061	0.0162
8	2	3+	0.1830	0	0.0232	0
9	3	0	0	0.2625	0.0207	0
10	3	1	0.0990	0.0750	0.0161	0.0689
11	3	2	0	0.0615	0.0041	0.0338
12	3	3+	0.5055	0	0.0048	0.0176
13	4	0	0.6330	0	0	0
14	4	1	0.1845	0	0.0048	0.1083
15	4	2	0.1275	0.1170	0.0104	0.1828
16	4	3+	0.1575	0	0.0434	0.0698
17	5+	0	0	0	0.2800	0
18	5+	1	0	0.1065	0.0331	0.1109
19	5+	2	0.0660	0.0795	0	0.1751
20	5+	3+	0.2715	0	0.0329	0.0688

4.2.2 Interpeak Period Private Trip End Productions

Private car driver trip ends were similarly produced from the Auckland HIS data for the interpeak. The rates have been fine-tuned in the validation process to match Nelson-Tasman traffic demand. Note these figures are for person trips.

The interpeak period generation is for the seven hours from 9am to Noon. Note that the resulting seven hour trip matrix may later be converted to a one hour 12pm-1pm matrix (by multiplying by 0.367) when the total trip matrix is formed.

The trip rates used are shown in **Table 9** and **Table 10**.

Interpeak Period 'Home To' Trip End Production Rates By Purpose And Category Model **Table 9**

Category	Persons /HH	Cars/ HH	Trip Purpose				
			HTW	HTE	HTS	HTO	NHB
1	1	0	0.0135	0.0084	0.3005	0.1326	0.1054
2	1	1	0.0517	0.0180	0.2530	0.1614	0.3647
3	1	2	0.0369	0.5267	0.1365	0.1015	0.3401
4	1	3+	0.1017	0.0311	0.1405	0.1656	0.6764
5	2	0	0.0557	0.0153	0.6432	0.2353	0.1245
6	2	1	0.0647	0.0181	0.5783	0.3144	0.4776
7	2	2	0.1368	0.0133	0.3294	0.1930	0.7525
8	2	3+	0.1155	0.0311	0.3630	0.2080	1.2981
9	3	0	0	0.0647	0.5176	0.2485	0.0667
10	3	1	0.0726	0.0401	0.3722	0.3748	0.6643
11	3	2	0.1074	0.0546	0.4430	0.2892	0.9550
12	3	3+	0.2572	0.1122	0.4434	0.5009	1.4839
13	4	0	0	0	0.6594	0	0.4530
14	4	1	0.2091	0.9975	0.3761	0.4492	0.9186
15	4	2	0.1593	0.0807	0.3291	0.7981	1.1503
16	4	3+	0.2668	0.2413	0.5695	0.2993	1.3822
17	5+	0	0.3497	0	0.2610	0	0.1044
18	5+	1	0.0835	0.0956	0.4592	0.3251	0.5320
19	5+	2	0.0793	0.1219	0.7049	0.3833	0.9152
20	5+	3+	0.2812	0.1000	0.4626	0.3594	1.2202

Interpeak Period 'To Home' Trip End Production Rates By Purpose And Category Model						Table 10
Category	Persons /HH	Cars/ HH	Trip Purpose			
			WTH	ETH	STH	OTH
1	1	0	0.0016	0.0033	0.2450	0.0497
2	1	1	0.0317	0.0122	0.2347	0.0888
3	1	2	0.0370	0	0.2064	0.0940
4	1	3+	0	0	0.1325	0.0349
5	2	0	0	0	0.6090	0.1369
6	2	1	0.0279	0	0.5747	0.2020
7	2	2	0.0764	0.0098	0.3162	0.1305
8	2	3+	0.0567	0	0.2022	0.1813
9	3	0	0	0.0954	0.2140	0
10	3	1	0.0728	0.0375	0.4603	0.2399
11	3	2	0.0558	0.0223	0.3542	0.3004
12	3	3+	0.2209	0.0253	0.3829	0.2520
13	4	0	0	0	0.5315	0
14	4	1	0.1493	0.0342	0.4419	0.4486
15	4	2	0.0474	0.0662	0.3938	0.3189
16	4	3+	0.0808	0.1504	0.5892	0.3811
17	5+	0	0	0	0	0
18	5+	1	0.0838	0.0629	0.4380	0.3806
19	5+	2	0.0525	0.0967	0.9435	0.4186
20	5+	3+	0.1180	0	0.5804	0.3994

4.2.3 Evening Peak Private Trip End Productions

Private car driver trip ends were similarly produced for the evening peak by using Auckland HIS data. The evening peak period generation is for trips which began between the two hours from 4pm to 6pm. Generation was carried out as 'Home to' and 'to Home' purposes to reflect the tidal movement of trips. The rates have been fine-tuned in the validation process to match Nelson-Tasman traffic demand. Note these figures are for vehicle trips.

Note that the resulting two hour trip matrix may later be converted to a one hour 5pm-6pm matrix (by multiplying by 0.540) when the total trip matrix is formed.

The trip rates used are shown in below **Table 11** and **Table 12**.

Evening Peak Period 'Home To' Trip End Production Rates By Purpose And Category Model **Table 11**

Category	Persons /HH	Cars/ HH	Trip Purpose			
			HTW	OTH	HTB	NHB
1	1	0	0	0	0	0.0059
2	1	1	0.0111	0.0651	0.0300	0.1736
3	1	2	0.0199	0.1173	0.0363	0.2945
4	1	3+	0	0.0273	0.0497	0.3170
5	2	0	0	0	0	0
6	2	1	0.0157	0.1120	0.0451	0.1768
7	2	2	0.0224	0.1186	0.0708	0.4349
8	2	3+	0	0.1566	0.0161	0.5265
9	3	0	0	0	0	0.0568
10	3	1	0.0047	0.2680	0.0723	0.3028
11	3	2	0.0094	0.1590	0.1125	0.3940
12	3	3+	0.0315	0.1356	0.0901	0.4738
13	4	0	0	0	0	0.1317
14	4	1	0.0509	0.2014	0.0796	0.1566
15	4	2	0.0491	0.2805	0.1267	0.5183
16	4	3+	0.0419	0.3665	0.2794	0.7569
17	5+	0	0	0	0	0.5305
18	5+	1	0	0.1629	0.0532	0.2083
19	5+	2	0.0337	0.2896	0.1359	0.6249
20	5+	3+	0.0430	0.2672	0.2158	0.9220

Evening Peak Period 'To Home' Trip End Production Rates By Purpose And Category Model					Table 12
Category	Persons /HH	Cars/ HH	Trip Purpose		
			WTH	HTO	BTH
1	1	0	0	0	0
2	1	1	0.1801	0.0999	0.1152
3	1	2	0.3323	0.1689	0.1374
4	1	3+	0.1621	0.1453	0.1022
5	2	0	0	0	0
6	2	1	0.2476	0.1574	0.1210
7	2	2	0.7212	0.1500	0.2450
8	2	3+	0.6767	0.1865	0.2506
9	3	0	0	0	0
10	3	1	0.3123	0.2995	0.2099
11	3	2	0.7774	0.3464	0.2017
12	3	3+	1.1341	0.2735	0.2937
13	4	0	0	0	0
14	4	1	0.3268	0.2032	0.1119
15	4	2	0.6776	0.3827	0.3142
16	4	3+	1.0282	0.3919	0.5311
17	5+	0	0	0	0
18	5+	1	0.4085	0.1909	0.1217
19	5+	2	0.4657	0.3513	0.2270
20	5+	3+	1.1243	0.4314	0.3038

4.3 One Hour Model Period Factors

The three calculated time period matrices are factored to produce one hour matrices that are representative of the AM peak, Interpeak and PM peak periods. Available traffic count data on five key locations throughout the study area was used to produce an average flow profile for the Nelson-Tasman Model area. For consistency, these counts were copied from the loading profile production as used in the assignment process.

In the case of the AM and PM Peaks, the total averaged flow for each two hour trip generation period (7-9am and 4-6pm respectively) was divided by the flow calculated in the modelled hour (8-9am and 5-6pm respectively). The Inter Peak period required the division of the total flow for the seven hour generation period (9am – 4pm) by the modelled hour (12-1pm) flow to get its period factor.

The factors to covert from one hour periods to the full period are as follows:

AM Peak	1.79
Interpeak	6.94
PM Peak	1.85

4.4 Private Trip Attractions

The private trip attraction equations used were recalibrated from the validated and peer reviewed Hawke's Bay Road Transport Study (HBRTS) model. The HBRTS model was determined to be the best basis for this model due to its similarities with the Nelson – Tasman area. Both areas are of similar land use composition, have a large centrally located port facility and significant tourist activity.

These equations were further refined in the validation process to model traffic behaviour specific to the Nelson-Tasman network.

The following land uses were used as the independent variables:

HH	-	Number of Households
AGI	-	Agricultural Jobs
MAN	-	Industrial + Manufacturing Jobs
WHO	-	Wholesale Trade Jobs
RET	-	Retail Trade Jobs
OFF	-	Office Jobs
EDU	-	Education Jobs
COM	-	Community Services + Health Services Jobs
TOT	-	Total Jobs
PRT	-	Airport Jobs
SCH	-	Primary and Secondary School Rolls
TER	-	Tertiary Education FTE Students

4.4.1 Morning Peak Private Trip Attractions

Morning Peak Private Trip Attractions		Table 13
Trips purpose	**Trip direction**	**Attraction Equations**
Home Based Work	HTW	= 0.52(AGR)+0.25(MAN)+0.79(WHO)+0.79(RET)+ 0.52(COM) + 0.25(TOT)
	WTH	= 0.52(AGR)+0.25(MAN)+0.79(WHO)+0.79(RET)+ 0.52(COM) + 0.25(TOT)
Home Based Education	HTE	= 1.00(SCH)+1.45(TER)
	ETH	= 1.00(SCH)+1.45(TER)
Home Based Business/Shop	HTB	= 0.925(WHO)+0.925(RET)+0.332 (COM)
	BTH	= 0.925(WHO)+0.925(RET)+0.332 (COM)
Home Based Other/School	HTO	= 1.52(HH)+0.94(WHO)+0.94(RET)+0.92(COM)+0.61(TOT)+ 5.00(PRT)+0.92(SCH)+0.92(TER)
	OTH	= 1.52(HH)+0.94(WHO)+0.94(RET)+0.92(COM)+0.61(TOT)+ 5.00(PRT)+0.92(SCH)+0.92(TER)
Non Home Based		= 1.52(HH)+1.458(WHO)+1.458(RET)+1.458(OFF)+0.377(COM) + 0.276(TOT)

4.4.2 Inter Peak Private Trip Attractions

Inter Peak Private Trip Attractions		Table 14
Trips purpose	**Trip direction**	**Attraction Equations**
Home Based Work	HTW	= 0.52(AGI)+0.25(MAN)+0.79(WHO)+0.79(RET)+0.52(COM)+ 0.25(TOT)
	WTH	= 0.52(AGI)+0.25(MAN)+0.79(WHO)+0.79(RET)+0.52(COM)+ 0.25(TOT)
Home Based Business	HTB	= 0.925(WHO)+0.925(RET)+0.332(COM)
	BTH	= 0.925(WHO)+0.925(RET)+0.332(COM)
Home Based Other/School	HTO	= 0.94(WHO)+0.94(RET)+0.92(COM)+0.61(TOT)+4.00(PRT)
	OTH	= 0.94(WHO)+0.94(RET) +0.92(COM)+0.61(TOT)+4.00(PRT)
Non Home Based		= 1.458(WHO)+1.458(RET)+1.458(OFF)+0.377(COM)+ 0.276(TOT)

4.4.3 Evening Peak Private Trip Attractions

Evening Peak Private Trip Attractions		Table 15
Trips purpose	**Trip direction**	**Attraction Equations**
Home Based Work	HTW	= 0.52(AGR)+0.25(MAN)+0.79(WHO)+0.79(RET)+0.79(OFF)+ 0.52(COM)+0.25(TOT)
	WTH	= 0.52(AGR)+0.25(MAN)+0.79(WHO)+0.79(RET)+0.79(OFF)+ 0.52(COM)+0.25(TOT)
Home Based Business	HTB	= 0.925(WHO)+0.925(RET)+0.332(COM)
	BTH	= 0.925(WHO)+0.925(RET)+0.332(COM)

Home Based Other/School	HTO	= 1.52(HH)+0.94(WHO)+0.94(RET)+0.92(COM)+ 0.61(TOT) +4.00(PRT)+0.92(SCH)+0.92(TER)
	OTH	= 1.52(HH)+0.94(WHO)+0.94(RET)+0.92(COM)+ 0.61(TOT) +4.00(PRT)+0.92(SCH)+0.92(TER)
Non Home Based		= 1.52(HH)+1.458(WHO)+1.458(RET)+1.458(OFF)+0.377(COM) +0.276(TOT)

4.5 Commercial Vehicle Trips

Commercial vehicles are represented as either light commercial vehicles (LCV) or heavy commercial vehicles (HCV). The generation rates are based on a comprehensive goods vehicle survey carried out in Christchurch, New Zealand in 1990 and have been integrated into the validation process to model traffic behaviour in Nelson-Tasman. For commercial trips, productions are set equal to attractions. The generation and attraction rates for commercial vehicles in each model period are described in **Table 16.**

Commercial Vehicle Trips Generation Rates **Table 16**

Model Period	Vehicle Type	Generation and Attraction Equations
Morning Peak (Two Hour Generation)	LCV	=0.034(HH)+0.064(MAN)+0.245(RET)+0.057(COM)
	HCV	=0.017(HH)+0.100(MAN)+0.088(RET)+0.022(COM)
	PHV	=0.0876(AGR)+0.0876(MAN)+0.0876(WHO)+0.0876(RET)
Inter Peak (Seven Hour Generation)	LCV	=0.183(HH)+0.348(MAN)+1.327(RET)+0.311(COM)
	HCV	=0.096(HH)+0.556(MAN)+0.493(RET)+0.124(COM)
Evening Peak (Two Hour Generation)	LCV	=0.020(HH)+0.039(MAN)+0.148(RET)+0.035(COM)
	HCV	=0.011(HH)+0.060(MAN)+0.054(RET)+0.013(COM)
	PHV	=0.0876(AGR)+0.0876(MAN)+0.0876(WHO)+0.0876(RET)

4.6 External Trips

Vehicles entering the study area via roads crossing the study area boundary are called external traffic. There are 6 external cordon stations entering or leaving the study area (these are zones 645 to 650 in **Figure 9**).

The incidence of the through traffic was deemed to have a negligible impact of model outcomes so has been excluded from the modelling. Therefore all external traffic was generated from or attracted to land use within the study area.

External traffic volumes have been extracted from traffic counts made available by Transit New Zealand.

The production and attraction equations used for each time period are shown below in **Table 17**. Those in bold determine the total generation.

The following variables were used in the land use file to model external traffic flows:

- EXAI External Morning Peak Inbound
- EXAO External Morning Peak Outbound
- EXSI External Inter Peak Inbound
- EXSO External Inter Peak Outbound

- EXPI External Evening Peak Inbound
- EXPO External Evening Peak Outbound
- EXAHI External Morning Peak Inbound (HGVs)
- EXAHO External Morning Peak Outbound (HGVs)
- EXSHI External Inter Peak Inbound (HGVs)
- EXSHO External Inter Peak Outbound (HGVs)
- EXPHI External Evening Peak Inbound (HGVs)
- EXPHO External Evening Peak Outbound (HGVs)

External Traffic Generation			Table 17
Peak Period	**Flow**	**Productions**	**Attractions**
Morning Peak	Inbound External	=1.786(EXAI)	=1.00(TOT)
	Outbound External	=1.00(HH)	=1.786(EXAO)
	Inbound External HGV	=1.00(EXAHI)	=0.017(HH)+0.100(MAN)+ 0.088(RET)+0.022(COM)
	Outbound External HGV	=0.017(HH)+0.100(MAN)+ 0.088(RET)+0.022(COM)	= 1.00(EXAHO)
Inter Peak	Inbound External	=1.00(EXSI)	=1.00(HH)+1.00(TOT)
	Outbound External	=1.00(HH)+1.00(TOT)	=1.00(EXSO)
	Inbound External HGV	=1.00(EXSHI)	=0.096(HH)+0.556(MAN)+ 0.493(RET)+0.124(COM)
	Outbound External HGV	=0.096(HH)+0.556(MAN)+ 0.493(RET)+0.124(COM)	=1.00(EXSHO)
Evening Peak	Inbound External	=1.00(EXPI)	=1.00(TOT)
	Outbound External	=1.00(HH)	=1.00(EXPO)
	Inbound External HGV	=1.00(EXPHI)	=0.011(HH)+0.060(MAN)+ 0.054(RET)+0.013(COM)
	Outbound External HGV	=0.011(HH)+0.060(MAN)+ 0.054(RET)+0.013(COM)	=1.00(EXPHO)

4.6.1 External Traffic Summary

The external traffic flows used in the model are summarised below in **Table 18**.

External Road Flows 2001						Table 18
Peak Period	**Zone No.**	**Description (All locations at district boundary)**	**Traffic**			
			In		**Out**	
			LIT	**HGVs**	**LIT**	**HGVs**
Morning Peak 1 Hour flows	645	SH6 – North at Hira	88	21	79	24
	646	Matai Valley Road	70	0	50	0
	647	Airport	145	0	23	0
	648	Kerr Hill Road @ Tophouse Road	6	4	6	3
	649	SH6 – South at Kawatiri Junction	8	6	13	7
	650	SH60 at Riwaka	86	22	112	13
Inter Peak 1 Hour flows	645	SH6 – North at Hira	108	22	99	26
	646	Matai Valley Road	114	0	114	0
	647	Airport	110	0	127	0
	648	Kerr Hill Road @ Tophouse Road	7	2	7	2
	649	SH6 – South at Kawatiri Junction	29	8	34	8
	650	SH60 at Riwaka	90	15	104	17
Evening Peak 1 Hour flows	645	SH6 – North at Hira	126	20	128	19
	646	Matai Valley Road	108	0	128	0
	647	Airport	23	0	157	0
	648	Kerr Hill Road @ Tophouse Road	9	2	9	3
	649	SH6 – South at Kawatiri Junction	37	7	27	8
	650	SH60 at Riwaka	117	8	135	18

4.7 Total Trip End Generation Summary

The relationships outlined in the preceding sections describe the trip end generation for the three model time periods, namely the 7:00am-9:00am morning peak, 9am-4pm Inter Peak and 4-6pm evening peak. The trip end totals for each purpose are shown below in **Table 19, Table 20** and **Table 21.**

Morning Peak Trip End Production Summary			Table 19
Trip Purpose	**Trip Ends**	**% of Private**	**% of Total Trips**
Home Based Work			
To Work	21999		
To Home	2788	42.56%	
Home Based Education			
To Education	13351		
To Home	867	24.42%	
Home Based Business/Shop			
To Business/Shop	2685		
To Home	397	5.29%	
Home Based Other			
To Other	5462		
To Home	1541	12.03%	
Non-Home Based	9144	15.70%	
Total Private Trips (2 hrs)	**58234**	**100%**	
LCV	3078		
HCV	1630		
Total Commercial Trips (2 hrs)	**4708**		
Total Internal Trips (2 hrs)	**62942**		
Total Internal Trips (1 hr)	**35248**		**96.4%**
Inbound External HGV	53		
Outbound External HGV	47		
Inbound External	720		
Outbound External	505		
Total External Trips (1 hr)	**1325**		**3.6%**
TOTAL TRIPS (1hr)	**36573**		**100.0%**
HH	30771		
No. Person Trips per HH (1Hr)	1.19		

Inter Peak Trip End Production Summary			Table 20
Trip Purpose	**Trip Ends**	**% of Private**	**% of Total Trips**
Home Based Work			
To Work	3402		
To Home	1860	7.11%	
Home Based Education			
To Education	4605		
To Home	799	7.30%	
Home Based Business/Shop			
To Business/Shop	12241		
To Home	12305	33.18%	
Home Based Other			
To Other	9439		
To Home	6739	21.87%	

Non-Home Based	22593	30.54%	
Total Private Trips (3 hrs)	**73983**	**100%**	
LCV	16662		
HCV	9141		
Total Commercial Trips (7 hrs)	**25803**		
Total Internal Trips (3 hrs)	**84107**		
Total Internal Trips (1 hr)	**30867**		**97.2%**
Inbound External HGV	47		
Outbound External HGV	53		
Inbound External	458		
Outbound External	485		
Total External Trips (1 hr)	**1043**		**2.8%**
TOTAL TRIPS (1hr)	**31910**		**100.0%**
HH	30771		
No. Person Trips per HH (1Hr)	**1.04**		

Evening Peak Trip End Production Summary **Table 21**

Trip Purpose	Trip Ends	% of Private	% of Total Trips
Home Based Work			
To Work	608		
To Home	14502	33.89%	
Home Based Business/Shop			
To Business/Shop	2219		
To Home	5725	17.81%	
Home Based Other			
To Other	4729		
To Home	6439	25.04%	
Non-Home Based	10370	23.26%	
Total Private Trips (2 hrs)	**44592**	**82%**	
LCV	1849		
HCV	1007		
Total Commercial Trips (2 hrs)	**2856**		
Total Internal Trips (2 hrs)	**47448**		
Total Internal Trips (1 hr)	**25622**		**95.9%**
Inbound External HGV	37		
Outbound External HGV	48		
Inbound External	420		
Outbound External	584		
Total External Trips (1 hr)	**1089**		**4.1%**
TOTAL TRIPS (1hr)	**26711**		**100.0%**
HH	30771		
No. Vehile Driver Trips per HH	**0.87**		

5. THE PARKING MODEL

5.1 Central Area Logistics Model (CALM)

For the morning and shopping period models a more detailed analysis of the central area parking was undertaken. Hence, a redistribution of trips to parking location was used within the CBD after the gravity distribution.

The Central Area Logistics Model takes the total trips coming into the Nelson CBD and redistributes the trips to the closest available parking space to the trip destination. 'Closest' is defined as the least cost including parking charges and the walking time from parking place to destination[2]. If a park is not available in the zone required, then circulating trips are generated to the nearest park taking into account the walk back time. The resulting circulation trips are added to the full trip matrix before assignment.

The trips are loaded in slices by purpose. As the analysis period progresses the model keeps count of the number of available spaces of each park-type and updates that information.

5.2 Trip Purpose and Parking Durations

All trip purpose matrices from the distribution phase have been allocated to central area parking spaces. Some trip purpose matrices have been divided to better represent the behaviour characteristics of things such as designated employee parking and duration of stay. These variations and the model parameters are summarised below.

Nominal Analysis Period	20 min
% of trip matrix loaded per iteration	16.7%
Number of parking categories	13

A summary of trip purposes is shown in **Table 22** for the Morning and Inter Peak. The proportion of trips using each parking purpose has been estimated based on the occupancy rates of time restricted parking areas. Trip Types are as follows:

Parking Model Variables — **Table 22**

	Perceived Costs		Average Duration	Work Trip Type	Outbound	AM Estimated proportion of trips	INT Estimated proportion of trips
	Time (c/min)	Dist (c/km)			Create a space		
Long term (240min Duration)	12.80	15.27	240	Y	Y	32%	30%
Short term (120min Duration)	20.40	15.27	120	N	Y	9%	30%

[2] Walkng speeds are modelled at 4.5km/hr

Short term (60min Duration)	20.40	15.27	60	N	Y	15%	20%
Short term (30min Duration)	20.40	15.27	30	N	Y	44%	20%

5.3 The Parking File

The parking file for the CBD zones was set up from the surveyed inventory and costs of parking. This parking split up is shown in **Table 23**. The parking inventory is shown in **Table 16**.

Parking Categories and Charges **Table 23**

	Cost of Parking (cents)							
Time (Minutes)	15	30	60	120	150	180	240	480
On Street								
M60	0	50	100	9999				
M120	0	50	100	120	9999			
P15	0	9999						
P30	0	0	9999					
P60	0	0	0	9999				
P120	0	0	0	0	9999			
Pay Display 180	0	25	50	100	125	150	9999	
Pay Display Day	0	25	50	100	100	100	200	400
All Day Free	0	0	0	0	0	0	0	0
Off Street								
Customer	0	0	0	0	0	0	0	0
Lease	0	0	0	0	0	0	0	0
Employee	0	0	0	0	0	0	0	0
All Day Free	0	0	0	0	0	0	0	0

5.4 The Parking Inventory

The parking inventory for the CBD zones was set up from the survey of total CBD parking inventory as suggested by Nelson City Council. This inventory is shown in **Table 24**. The parking validation is discussed in **Section 12.4**.

Parking Inventory **Table 24**

Zone	Parking Type												
	FREE	M60	M120	P15	P30	P60	P120	P180	Pay Day	Off Str	Custm	Lease	Empl
1	0	0	0	0	0	0	0	329	0	70	0	0	0
2	0	0	19	0	0	0	0	0	0	0	0	0	0
3	0	33	0	0	0	0	0	0	0	0	0	0	0
4	0	0	7	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	7	0	0	0	12	0	0	0
6	0	0	0	0	0	0	0	329	0	0	0	0	0
7	0	0	10	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	15	0	0	7	0	0	0	12	0	0	0
10	0	39	5	0	0	0	0	0	0	0	0	0	0
11	0	0	10	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	10	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	5	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	81	0	0	0
17	0	28	0	0	0	0	0	0	0	42	0	0	0
18	0	0	14	0	0	0	0	0	0	0	0	0	0
19	0	15	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	28	20	0	0	0
21	0	0	10	0	0	0	0	0	0	0	0	0	0
22	0	0	19	0	0	0	0	0	0	0	0	0	0
23	5	0	0	0	0	2	0	0	0	0	0	0	0
24	0	0	0	3	0	4	0	0	0	0	0	0	0
25	0	24	0	4	0	0	0	0	0	8	0	0	0
26	0	0	0	0	0	15	0	0	0	17	0	0	0
27	0	0	3	0	0	5	0	0	0	3	0	0	0
28	0	0	0	0	0	4	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	24	0	0	0
30	0	0	0	0	0	2	10	0	0	7	0	0	0
31	0	0	10	0	0	13	0	0	0	0	0	0	0
32	0	0	0	0	0	1	10	0	0	7	0	0	0
33	0	0	0	0	0	0	0	0	0	60	0	0	0
34	0	15	0	3	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	37	0	0	0	0
36	0	11	0	0	0	0	0	0	0	3	0	0	0

Parking Inventory													Table 25
Zone	Parking Type												
	FREE	M60	M120	P15	P30	P60	P120	P180	Pay Day	Off Str	Custm	Lease	Empl
37	0	0	0	0	0	0	0	0	80	0	0	0	0
38	0	0	0	0	0	0	0	0	0	20	0	0	0
39	0	0	0	0	0	0	0	92	0	23	0	0	0
40	7	0	0	0	0	8	0	0	0	21	0	0	0
41	0	0	16	0	0	19	0	0	0	3	0	0	0
42	0	0	0	1	1	3	0	0	0	0	0	0	0
43	17	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	2	3	0	0	0	0	0	0	0
45	0	0	0	3	4	44	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	100	0	0	0
48	0	0	0	2	0	6	0	0	0	10	0	0	0
49	4	0	0	0	0	0	0	0	0	88	0	0	0
50	5	0	0	0	0	2	0	0	0	0	0	0	0
51	10	0	0	0	0	0	0	0	0	1	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0
53	67	0	0	0	0	0	0	0	0	10	0	0	0
54	0	0	0	4	0	21	0	0	0	69	0	0	0
55	0	0	0	0	0	6	0	0	0	21	0	0	0
56	0	0	0	0	0	6	0	0	0	16	0	0	0
57	149	0	0	11	12	33	0	0	0	476	0	0	0
58	14	0	0	0	0	8	0	0	0	42	0	0	0
59	27	0	0	0	0	31	0	0	0	67	0	0	0
60	31	0	0	1	1	4	0	0	0	18	0	0	0
61	0	0	11	4	0	22	0	0	0	141	0	0	0
62	0	0	17	0	0	20	0	0	0	70	0	0	0
63	27	0	0	3	2	32	4	0	0	40	0	0	0
64	58	0	0	0	0	19	0	0	0	64	0	0	0
65	73	0	0	0	0	0	0	0	0	13	0	0	0
66	82	0	0	0	0	0	0	0	0	9	0	0	0
67	100	0	0	0	0	0	7	0	0	20	0	0	0
68	139	0	0	0	0	0	8	0	0	0	0	0	0
69	19	0	0	4	1	6	19	0	0	4	0	0	0
70	28	0	0	0	0	5	19	0	0	53	0	0	0
71	9	0	0	0	0	5	10	0	0	42	0	0	0
72	0	15	6	0	0	0	0	0	0	22	0	0	0
73	0	0	5	0	0	10	0	0	0	19	0	0	0
74	0	0	5	0	2	13	0	0	0	41	0	0	0
75	0	0	5	0	3	8	0	0	0	30	0	0	0
76	52	0	0	0	0	0	0	0	0	0	0	0	0
77	85	0	0	0	0	0	0	0	0	22	0	0	0
78	150	0	0	8	0	0	2	0	0	0	0	0	0

Parking Inventory													Table 26
Zone	Parking Type												
	FREE	M60	M120	P15	P30	P60	P120	P180	Pay Day	Off Str	Custm	Lease	Empl
79	**44**	0	0	0	0	3	0	0	0	12	0	0	0
80	**113**	0	0	16	0	32	3	0	0	333	0	0	0
81	**74**	0	0	1	0	4	8	0	0	10	0	0	0
82	**0**	0	0	0	0	21	0	0	0	69	0	0	0
83	**23**	0	5	0	0	10	0	0	0	64	0	0	0
84	**52**	0	0	0	0	12	0	0	0	0	0	0	0
85	**0**	0	5	2	0	14	0	0	0	85	0	0	0
86	**0**	0	7	2	0	15	0	0	0	18	0	0	0
87	**23**	0	0	0	0	3	4	0	0	27	0	0	0
88	**12**	0	0	0	0	40	62	0	0	238	0	0	0
89	**0**	0	0	0	0	5	0	0	0	0	0	0	0
90	**8**	0	0	0	0	8	0	0	0	22	0	0	0
91	**40**	0	0	0	0	0	4	0	0	9	0	0	0
92	**113**	0	0	2	0	0	0	0	0	5	0	0	0
93	**53**	0	0	0	0	0	0	0	0	0	0	0	0
94	**174**	0	0	3	0	0	5	0	0	8	0	0	0
95	**0**	0	0	0	0	0	0	0	0	20	0	0	0
96	**451**	0	0	0	0	0	0	0	0	10	0	0	0
97	**0**	0	0	0	0	0	0	0	0	45	0	0	0
98	**40**	0	0	0	0	0	0	0	0	24	0	0	0
99	**250**	0	0	0	0	0	0	0	0	333	0	0	0
100	**73**	0	0	0	0	0	0	0	0	90	0	0	0
101	**60**	0	0	0	0	0	0	0	0	0	0	0	0
102	**100**	0	0	0	0	0	0	0	0	0	0	0	0
103	**99**	0	0	0	0	0	0	0	0	0	0	0	0
104	**147**	0	0	0	0	0	0	0	0	0	0	0	0
105	**84**	0	0	0	0	0	0	0	0	0	0	0	0
106	**185**	0	0	0	0	0	0	0	0	0	0	0	0
107	**135**	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**3511**	**180**	**204**	**77**	**28**	**576**	**175**	**750**	**145**	**3372**	**0**	**0**	**0**

The locations of the parking zones are displayed in **Figure 6** for Nelson city centre.

Parking occupancy validation has been summaried in **Section 12.4.1**of this report.

6. MODE CHOICE MODELLING

In the mode choice phase of the analysis the aim is to predict how many people, travelling between particular origin and destination would use each of the available modes. The most common form of discrete choice model applied to mode choice is the multinomial logit model. This model is derived by assuming that people have a choice between a number of discrete alternatives or modes, e.g. Car versus bus versus train. The characteristics (times, costs etc.) of each alternative determine the satisfaction that people get from each mode. The logit model predicts the probability that an individual will choose a particular alternative (mode m). The logit function used in the Nelson-Tasman Transportation model is as follows:

$$\rho_k = \frac{e_k^{-\alpha u + \beta}}{\sum_{k=1}^{N} e_k^{-\alpha u + \beta}}$$

Where:

ρ_m	=	probability of choosing mode m
$-u_m$	=	utility of mode m (based on cost)
α, β	=	logit model coefficients
N	=	the set of available modes

The Nelson-Tasman Public Transport model incorporated four modes:

- Car driver
- Car passenger
- Bus passenger
- Walking/cycling modes combined

The utility[3] function $-u_m$ incorporates variety of variables that influence mode choice and is usually formulated as a linear function of variables reflecting the attributes of the modes (e.g. Time, parking cost, fare cost, transfer cost etc). As the utility of a particular mode improves, reflecting a reduction in generalised cost, the model will predict an increase in the probability that a person trip will be made by using that mode.

If the probability of choosing mode m is ρ_m and the total number of people travelling between an origin and a destination is T_{ij} the number predicted to use mode m will be:

$$T_{ij}^m = \rho_m * T_{ij}$$

where the value for T_{ij} is obtained from the trip distribution model.

The logit model coefficients are usually calibrated from travel survey data using proportions of person trips made by each mode. These proportions were not available from direct surveys other than from 2006 census Journey To Work (JTW) data that is summarised in **Table 27**, with other key economic indicators. This modal split can be used as a guideline only, as it does not capture exclusively morning peak JTW trips and does not capture other morning peak private trip purposes.

[3] Or more correctly the 'disutility' function

Journey To Work Transport Modal Split for Nelson and Tasman, 2006	Table 27

Description	Nelson	Tasman
Population	42,891	44,625
Households	16,920	16,800
Mode of Travel to Work:		
Drive	70.6%	73.6%
Passenger in car/truck	5.3%	5.1%
Motor bike	1.2%	1.6%
Bicycle	6.8%	5.2%
Walk	9.8%	7.6%
Bus	0.6%	0.4%
Other	5.7%	6.5%

The mode split applied in the Nelson-Tasman model is a nested logit model and it can be schematically represented in **Figure 18** and **Figure 18.**

There are two mode splits in the nested model. Firstly, private trips from HH identified, are split into:

- In-vehicle trips
- Public transport trips
- Walking or cycling trips

In-vehicle trips are then further split into car passenger and car driver trips.

These two mode splits are undertaken separately for Education trips and non-Education trips due to the different mode share for the respective trip types.

The trip matrices by mode are then aggregated prior to transit and vehicle assignment. The α and β parameters for each logit model and the resultant number of trips are also documented in **Figure 18** (for AM Peak) and **Figure 18** (for Inter Peak)**.**

Following consultation with Council, it is estimated that there are approximately 200,000 public transport trips per annum in 2008 across all services. This figure does not include 'school-only' services which are not available to the genreal public. Such trips are not modelled as public transport because it is not possible to differentiate between which persons in the model are canfifates which are not candidates for these specific services. They are also very difficult to predict in the future.

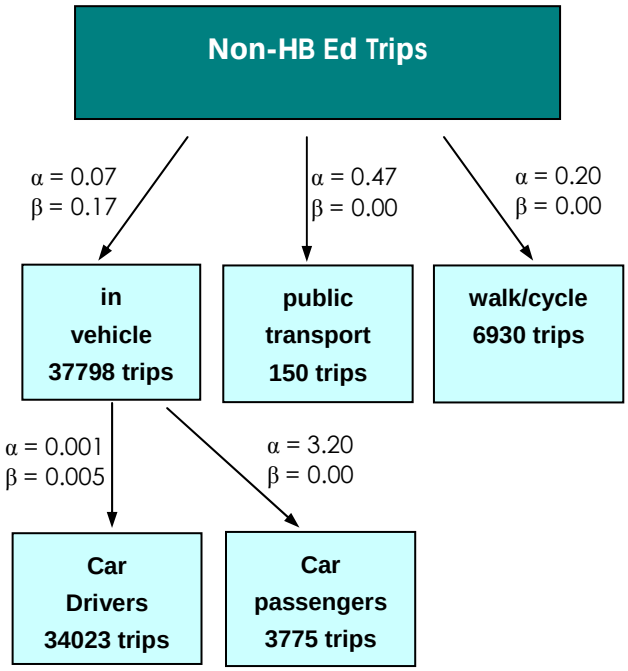
Assuming 90% of patronage on typical weekdays (of which there are 245 in a year) and the remaining 20% on weekends/holidays (of which there are 120 per year) it is estimated that there are 200000 * .8 / 245 = 650 trips per day. Of this total estimated 650 trips per day, the split for 7-9am, 9am-3pm and 3-6pm is approx one third each. Following this methodology, (i.e. in lieu of more detailed data) the model has been validated against 215 patrons in the morning peak two hour period and half of this number in the three hour interpeak period (9am-12 noon).

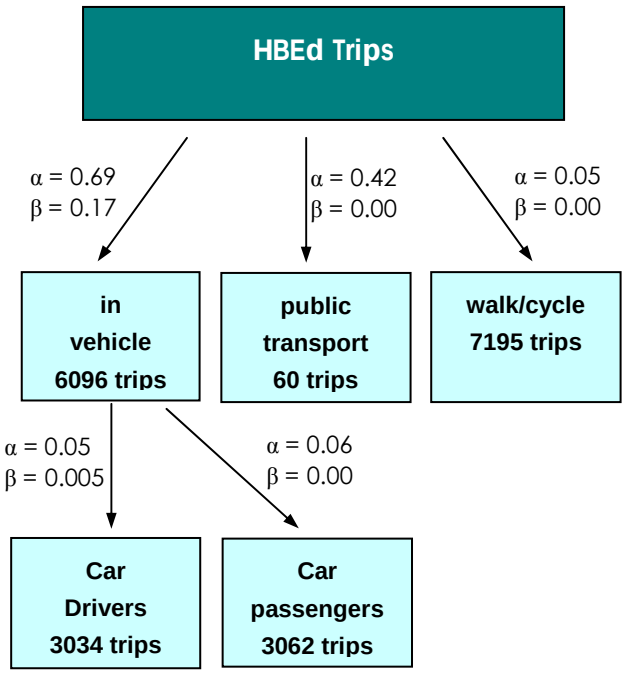
Whilst there is no specific data on vehicles occupancies and the quantity of trips made by active modes by different times of day, the 2006 JTW data from Table 27 has been used as a guide, and the total number of vehicle driver trips has been checked in the

model validation process to ensure there is the correct level of traffic on the road network.

Table 28 details the modeled mode split achieved for each of the four modes modeled.

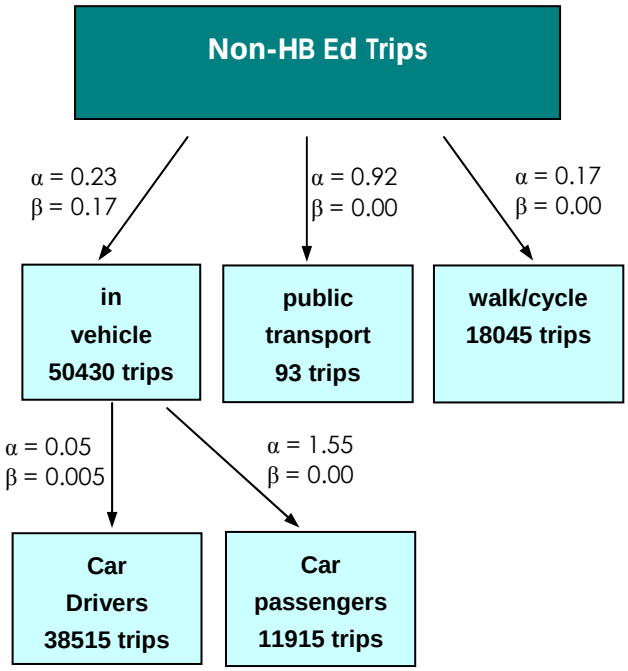
Mode Split Comparison			Table 28
Description	**JTW Study Area**	**Modeled Trips (Excl. HBEd)**	
		AMP	**INP**
Mode of Travel:			
Drive	77.4%	75.8%	56.2%
Passenger in car/truck	5.7%	8.4%	17.4%
Bicycle/Walk	16.3%	17.5%	26.3%
Bus	0.6%	0.3%	0.1%

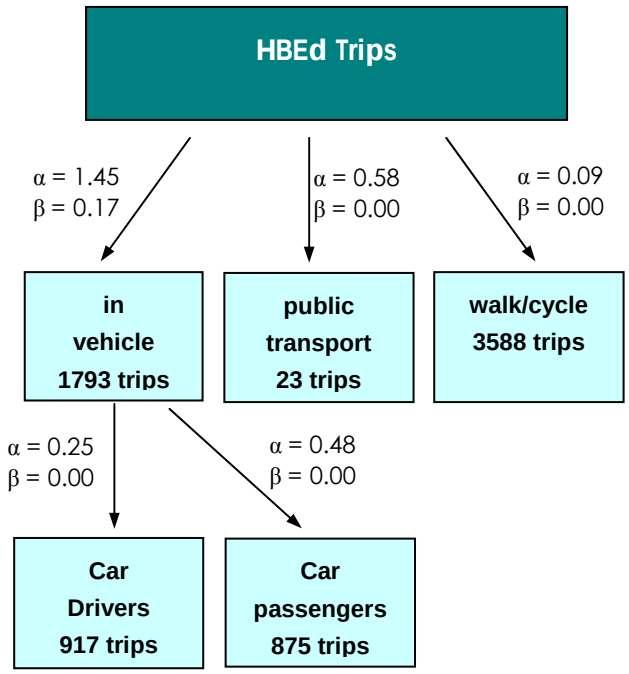




Mode of Transport	**Total Trips**	**% by mode**
Car driver	37057	63.7%
Car passenger	6837	11.8%
Public Transport	110	0.2%
Walk/cycle	14125	24.3%
Total	**58129**	

2006 Nelson-Tasman Transportation Model	**AM Peak Mode Split**	**Figure 18**
Gabites Porter		





Mode of Transport	**Total Trips**	**% by mode**
Car driver	39432	53.3%
Car passenger	12790	17.3%
Public Transport	116	0.2%
Walk/cycle	21633	29.2%
Total	**73971**	

2006 Nelson-Tasman Transportation Model	**Inter Peak Mode Split**	**Figure 19**
Gabites Porter		

7. TRIP DISTRIBUTION AND THE COSTS OF TRAVEL

7.1 The Gravity Distribution Model

Having derived the trip end generation in Section 4 the task was then to distribute trips between the zones. That is, determining what trips are made for each purpose and to which zone are they likely to travel. This process is called trip distribution and creates the trip matrices, or, origin-destination pairs.

The gravity model form chosen for this work was

$$T_{ij} = P_i.K_i\ A_j.L_i\ f(c_{ij})$$

subject to the double constraints of

$$K_i = \frac{P_i}{\Sigma_j T_{ij}}$$

$$L_j = \frac{A_j}{\Sigma_i T_{ij}}$$

Where:

T_{ij} = Trips between zones i and j
P_i = Productions at zone i
A_j = Attractions at zone j
$f(c_{ij})$ = Some function of the travel cost between zones i and j
$K_i\ L_j$ = Balancing factors

The balancing factors were successively applied until there was convergence. A number of iterations were used, and all purposes converged so that there was no difference between iterations to five decimal places.

The derivation of P_i and A_j has been discussed in Section 4. This section will deal with the distribution function $f(c_{ij})$ and the costs of travel.

7.2 The Distribution Function

The person trip distribution is based on the generalised cost of travel between each zone for each mode of travel as calculated during the mode choice modelling.

The generalised cost distribution function can be approximated to an exponential line of the form:

$$f(c_{ij}) = e^{-\alpha c_{ij}}$$

Where:

$f(c_{ij})$ = function of generalised cost of travel between zone i and zone j
c_{ij} = cost between zone i and zone j
α = exponent

The distribution function values used (α) are shown in **Table 29.** It should be noted that the alpha values are the same for 'from home' and 'to home' purposes, and the matrices combined prior to trip length frequency analysis.

Time Based Distribution Function Exponents **Table 29**

Trip Purpose	Morning Peak	Interpeak	Evening Peak
HTW	0.01000	0.01000	0.00690
WTH	0.01000	0.01000	0.00690
HTB	-	-	0.05950
BTH	-	-	0.05950
HTE	0.01500	0.01500	-
ETH	0.01500	0.01500	-
HTS	0.00900	0.00900	-
STH	0.00900	0.00900	-
HTO	0.01300	0.01300	0.00839
OTH	0.01300	0.01300	0.00839
NHB	0.01500	0.01500	0.00749
LGV	0.00281	0.00281	0.00281
HGV	0.00255	0.00255	0.00255
Residual HGV Inbound	0.00255	0.00255	0.00255
Externals Inbound	0.00396	0.00396	0.00396
Externals Outbound	0.00396	0.00396	0.00396
HGV Externals Inbound	0.00396	0.00396	0.00396
HGV Externals Outbound	0.00396	0.00396	0.00396

8. PUBLIC TRANSPORT ASSIGNMENT

The following section briefly details the development of the public transportation model. There is much technical detail included and no attempts have been made to simplify the text beyond its technical status.

8.1 The Assignment Process

The PT assignment model is analogous to the vehicle assignment and is used for assigning PT trips onto the network. Unlike conventional vehicle assignment, PT assignment assigns the bus passenger matrix onto a fixed set of routes. Similar to vehicle assignment the decision of which route is taken is based on a least cost algorithm. The main difference between the vehicle and public transport assignment is in the way the matrix is loaded. Public transport represents a dynamic assignment model where the modelled period and the matrix are divided into slices and passengers are released in intervals starting from the beginning of the modelled period. A dynamic assignment approach is necessary because of the way that buses run following a fixed timetable. The decision is made by each passenger as to which service or services will be taken, given the time that a service is available, and the time between two or more services connecting.

a) A single ride trip will occur if:

$$T^1_A > T^i_S + T_F + T_C$$

Where:

T^1_A = the time at which the first available bus arrives at the bus stop A.
T^i_S = slice release time where the number of slices is i.
T_F = access time by foot.
T_C = access time by car to the park'n'ride station (where applicable)

The difference between the left and right hand side in the inequality above represents the waiting time T_W:

$$T_W = T^1_A - T^i_S + T_F + T_C$$

The waiting time has to be greater or equal to 0 and less than or equal to a nominated maximum waiting time otherwise the trip cannot occur.

$$T_{W(max)} \geq T_W \geq 0$$

b) A multi ride trip will occur if the single ride trip condition is satisfied for the first bus service used, and

$$T^2_B \geq T^1_B + 30sec$$

Where:

T^1_B is the time at which the first bus arrives at the bus stop B.
T^2_B is the time at which the second bus departs at the bus stop B.
30sec is the minimum time allowed for the passenger transfer.

The difference between the first bus arrival and the second bus departure represents the waiting time:

$T_W = T^2_B - T^1_B$

Therefore TW has to be greater than or equal to 30 seconds and less than or equal to the maximum waiting time TW(max) for the trip to occur:

$T_{W(max)} \geq T_W \geq 30sec$

If the maximum number of transfers is 3, then another condition has to be met for the trip to occur:

$T^3_C > T^2_C + 30$, and

$T_{W(max)} \geq T_W \geq 30sec$

Where:

T^2_C	=	the time at which the second bus arrives at the bus stop C.
T^3_C	=	the time at which the third bus departs at the bus stop C.
T_W	=	$T^3_C - T^2_C$
$T_{W(max)}$	=	the maximum waiting time.

Further constraints are the maximum inter-zonal cost and the maximum number of transfers. They cannot exceed values specified in the parameter file.

The inter-zonal cost for PT trips is derived as the sum of several components:

▪ wait time cost	28 c/min
▪ walking time cost at each end of the trip	28 c/min
▪ in-vehicle time	14 c/min
▪ park'n'ride cost (if used)	varies
▪ fare cost	varies
▪ a penalty for transferring between services	120 c/min

All bus routes are divided into a number of fare sections and the bus fare is derived on the number of fare sections crossed. In the base model, a new ticket has to be purchased if a transfer is needed.

If a car is used as part of a PT trip (for example a park'n'ride trip) than the car cost is added and it consists of:

▪ In vehicle time cost	14.12 c/min
▪ In vehicle distance cost	12.00 c/km
▪ Parking cost	varies

Time and distance costs are derived from the loaded vehicle network. During the assignment the link time is multiplied by 1.3 to allow for the time lost at bus stops where the boarding and alighting of buses occurs. The route file defines express routes where passengers can board buses only on certain stations, and no additional allowance is made for pick up times.

8.2 Public Transport Model Outputs

The public transport assignment outputs a series of matrices representing various time and cost components, and are a weighted average of the cost of all trips between each zone pair.

- In vehicle time.
- Average walk time
- Average wait time
- Average car cost
- Average fare cost

Other matrices output by the public transport assignment are:

- Average number of fare sections crossed
- Average number of transfers.

It is also possible to establish the services used between each zone pair for each slice of loading. Also available are the origin and destination nodes for each bus service used and the park'n'ride nodes if these facilities are used to complete the trip. The path file also contains information about each of the slices loaded, the release time and the cost in dollars for that trip portion. If the trip happens to be one where passengers transferred from one bus to another, then the node at which the transfer occurs is recorded.

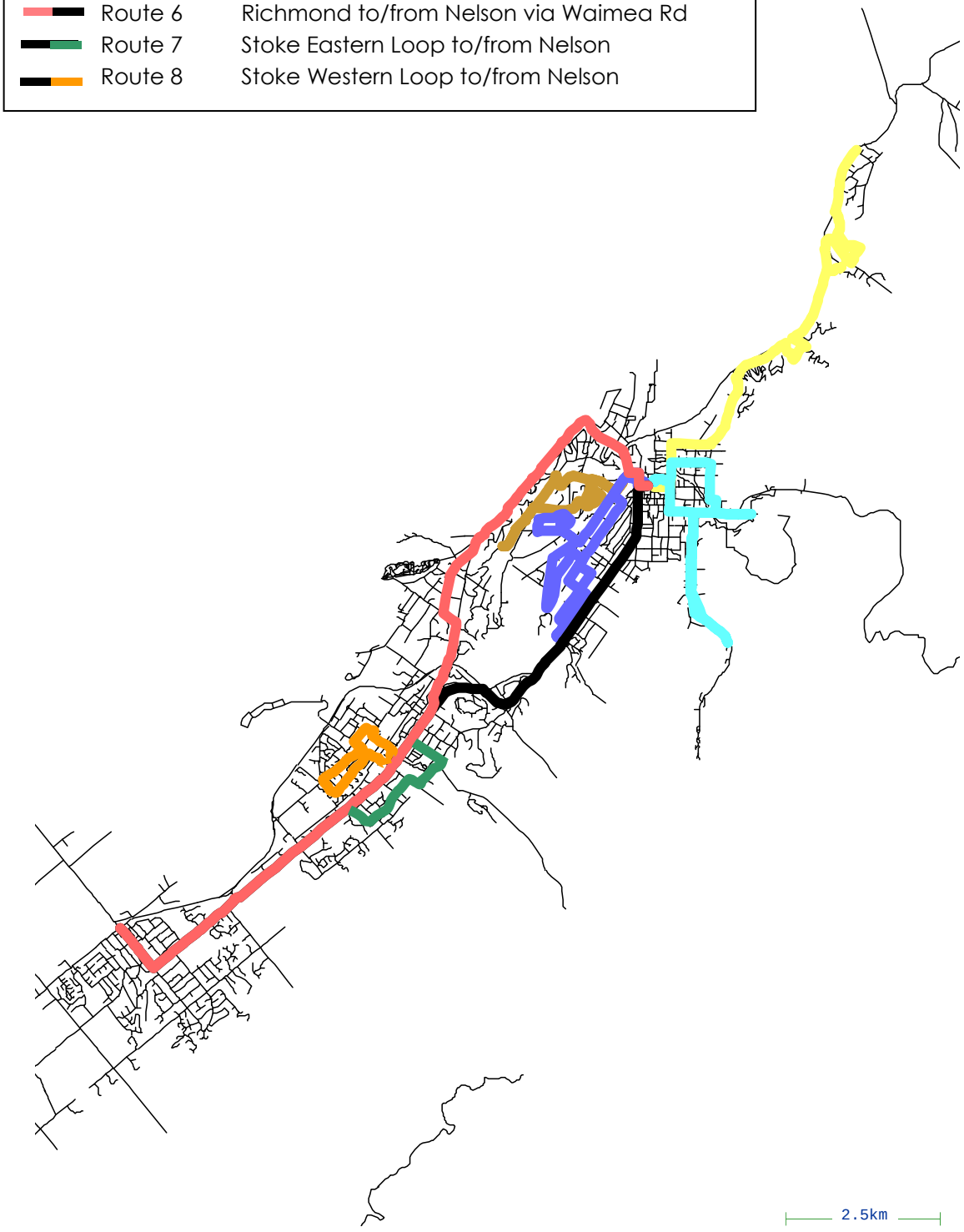
Passenger patronage per service with the time component included is reported in a separate file, which lists all services and the number of passengers getting on and off the buses along the route.

Similar to vehicle assignment a loaded network is produced at the end of each run, and depending on the switch used in the parameter file, the loaded network will contain either PT passenger numbers or the number of buses. The number of buses is a graphical check on the coding and is a direct reflection of input.

There are 8 bus services operating in the Nelson-Tasman study area and their geographical location is shown in **Figure 20**. Routes 1 through 4 and 5 through 7 have different operators respectively. Observed data describing operational characteristics of these routes (e.g. service patronage along the route and the total service patronage) were not available for this study, however approximate patronages have been provided as observed values in order to validate results in **Table 30** (for AM peak) and **Table 31** (for Inter peak). Service times are also included in this table.

Morning Peak (7-9am) Bus Occupancies by Route				Table 30
Bus Route		**Service Times**	**Observed Occupancy**	**Modelled Occupancy**
1	Toi Toi/Hospital	7:15 7:50 8:25	**215**	**212**
2	Atawhai	7:25 (to city only) 7:50		
3	Brook/Matai	8:25		
5	Richmond to Nelson via Tahunanui Rd	7:10 7:40 8:10		
5	Nelson to Richmond via Tahunanui Rd	7:40 8:15		
6	Richmond to Nelson via Waimea Rd	7:10 7:40 8:10		
6	Nelson to Richmond via Waimea Rd	7:40		
Private Total				

Inter Peak (9am-12pm) Bus Occupancies by Route				Table 31
Bus Route		**Service Times**	**Observed Occupancy**	**Modelled Occupancy**
1	Toi Toi/Hospital	9:28 10:25	**108**	**110**
2	Atawhai	9:30 10:30		
3	Brook/Matai	10:05		
4	Washington Valley	9:00 11:00		
5	Richmond to Nelson via Tahunanui Rd	9:30 10:30 11:30		
5	Nelson to Richmond via Tahunanui Rd	10:00 11:00		
6	Richmond to Nelson via Waimea Rd	9:30 10:30 11:30		
6	Nelson to Richmond via Waimea Rd	10:00		
7	Stoke (Eastern Loop) to Nelson	10:20		
7	Nelson to Stoke (Eastern Loop)	10:30		
8	Stoke (Western Loop) to Nelson	10:00		
8	Nelson to Stoke (Western Loop)	10:00		
Private Total				



2001 Nelson-Tasman Transportation Model	**Public Transport Routes**	**Figure 20**
Gabites Porter		

9. PUBLIC TRANSPORT QUALITY OF SERVICE MEASURES

Further use of public transport model outputs is achieved by deriving performance measures that provide an overall picture of 'goodness' of a Public Transport system. The US Transportation Research Board has recently published "Transit Capacity and Quality of Service Manual" (TCQSM) specifying several performance measures based on a user's perception of the comfort and convenience of the public transport. Apart from performance measures from the passenger's point of view there are also system wide performance measures, and both are appropriate to use in the context of transport modelling. TCQSM is the equivalent of the Highway Capacity Manual, but is dealing mainly with performance measures of public transport.

PT quality of service measures can be divided into two main categories:

- Availability
- Quality

The availability measures address the spatial and temporal availability of public transport. If PT is located too far away from a potential user or if it does not run at the times a user requires a service, that user would not consider PT service to be available and thus the quality of service would be poor. Assuming however that PT service is available, the quality measures can be used to evaluate a user's perception of the comfort and convenience.

Since the data necessary for determining all of the quality of service measures for the Nelson-Tasman bus system were not available this section will present only those measures that could have been derived.

9.1 Measures of Availability

Measures of PT availability are:

- Frequency of buses (Headways)
- Hours of service
- Service coverage

9.1.1 Frequency of Buses

From the user's perspective, frequency determines the number of times an hour a user has access to the bus system assuming the service is provided within an acceptable walking distance. The waiting time, which is one of the components for the PT composite travel cost, is also dependant on the frequency of buses.

Since the headway is the service frequency Level of Service measure for urban scheduled public transport it is possible to determine the bus stop level of service for particular destinations as bus stops are often served by several services which reduces the bus headway. However the exact location of bus stops were not available for this study, and indeed, this analysis is ideally carried out using data gathered using GPS techniques.

As well as bus stops, similar level of service measures can be determined for segments of roads using headway ranges from **Table 32** and the model outputs.

The service frequency for each of the Nelson-Tasman urban scheduled public transport routes are shown in **Table 30**. Of the eight routes there is only one with a headway below the 30min Level of Service D value, namely Route 6. The others are all operating at effectively Level of Service E or F as they have two or fewer buses operating in the morning peak two hour period.

Service Frequency LOS			Table 32
LOS	**Headway (min)**	**Veh/h**	**Comments**
A	<10	>6	Passengers don't need schedules
B	10-14	5-6	Frequent service, passengers consult schedules
C	15-20	3-4	Maximum desirable time to wait if bus missed
D	21-30	2	Service unattractive to choice riders
E	31-60	1	Service available during hour
F	>60	<1	Service unattractive to all riders

9.1.2 Hours of Service

Hours of service, also known as "service span" is simply the number of hours during the day when a public transport service is provided along a route, a segment of a route, or between two locations. It plays as important a role as frequency and service coverage in determining the availability of public transport service to potential users. If a service is not provided at the time of day a potential passenger needs to take a trip, it does not matter where or how often services are provided the rest of the day.

For a fixed route service level of service is based on the number of hours per day a public transport service is provided at least once an hour. As with frequency, hours of service level of service can vary by day. Hours of service levels of service are shown in **Table 33**. Timetable details indicate that all routes fall into the Level of Service E category as no route is providing at least one service an hour for more than 11 hours a day.

Hours of Service LOS		Table 33
LOS	**Hours per Day**	**Comments**
A	19-24	Night or owl service provided
B	17-18	Late evening service provided
C	14-16	Early evening service provided
D	12-13	Daytime service provided
E	4-11	Peak hour service/limited midday service
F	0-3	Very limited or no service

9.1.3 Service Coverage

Service coverage is a measure of the area within walking distance of a public transport service. As with previous two measures it does not provide complete picture of public transport availability by itself, but when combined with frequency and hours of service,

it helps identify the number of opportunities people have to access public transport from different locations. To obtain this measure the area within 400 metres (5 min walk) from all the routes is divided by the public transport supportive area which is the area having at least 7.5 dwelling units per hectare or an employment density of at least 10 jobs per hectare.

Service coverage Level of Service is based on the percentage of the public transport supportive area covered as shown in **Table 34**.

Service Coverage LOS	Table 34
LOS	**% PT supportive area covered**
A	90.0-100.0
B	80.0-89.9
C	70.0-79.9
D	60.0-69.9
E	50.0-59.9
F	<50.0

Using this methodology the Nelson-Tasman system produces a service coverage of:

$$\frac{\text{PT}}{\text{Urban Area}} = \frac{15.8}{28.1} = 56\%$$

The service coverage indicates it operates at LOS E.

9.2 Measures of Quality

Measures of PT quality are:

- Passenger loads
- Reliability
- PT/Auto travel time

Passenger loads, which reflect the comfort level of the on-board vehicle portion of a PT trip, and reliability, which measures how closely buses match the published schedules cannot be analysed as it requires additional data from the bus operators. In Christchurch, for example, this data is available through the real time tracking system. The model outputs do, however, allow derivation of the PT/Auto travel time.

9.2.1 PT/Auto Travel Time

An important factor in a potential PT user's decision to use PT on a regular basis is how much longer the trip will take in comparison to the automobile. The level of service measure is door-to-door difference between automobile and PT travel times, including walking, waiting, and transfer times. It is a measure of how much longer (or in some cases, shorter) a trip will take by using a bus. The advantage of using a transportation model for calculating this measure is that all trips between all zones can be modelled, and different kinds of trip types can be compared. **Table 35** shows PT/Auto travel time Level of Services.

The steps to calculate this PT quality level of service are as follows:

Step 1: *Calculate travel time differences between zones.*
Time matrices are available as an output from the model. For PT trips the time matrix is the sum of in-vehicle, walk and wait times. By subtracting of those two matrices travel time differences between each pair of zones are obtained.

Step 2: *Calculate total person trips between zones.*
Both trip tables are available from the model.

Step 3: *Calculate the weighted average of travel time differences.*
For each pair of zones, multiply the travel time difference between the zones by the number of person trips between the zones. Sum all of the resulting values and divide by the total number of person trips that took place. The result is a system wide weighted average travel time difference, which then can be used with **Table 35** to determine a system wide level of service.

PT/Auto Travel Time **Table 35**

LOS	Travel Time Difference (min)	Comments
A	≤ 0	Faster by PT than by automobile
B	1-15	About as fast by PT as by automobile.
C	16-30	Tolerable for choice PT users
D	31-45	Round trip at least an hour longer by PT
E	46-60	Tedious for all PT users; may be best possible in small cities
F	>60	Unacceptable to most PT users

Given that 44% of the Nelson/Richmond urban areas are not PT-supportive (See **Section 9.1**). It is evident that given the methodology above, the PT service has LOS E or F.

9.3 Improving Public Transport Patronage

Public transport use tends to be the most cost effective in dense urban corridors, due to high load factors and relatively low cost per passenger kilometre. On major urban routes fares often cover all operating costs and some cases the capital cost as well. These are also conditions where congestion, parking, crash risk and pollution costs tend to be greatest, due to traffic density and high land values. In such conditions, a public transport system that substitutes for automobile travel can provide particularly large benefits. To be able to achieve high patronage levels the public transport needs to include:

- Additional routes, expanded coverage, increased service frequency and hours of operation
- Reduced and more convenient fares (such as discount for frequent users)
- Bus priority traffic signals and other measures that reduce delay to PT vehicles
- Comfort improvements
- Improved passenger information and marketing programs
- Park and Ride facilities.

There are also some external factors affecting public transport patronage and they are listed in **Table 36** which shows the elasticity of public transport use with respect to those factors. For example, a 1% increase in regional employment is likely to increase public transport patronage by 0.25%, while a 1% increase in fare prices will reduce patronage by 0.4%, all other things being equal.

Factors Affecting Public Transport Patronage — **Table 36**

Factor	Elasticity
Regional Employment	**0.25**
Central City Population	**0.61**
Service	**0.35**
Fare Price	**-0.40**

(Transfund New Zealand Research Report No.248 – Review of Passenger Transport Demand Elasticities

Improved schedule information, easy to remember departure times (e.g. 'clock face' timetabling), real time tracking, and more convenient transfers have been shown elsewhere to increase public transport use, particularly in areas where service is less frequent.

A test involving a 100% increase in fares was undertaken to determine the patronage elasticity of the Morning Peak PT Model. Patronage was found to drop by 39% in the AM and 50% in the Inter peak. An additional test involving a 100% increase in service rate indicated that the increase in patronage would be 30% in both periods. Whilst this is less than the expected 35% elasticity it is within the acceptable tolerance interval of 20% - 50%.

10. TRIP ASSIGNMENT

10.1 Costs of Travel

When undertaking transportation analyses it is important to make the distinction between the travel costs seen by the driver, (commonly termed perceived or behavioural costs), and the true cost of a trip from the viewpoint of the country as a whole.

Behavioural costs give the best empirical fit to the observed behaviour of travellers. They represent the cost or price that travellers perceive they are paying in terms of time, distance, comfort and convenience. For example, it can be argued that most car drivers, when deciding whether or not to make a trip by car, consider as their mileage costs only the cost of the fuel that they buy. The cost value of time that people place on travel depends on the type of journey undertaken, so that behavioural time costs for journeys to work, journeys during working hours and shopping trips are different.

Resource costs are defined as the whole of resources consumed per unit of travel to the nation as a whole. The difference between the resource cost and the behavioural cost lies in the distance cost. For example, resource cost per km does not include fuel tax, as this is purely an internal or "paper" transfer, but does include allowances for oil, maintenance and other operating costs. The discrepancy between behavioural and resource costs has been termed "driver misperception," that is the hidden costs that play little or no part in a driver's trip making decisions.

Brown Copeland and Co. Consulting Economists prepared these values. In effect, it is only the relativity between the costs that is important, rather than the absolute values. These costs have recalculated based on the current Transfund Project Evaluation Manual values for travel time costs and vehicle operating costs. The following details the calculations of the perceived costs used in the assignment process.

10.2 Loading Profile

The total vehicle matrix was assigned to the road network using an incremental time dependent assignment procedure with multiple iterations and a loading profile for the time periods as shown in **Table 37**, **Table 41**, and **Table 42**. Traffic is loaded in time slices onto the network at flow rates that approximate the traffic flow profile over the time period modelled. The TRACKS assignment program ASSIGN version 6.30 was used.

Interzonal time and distance matrices were extracted during the assignment process. These are weighted sums corresponding to the points on the loading profile.

The assignment procedure is explained in the TRACKS user manual. To summarise, in each iteration, a proportion of the matrix is loaded according to the loading profile which is derived from traffic counts over the period. As a consequence the profiles for each period are different. In effect, where there are a number of iterations before a skim. It is an incremental assignment for that proportion of traffic. Times and distances are accumulated at the skim point. If iterations are successively skimmed, then the assignment is an 'all or nothing' assignment for the proportion being loaded.

The profile can be altered for future runs, if there is a reason to do so, but it must be kept constant for all assignments (do min and options) of any given year.

These profiles are generally stylised for each of the different period models based on 10 minute (or more frequent) traffic counts at key locations within the Study Area. As no 10 minute counts were made available a typical hourly assignment loading profile has been adopted as is detailed in **Table 37**, **Table 41**, and **Table 42**.

AM Peak (8-9am) Period Assignment Loading Profile					Table 37
Assignment Increment	**% Trip Matrix Loaded**	**% of Peak Hourly Flow Rate**	**Steady State Rate (Minute)**	**Perceived Assignment Costs**	
1	10	10	-	18.23 ¢/min	14.76 ¢/Km
2	10	20	-		
3	10	30	-		
4	10	40	-		
5	10	50	-		
6	10	60	-		
7	10	70	-		
8	6	76	-		
9	5	81	20		
10	4	85	15		
11	4	89	10		
12	3	92	-		
13	3	95	10		
14	3	98	-		
15	2	100	5		

Inter Peak (12-1pm) Period Assignment Loading Profile					Table 38
Assignment Increment	**% Trip Matrix Loaded**	**% of Peak Hourly Flow Rate**	**Steady State Rate (Minute)**	**Perceived Assignment Costs**	
1	10	10	-	18.23 ¢/min	14.76 ¢/Km
2	10	20	-		
3	10	30	-		
4	10	40	-		
5	10	50	-		
6	10	60	-		
7	10	70	-		
8	7	77	-		
9	6	83	30		
10	5	88	-		
11	4	92	20		
12	3	95	-		
13	3	98	-		
14	2	100	10		

PM Peak (5-6pm) Period Assignment Loading Profile					Table 39
Assignment Increment	**% Trip Matrix Loaded**	**% of Peak Hourly Flow Rate**	**Steady State Rate (Minute)**	**Perceived Assignment Costs**	
1	10	10	-	18.23 ¢/min	14.76 ¢/Km
2	10	20	-		
3	10	30	-		
4	10	40	-		
5	10	50	-		
6	10	60	-		
7	10	70	-		
8	6	76	15		
9	5	81	-		
10	5	86	-		
11	4	90	15		
12	2	92	20		
13	3	95	-		
14	3	98	5		
15	2	100	5		

10.3 Network Links

Travel Journey times were established by a combination of link times and delays at intersections. The simplest form of calculating journey times in the 1960's and 70's was where all delay (link and intersection) was attributed to a link. Volume/delay relationships were derived for various types of road. Selection of the appropriate curve was made on the basis of a number of variables that physically describe the road.

Results from more recent surveys have allowed link only delays to be empirically separated from intersection delays. The volume delay relationships used in this study were for delays on links only and were based on those analytically derived by Akcelik:(1991) using a time dependent Davidson model. As a result, these curves give 'link only' delays, allowing intersection delays to be separately calculated. The J_A parameter, or friction factor, in Akcelik's equation for travel time was set for each link type so that Vcapacity/Vfree flow = 0.5. This is consistent with standard traffic theory and Fisk's behavioural model and matches the data collected in Wellington.

Each link in the network is given a volume delay curve depending of the speed limit, function and characteristic of the road the link represents. A steady state period of one hour was used.

Akcelik's formula is:

$$t = t_O \left\{ 1 + 0.25\, r_f \left[(x - 1) + \left((x-1)^2 + (8 J_A x) / (Q t_O r_f) \right)^{1/2} \right] \right\}$$

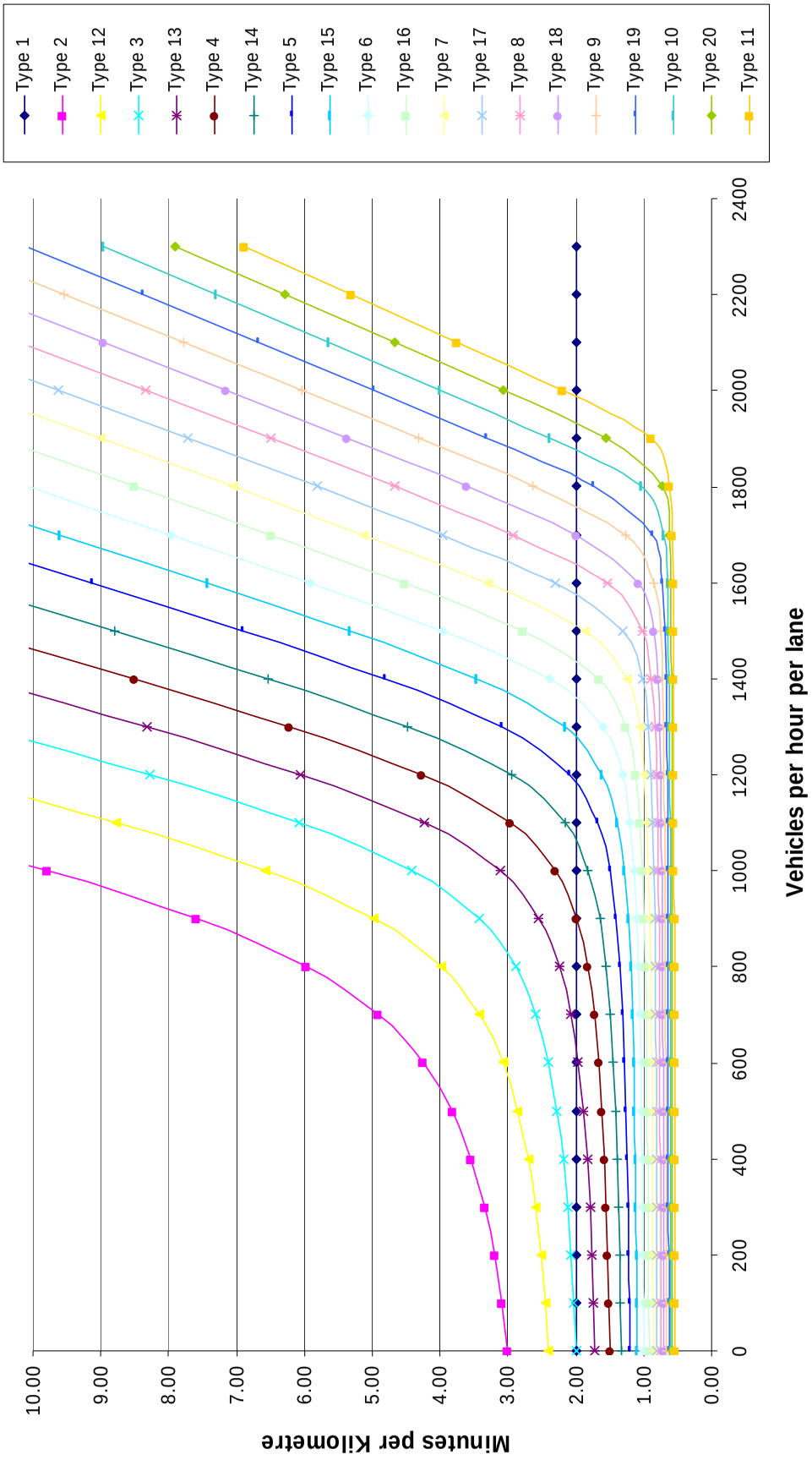
Where:

t	=	travel time per unit distance (e.g., secs/km)
t_O	=	minimum (zero flow) travel time per unit distance (e.g., secs/km)
J_A	=	delay (side friction, level-of-service(LOS)) parameter
x	=	q/Q = degree of saturation
q	=	demand (arrival) flow rate (veh/sec)
Q	=	capacity (veh/sec) per lane
r_f	=	ratio of flow period T_f, to minimum travel time t_O

Twenty curves were developed with free flow times at 5km/hr intervals. The capacities and J_A values used for each curve are given below. Curve number 1 is a flat line for a centroid connector. The resulting volume/delay curves used for this study are shown in **Figure 21**. Each link in the network was allocated a curve from an assessment of the free flow speed, its capacity and the environmental conditions of the link.

New future links should be coded by assessing the environment in which the link will operate, and choosing a curve with an appropriate free flow speed and capacity, given the way in which link with a similar curve operate under current traffic condition. During evaluation of a project it would be useful to test the sensitivity of the choice of curves on traffic flows, and benefits.

Link Types				Table 40
Speed (kph)	**Capacity (vph)**	**Free Flow Time (t_0) min/km**	**J_a**	**Link Type**
10	2500	2.00		Type 1
20	900	3.00	10.55	Type 2
30	1100	2.00	5.20	Type 3
40	1300	1.50	3.00	Type 4
50	1500	1.20	1.90	Type 5
60	1600	1.00	1.25	Type 6
70	1700	0.86	0.84	Type 7
80	1900	0.75	0.54	Type 8
90	2000	0.67	0.34	Type 9
100	2200	0.60	0.20	Type 10
110	2400	0.55	0.13	Type 11
25	1000	2.40	7.10	Type 12
35	1200	1.71	3.90	Type 13
45	1400	1.33	2.35	Type 14
55	1500	1.09	1.52	Type 15
65	1600	0.92	1.02	Type 16
75	1800	0.80	0.67	Type 17
85	2000	0.71	0.44	Type 18
95	2200	0.63	0.26	Type 19
105	2300	0.57	0.16	Type 20



2006 Nelson-Tasman Transportation Model	**Volume – Delay Curves**	**Figure 21**
Gabites Porter		

10.4 Network Intersections

Each intersection on the road network is coded explicitly. The coding adopted in TRACKS to represent the different types of approach control is:

Type 0	-	Not controlled, has priority
Type 1	-	No controls marked, non priority
Type 2	-	Merge
Type 3	-	Roundabout
Type 4	-	Give Way, non-priority
Type 5	-	Stop, non-priority
Types 6,7	-	Signals
Types 8,9	-	Signals

a) Priority Intersections

Delays at priority intersections are calculated at the movement level. That is, left, right and through movements on all legs have delays calculated specifically.

The approach lanes at each intersection are coded as one of eight movement types as shown below. The opposing traffic flows are calculated from the intersection geometry, determined from the link coordinates.

1. Left, Through and Right
2. Left and Right
3. Left
4. Left free
5. Left and Through
6. Through
7. Through and Right
8. Right

The way each lane type was treated came from the publication titled, "Performance Analysis of Priority Intersections - A Practitioner's Guide" by Gabites Porter:(1991).

A queuing theory model is used to calculate the delays. The queuing theory formulation adopted is that described by Fisk:(1989), which uses an M/M/1 model (indicates a queuing system with negative exponential distributions for arrival headway and service times, with one service channel) and a coordinate transformation approximation to allow for over-saturated conditions.

The formulation is:

d	=	r/μ (1 - r)	steady state conditions, r<1
		(r - 1) T/2	deterministic conditions, r>1

Where:

r = q_2 / μ

$$\mu = \frac{q_1 e^{-q_1 t}}{1 - e^{-q_1 b}}$$

T	=	duration of time period over which a steady state is assumed
q_1	=	major road flow rate
q_2	=	minor road flow rate, always defined as approach being delayed
t	=	critical gap
b	=	move-up time for minor road traffic.
μ	=	mean service rate
r	=	traffic intensity

Fisk shows that the delay equation can be written:-

$$d = \frac{-(2 + \mu t - r\mu t) + \sqrt{(2 + \mu t - r\mu t)^2 + 8r\mu t}}{4\mu} + \frac{1}{\mu}$$

when the coordinate transform is included and this formulation is used. The critical gaps and move-up times used are described in **Table 41**.

Intersections: Critical Gap and Move-Up Times **Table 41**

Lane Type	Critical Gap (sec)	Move-up Time (sec)
Left turn-non-priority	5.00	3.00
Left turn-priority	5.00	3.00
Thru/Right-non-priority	5.00	3.00
Thru/Right-priority	5.00	3.00
Merge	3.00	2.00
Roundabout	4.00	3.00
Bottleneck	3.00	2.00
Parameters		**Factor**
Tracking Headway		1.2 seconds
Lane Sharing Convergence Parameter		0.01000
Number of external iterations		50
Number of internal iterations (lane sharing algorithm)		200

NB: a bottleneck is automatically recognised at a node where the number of lanes leaving the node is less than the number of lanes entering the node.

b) Roundabouts

Delays at roundabouts are calculated using the formulae described in the SIDRA 5 User Manual.

c) Signalised Intersections

Delays at signalised intersections are calculated according to turning movements using the formulations in ARR123, including equations 6.4, 6.3 and 6.1 shown below. While ARR123 is the basis for SIDRA it does not give exactly the same results, especially for the more recent versions of SIDRA.

A general formula for the average delay per vehicle, d (in seconds) is

d = D/q eqn (6.4)

Where:

D = total delay (veh/hr/hr)

q = flow rate (veh/s)

$$D = \frac{qc(1-u)^2}{2(1-y)} + N_0 x \quad \text{eqn (6.3)}$$

Where:

qc = average number of arrivals in vehicles/cycle

q = flow (veh/sec)

c = cycle time (sec)

u = green time ratios = g/c

y = flow ratio = q/s

s = saturation flow (veh/sec)

N_o = average overflow queue (vehicles)

x = q/Q = degree of saturation

$$N_0 = \begin{cases} \frac{QT_f}{4}\left[z + \sqrt{z^2 + \frac{12(x-x_0)}{QT_f}}\right] & \text{for } x > x_0 \\ 0 & \text{for } x \le x_0 \end{cases} \quad \text{eqn (6.1)}$$

Where:

Q = capacity (veh/hr)

T_f = flow period (hours)

z = x - 1

x_o = degree of saturation below which the average overflow queue is approximately zero = 0.67 + sg/600

Signalised intersections were modelled specifically and each required a SIDRA input data file.

d) Geometric Delays

The delays calculated above are the stopped delays for vehicles. As vehicles decelerate to stop or negotiate a corner a geometric delay is encountered. The geometric delay is calculated from the formulations in Gabites Porter:(1991).

11. MODEL CONVERGENCE

11.1 Assignment and Distribution Loop

Time and distance matrices are required as input for trip distribution. As these matrices are generated by assigning the trips to the network, after each assignment the trip distribution needs to be re-run and the trips re-assigned until the time and distances matrices converge. The assignment and distribution steps are run iteratively until the totals of both the time and distance matrices between successive runs remain constant.

Convergence was achieved with the Nelson-Tasman network. The totals for the final time and distance matrices (after many previous runs) are shown in **Table 42**.

Model Convergence						Table 42
PERIOD	**AM Peak Hour**	**AM Peak Hour**	**Inter Peak Hour**	**Inter Peak Hour**	**PM Peak Hour**	**PM Peak Hour**
	TVM*	**TVK#**	**TVM**	**TVK**	**TVM**	**TVK**
Final Run	206942	171759	166796	142910	233290	191570
Prev. Run	206975	171736	166786	142901	233293	191605
% Diff	-0.02%	0.01%	0.01%	0.01%	0%	-0.02%

*TVM = Total Vehicle Minutes, #TVK = Total Vehicle Kilometres

12. VALIDATION

12.1 Network Validation

Network flow comparisons are tested using a number of statistical measures. Traffic counts were grouped into cordons, or screenlines, and the following measures calculated:

- Comparisons of individual links
- Comparisons of total trips over each screenline
- Percentage difference
- Correlation coefficient
- % Root mean square
- GEH.

Guidelines for each of the above criteria were obtained NZTA's Economic Evaluation Manual and listed in **Table 43**.

The correlation coefficient is a first order measure of the co-relation, using the formula:

$$P_{x,y} = \frac{\frac{1}{n} \Sigma (x_i - \bar{x}_i)(y_i - \bar{y}_i)}{\sigma_x \sigma_y}$$

Where:

Σ	=	Sum of…
X	=	Variable X (observed traffic)
Xi	=	The mean of variable x (observed traffic)
Y	=	Variable y (modelled traffic)
Yi	=	The mean of y (modelled traffic)
□x	=	The standard deviation of x (observed traffic)
□y	=	The standard deviation of y (modelled traffic)
n	=	Number in sample

The *GEH* is a form of the Chi-squared statistic that incorporates both relative and absolute errors. It is designed to be more tolerant of the large percentage differences in lower flows. The form of the statistic is:

$$GEH = \sqrt{\frac{2(m-o)^2}{m+o}}$$

Where **m** is the modelled flow and **o** is the observed count.

It should be noted that where the model assignments are other than one hour, the traffic volumes have been adjusted for GEH comparisons.

The available traffic counts have been arranged into screenlines where possible. In many cases there are roads on a screenline that have not been counted and hence these have had to be omitted. In other cases it was not been possible to create screenlines and hence the extra counts are grouped in the area in which they occur. A summary of the cordon results can be found below in **Table 45**, **Table 46** and **Table 47.** Scatterplots for all links in each period are shown in **Figure 24**, **Figure 25** and **Figure 26** with full cordon outputs in **Appendix Three**.

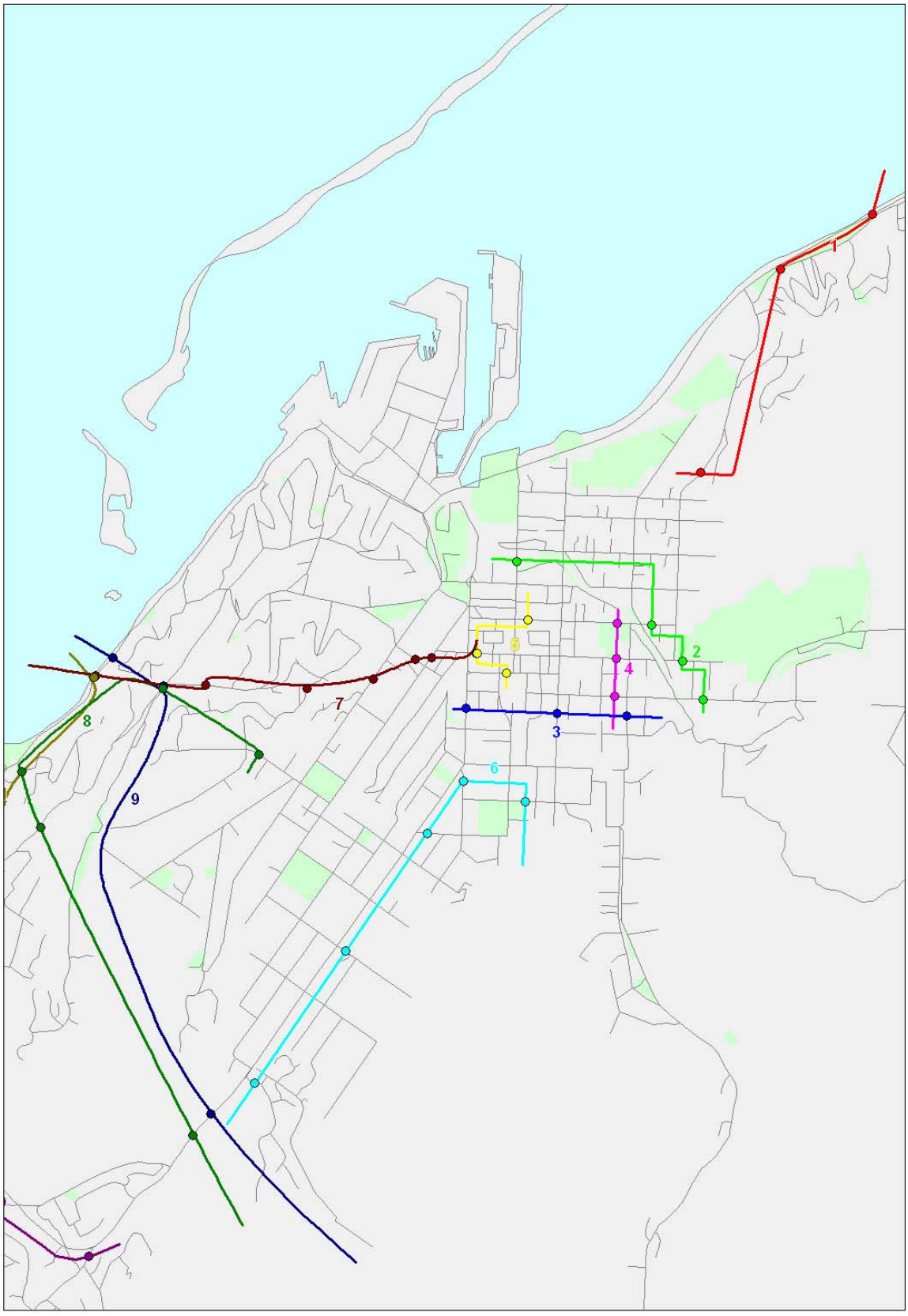
Model Traffic Flow Validation Guidelines				Table 43
Screenline Totals				
Traffic Flow		± 10%		
Correlation Coefficient		>0.8		
% RMS		<30		
GEH		<4		
Individual Links (vpd)	24 Hour	1hr Period		
0-10,000	± 60%	± 300		
10-20,000	± 40%	± 400		
20-30,000	± 30%	± 600		
30-50,000	± 20%	± 750		
50,000 +	± 20%	± 1,000		
GEH	<5	<7	<10	<12
(modified for 1hr flows only)	60%	80%	95%	100%

The Screenlines counts sites used in this model are shown in **Figure 22** and described in **Table 44**.

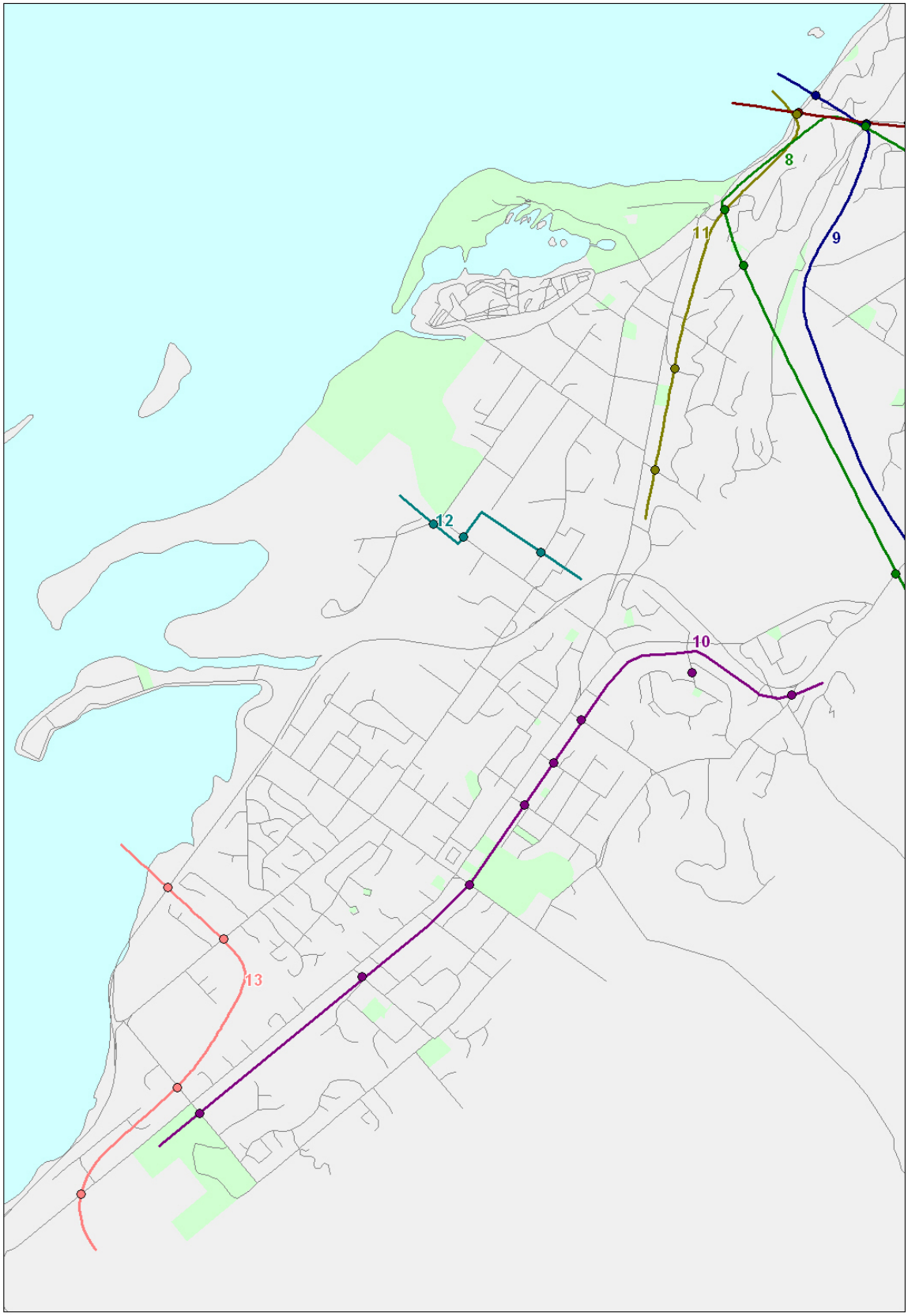
Screenline Descriptions			Table 44
Screenline	**Link**		**Description**
1. Atawhai Dr	3831	3826	00600114 Nelson Nth - Atawhai Cemetry
	3843	3839	Atawhai Drive (027)
	5297	3865	Atawhai Dr - Btwn Iwa Rd & Weka St (027A)
2. Maitai River	4114	5496	Nile St (253) btw Domett St and Maitai Rd
	4058	4059	Hardy St (139) btw Avon Tce and Tory St
	4007	4011	BRIDGE STREET (52) btw TASMAN ST BRIDGE and MILTON ST
	3941	3924	Trafalgar St (374) btw SH 6/QE II Dr and Halifax St
3. South CBD	6108	5024	Tasman St (350) btw Nile St and Manuka St
	4146	4962	Collingwood St (87) btw Nile St and Bronte St
	4144	4101	Rutherford St (314) b tw Nile St West and Waimea Rd

Screenline Descriptions			Table 44 Continued
Screenline	**Link**		**Description**
4. East CBD	4110	5024	Nile St - Btwn Alton St and Tasman St
	4053	4054	Hardy St (138) btw Collingwood St and Tasman St
	4499	4999	Bridge St (52) btw Collingwood St and Tasman St Bridge
5. CBD	4070	4071	Selwyn Pl btw Trafalgar Square and Trafalgar St
	4041	1197	Hardy St (138) btw Rutherford St and Trafalgar St
	3988	3989	Bridge St (52) btw Trafalgar St and Collingwood St
6. Waimea Rd	4202	5393	Rutherford St (314) btw Waimea Rd and Van Dieman St
	4236	5534	Van Dieman St (383) btw Waimea Rd and Ngatiawa St
	2597	4384	Motueka ST (231) btw Waimea Rd and Campbell St
	5001	4446	Market Rd (207) btw Waimea Rd and Brunner St
7. Washington Valley	4041	1197	Hardy St (138) btw Rutherford St and Trafalgar St
	4796	4961	Vanguard St (384) btw Hardy St and Gloucester St
	4958	5554	Gloucester St (124) btw St Vincent St and Vanguard St
	2098	4064	St Vincent St (318) btw Gloucester St and Parere St
	2100	4923	Abraham Heights (6) btw Quebec Rd and Montreal Rd
	4088	5025	Quebec Rd (285) btw End of KCC RHS and Princes Dr
	4089	4088	Princes Dr (280) btw Richardson St and Quebec Rd
	4919	3944	00600118 Basin Reserve(Rocks Rd)
8. Moana	4989	5480	Waimea Rd (391) btw Boundary and Beatsons Rd
	4162	4179	Toi Toi St (365) btw Montreal Rd and St Vincent St
	4089	4088	Princes Dr (280) btw Quebec Rd and Richardson Ave
	4263	3196	Stansell Ave (338) btw Moana Ave and Paddys Knob Access
	4966	1994	Bisley Ave (43) btw Rocks Rd and Champion Tce
9. Moana	4989	5480	Waimea Rd (391) btw Boundary Rd and and Beatsons Rd
	4089	4088	Princes Dr (280) btw Quebec Rd and Richardson Ave
	4919	3944	00600118 Basin Reserve(Rocks Rd)
10. Main Road Stoke	4545	4518	The Ridgeway (357) btw Waimea Rd and Inner Glynn Rd
	4515	4501	Waterhouse St (399) btw Waimea Rd and Coster St
	4555	4612	Arapiki Rd (23) btw Main Rd Stoke and The Ridgeway
	4608	4623	Maitland Ave (198) btw Main Rd Stoke and Koromiko Ave
	4651	4659	Marsden Rd (208) btw Main Rd Stoke and The Ridgeway
	4747	5489	Songer St (331) btw Main Rd Stoke and The Ridgeway
	4816	4821	Polstead Rd (277) btw Main Rd Stoke and Suffolk Rd
	5111	5112	Saxton Rd 319) btw Main Rd Stoke and The Ridgeway

Screenline Descriptions			Table 44 Continued
Screenline	**Link**		**Description**
11. Tahunanui Dr (SH6)	4919	3944	00600118 Basin Reserve(Rocks Rd)
	4966	1994	Bisley Ave (43) btw Rocks Rd and Champion Tce
	4312	6113	Tosswill Rd (368) btw Tahunanui Dr and Chamberlain St
	4972	4973	Maire St (195) btw Annesbrook Dr and End
12. Quarantine Rd	4462	3399	Pascoe St (268) btw Parkers Rd and Quarantine Rd
	5118	4459	Quarantine Rd (284) btw Bolt Rd and Nayland Rd
	5119	5118	Trent Dr (376) btw Bolt Rd and End
13. Whakatu Dr / Nayland Rd / Main Road Stoke	5478	5462	00600122 Stoke-Telemetry Site 81 - Whakatu Drive at Songer St
	5180	4783	Nayland Rd - Kendall Vw & Holdcroft Pl (241C)
	5111	2699	Saxton Rd West - Railway Reserve & Main Rd Stoke (319A)
	5188	5176	Main Rd Stoke (7805) btw…
14. State Highway Counts	4919	3944	00600144 Eighty Eight Vly Stm bridge
	4966	1994	00600153 Spooners Hill (Higgins Cul)
	4312	6113	00600138 Brightwater (Pitfure bridge)
	4972	4973	00600135 Wairoa Rr (Burkes Bank)
	5118	4459	06000000 Start of State Highway 60
	5119	5118	06000005 Appleby Bridge
	5478	5462	06000008 Research Orchard Rd
	5180	4783	06000018 Ruby Bay
	5188	5176	06000036 Motueka Nth (Bridge)
	2675	2678	00600122 Stoke-Telemetry Site 81 - Whakatu Drive at Songer St
	2937	2826	00600118 Basin Reserve(Rocks Rd)
	1654	1655	00600114 Nelson Nth - Atawhai Cemetry
15. Richmond Spot Counts	1523	1518	Salisbury Road (723)
	1623	1619	Queen Street (676)
	1756	1755	Bateup Road (171)
	2067	2070	Champion Road (243a)
	5478	5462	McGlashen (574)
	4919	3944	McShane Road (69)
	3831	3826	Hill Street (454a)
	1301	1305	Hill Street (454b)
	1129	1130	Hart Road (427)
	1252	6115	Paton Road (644)
	3992	1304	Clover Road East (260)



2006 Nelson-Tasman Transportation Model	**Screenline Locations – CBD**	**Figure 22**
Gabites Porter		



2006 Nelson-Tasman Transportation Model	**Screenline Locations - Stoke**	**Figure 23**
Gabites Porter		

12.1.1 Morning Peak Validation

Morning Peak Network Screenline Validation				Table 45
Screenline 1 – Atawhai Dr				
Count		1551		
Volume		1687		
Change		136		
%		109		
Correlation Coefficient		0.998		
%RMS		12.69		
GEH Total		3.4		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	66.7	100	100	100
Screenline 2 – Maitai River				
Count		1414		
Volume		1465		
Change		51		
%		104		
Correlation Coefficient		0.991		
%RMS		11.94		
GEH Total		1.3		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 3 – South CBD				
Count		2008		
Volume		2015		
Change		7		
%		100		
Correlation Coefficient		0.997		
%RMS		13.34		
GEH Total		0.2		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 4 – East CBD				
Count		1092		
Volume		1041		
Change		-51		
%		95		
Correlation Coefficient		0.807		
%RMS		28.43		
GEH Total		1.6		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	66.7	100	100	100

Morning Peak Network Screenline Validation				Table 45 Cont.
Screenline 5 – CBD				
Count		1330		
Volume		1326		
Change		-4		
%		100		
Correlation Coefficient		0.984		
%RMS		11.24		
GEH Total		0.1		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 6 – Waimea Rd				
Count		701		
Volume		680		
Change		-21		
%		97		
Correlation Coefficient		0.971		
%RMS		21.37		
GEH Total		0.8		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 7 – Washington Valley				
Count		5158		
Volume		5304		
Change		146		
%		103		
Correlation Coefficient		0.994		
%RMS		11.50		
GEH Total		2.0		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 8 – Moana				
Count		3098		
Volume		3074		
Change		-24		
%		99		
Correlation Coefficient		1.000		
%RMS		5.40		
GEH Total		0.4		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100

Morning Peak Network Screenline Validation				Table 45 Cont.
Screenline 9 – Moana				
Count		4257		
Volume		4149		
Change		-108		
%		97		
Correlation Coefficient		0.998		
%RMS		6.87		
GEH Total		1.7		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 10 – Main Road Stoke				
Count		1740		
Volume		1912		
Change		172		
%		110		
Correlation Coefficient		0.994		
%RMS		15.64		
GEH Total		4.0		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 11 – Tahunanui Dr (SH6)				
Count		2095		
Volume		1970		
Change		-125		
%		94		
Correlation Coefficient		1.000		
%RMS		14.28		
GEH Total		2.8		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 12 – Quarantine Rd				
Count		1372		
Volume		1378		
Change		6		
%		100		
Correlation Coefficient		0.999		
%RMS		5.17		
GEH Total		0.2		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100

Morning Peak Network Screenline Validation				Table 45 Cont.
Screenline 13 – Whakatu Dr / Nayland Rd / Main Road Stoke				
Count	4078			
Volume	4021			
Change	-57			
%	99			
Correlation Coefficient	0.997			
%RMS	5.12			
GEH Total	0.9			
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 14 – State Highway counts				
Count	9585			
Volume	9685			
Change	100			
%	101			
Correlation Coefficient	0.992			
%RMS	8.99			
GEH Total	1.0			
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 15 – Richmond spot counts				
Count	3505			
Volume	3438			
Change	-67			
%	98			
Correlation Coefficient	0.999			
%RMS	9.11			
GEH Total	1.1			
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 16 – All counts				
Count	36214			
Volume	36834			
Change	620			
%	102			
Correlation Coefficient	0.995			
%RMS	9.81			
GEH Total	3.2			
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	97.3	100	100	100

12.1.2 Inter Peak Validation

Inter Peak Network Screenline Validation				Table 46
Screenline 1 – Atawhai Dr				
Count		1169		
Volume		1253		
Change		84		
%		107		
Correlation Coefficient		0.991		
%RMS		30.46		
GEH Total		2.4		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	66.7	100	100	100
Screenline 2 – Maitai River				
Count		1263		
Volume		1234		
Change		-29		
%		98		
Correlation Coefficient		0.981		
%RMS		16.87		
GEH Total		0.8		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 3 – South CBD				
Count		1989		
Volume		2051		
Change		62		
%		103		
Correlation Coefficient		1.000		
%RMS		4.02		
GEH Total		1.4		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 4 – East CBD				
Count		968		
Volume		946		
Change		-22		
%		98		
Correlation Coefficient		0.932		
%RMS		15.49		
GEH Total		0.7		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100

Inter Peak Network Screenline Validation				Table 46 Cont.
Screenline 5 – CBD				
Count		1270		
Volume		1318		
Change		48		
%		104		
Correlation Coefficient		1.000		
%RMS		5.15		
GEH Total		1.3		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 6 – Waimea Rd				
Count		676		
Volume		586		
Change		-90		
%		87		
Correlation Coefficient		0.982		
%RMS		22.36		
GEH Total		3.6		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	75	100	100	100
Screenline 7 – Washington Valley				
Count		4870		
Volume		4629		
Change		-241		
%		95		
Correlation Coefficient		0.985		
%RMS		16.40		
GEH Total		3.5		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	87.5	87.5	100	100
Screenline 8 – Moana				
Count		2633		
Volume		2784		
Change		151		
%		106		
Correlation Coefficient		1.000		
%RMS		17.58		
GEH Total		2.9		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100

Inter Peak Network Screenline Validation				Table 46 Cont.
Screenline 9 – Moana				
Count		3847		
Volume		4022		
Change		175		
%		105		
Correlation Coefficient		0.997		
%RMS		9.93		
GEH Total		2.8		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 10 – Main Road Stoke				
Count		1344		
Volume		1215		
Change		-129		
%		90		
Correlation Coefficient		0.817		
%RMS		34.83		
GEH Total		3.6		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	75	87.5	100	100
Screenline 11 – Tahunanui Dr (SH6)				
Count		1892		
Volume		1878		
Change		-14		
%		99		
Correlation Coefficient		1.000		
%RMS		7.00		
GEH Total		0.3		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	75	100	100	100
Screenline 12 – Quarantine Rd				
Count		1346		
Volume		1448		
Change		102		
%		108		
Correlation Coefficient		0.249		
%RMS		22.95		
GEH Total		2.7		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	66.7	100	100	100

Inter Peak Network Screenline Validation				Table 46 Cont.
Screenline 13 – Whakatu Dr / Nayland Rd / Main Road Stoke				
Count		3567		
Volume		3430		
Change		-137		
%		96		
Correlation Coefficient		0.994		
%RMS		9.28		
GEH Total		2.3		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 14 – State Highway counts				
Count		7986		
Volume		8280		
Change		294		
%		104		
Correlation Coefficient		0.995		
%RMS		8.13		
GEH Total		3.3		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	91.7	100	100	100
Screenline 15– Richmond spot counts				
Count		2783		
Volume		2632		
Change		-151		
%		95		
Correlation Coefficient		0.997		
%RMS		13.02		
GEH Total		2.9		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	90.9	100	100	100
Screenline 16 – All counts				
Count		30397		
Volume		30233		
Change		-164		
%		99		
Correlation Coefficient		0.992		
%RMS		14.68		
GEH Total		0.9		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	89.0	97.3	100	100

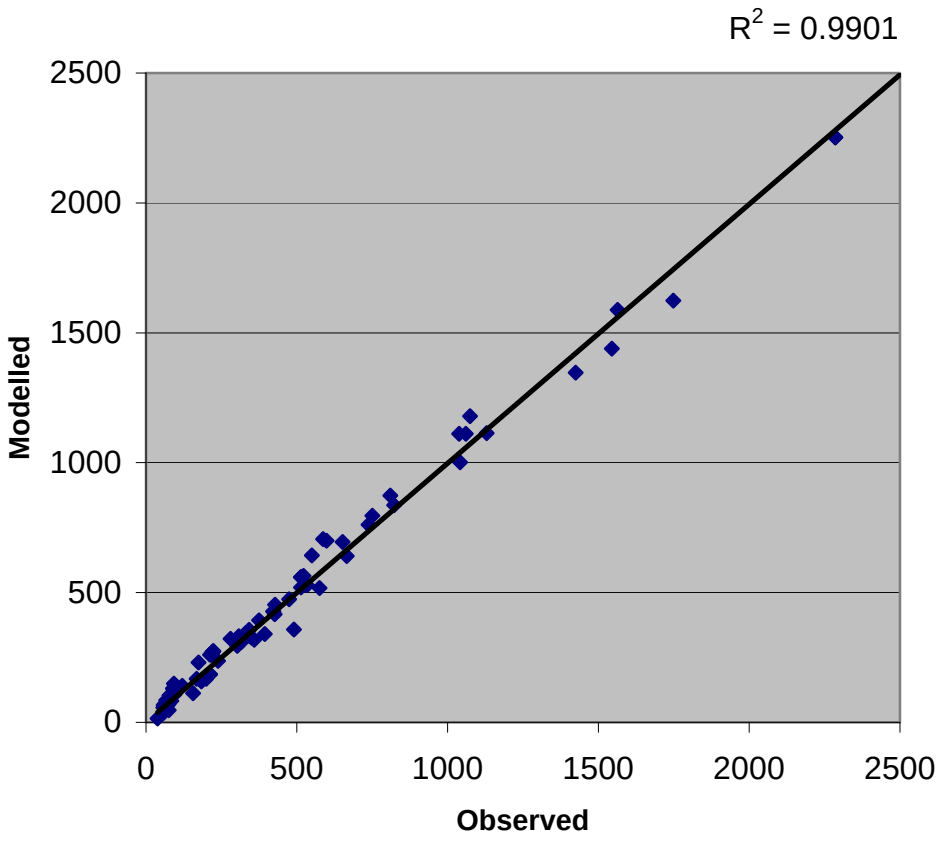
12.1.3 Evening Peak Validation

Evening Peak Network Screenline Validation				Table 47
Screenline 1 – Atawhai Dr				
Count		1659		
Volume		1788		
Change		129		
%		108		
Correlation Coefficient		1.000		
%RMS		9.81		
GEH Total		3.1		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 2 – Maitai River				
Count		1600		
Volume		1614		
Change		14		
%		101		
Correlation Coefficient		0.993		
%RMS		10.30		
GEH Total		0.3		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 3 – South CBD				
Count		2456		
Volume		2301		
Change		-155		
%		94		
Correlation Coefficient		0.998		
%RMS		15.47		
GEH Total		3.2		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 4 – East CBD				
Count		1188		
Volume		1150		
Change		-38		
%		97		
Correlation Coefficient		0.995		
%RMS		11.78		
GEH Total		1.1		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100

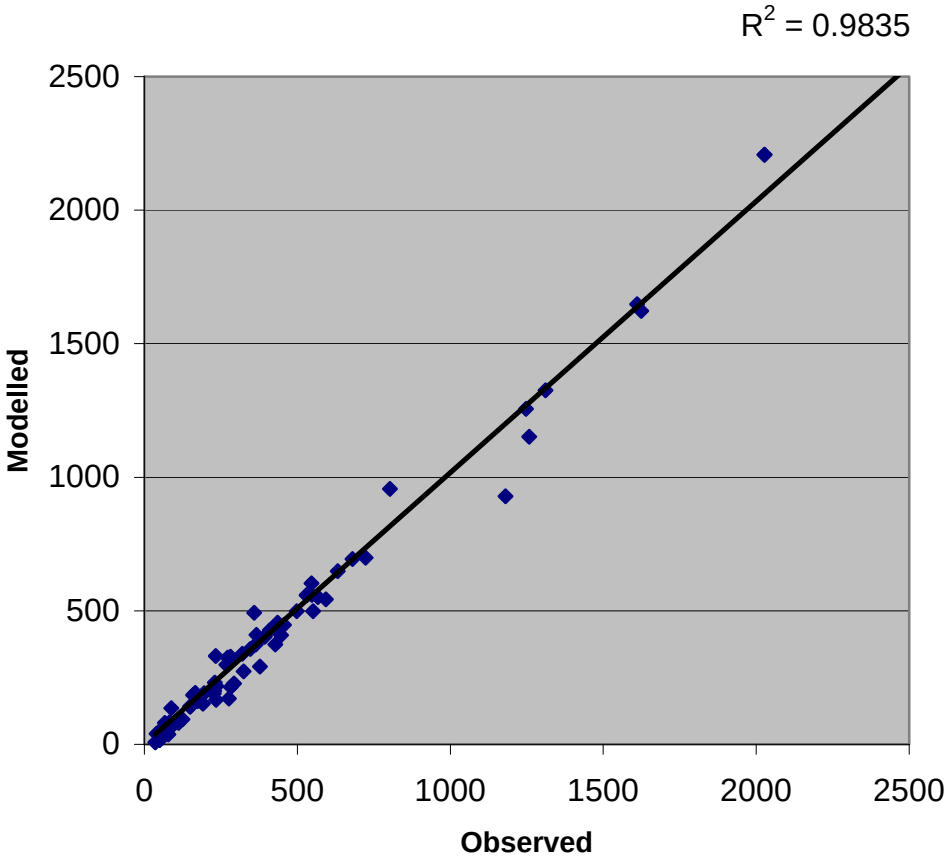
Evening Peak Network Screenline Validation				Table 47 Cont.
Screenline 5 – CBD				
Count		1330		
Volume		1407		
Change		77		
%		106		
Correlation Coefficient		0.984		
%RMS		9.61		
GEH Total		2.1		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 6 – Waimea Rd				
Count		854		
Volume		815		
Change		-39		
%		95		
Correlation Coefficient		0.976		
%RMS		24.24		
GEH Total		1.4		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 7 – Washington Valley				
Count		5686		
Volume		5767		
Change		81		
%		101		
Correlation Coefficient		0.999		
%RMS		7.15		
GEH Total		1.1		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 8 – Moana				
Count		3621		
Volume		3650		
Change		29		
%		101		
Correlation Coefficient		1.000		
%RMS		11.07		
GEH Total		0.5		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100

Evening Peak Network Screenline Validation				Table 47 Cont.
Screenline 9 – Moana				
Count		4707		
Volume		4879		
Change		172		
%		104		
Correlation Coefficient		1.000		
%RMS		8.09		
GEH Total		2.5		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 10 – Main Road Stoke				
Count		2089		
Volume		2116		
Change		27		
%		101		
Correlation Coefficient		0.965		
%RMS		15.06		
GEH Total		0.6		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 11 – Tahunanui Dr (SH6)				
Count		2215		
Volume		2256		
Change		41		
%		102		
Correlation Coefficient		1.000		
%RMS		9.64		
GEH Total		0.9		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 12 – Quarantine Rd				
Count		1293		
Volume		1345		
Change		52		
%		104		
Correlation Coefficient		0.996		
%RMS		8.67		
GEH Total		1.4		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100

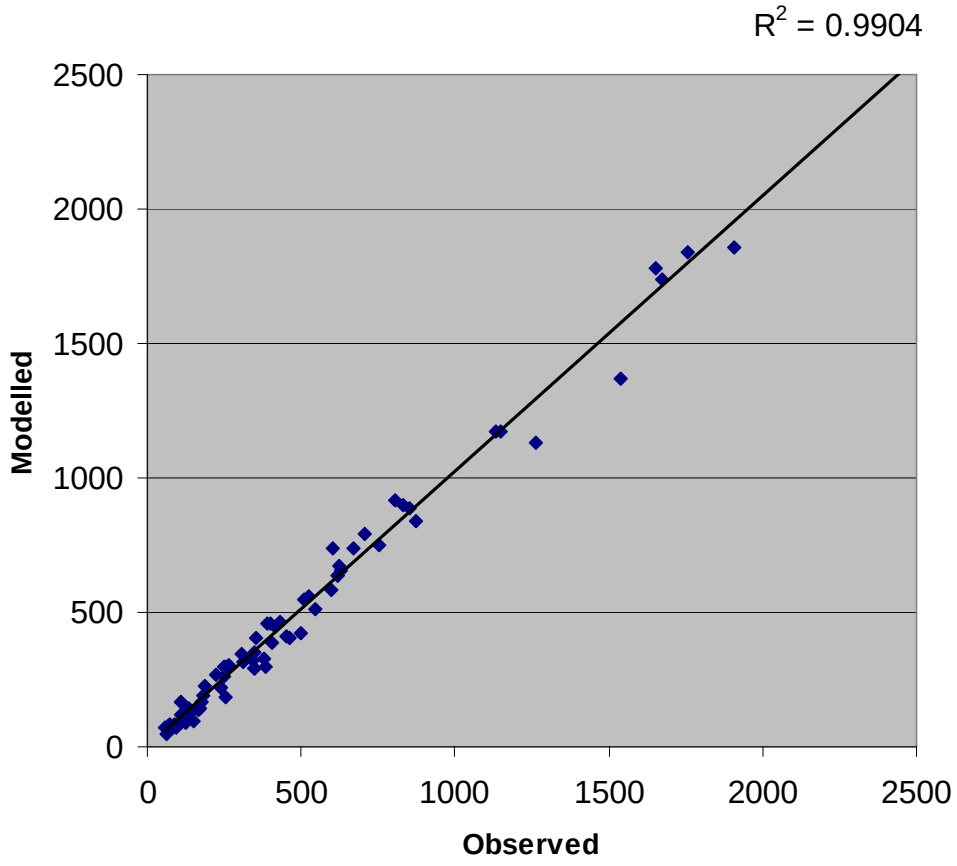
Evening Peak Network Screenline Validation				Table 47 Cont.
Screenline 13 – Whakatu Dr / Nayland Rd / Main Road Stoke				
Count		4670		
Volume		4654		
Change		-16		
%		100		
Correlation Coefficient		0.997		
%RMS		5.16		
GEH Total		0.2		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	100	100	100	100
Screenline 14 – State Highway counts				
Count		10586		
Volume		10941		
Change		355		
%		103		
Correlation Coefficient		0.989		
%RMS		9.65		
GEH Total		3.4		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	91.7	100	100	100
Screenline 15 – Richmond spot counts				
Count		3816		
Volume		3995		
Change		179		
%		105		
Correlation Coefficient		0.996		
%RMS		16.92		
GEH Total		2.9		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	90.6	100	100	100
Screenline 16 – All counts				
Count		39465		
Volume		40122		
Change		657		
%		102		
Correlation Coefficient		0.995		
%RMS		11		
GEH Total		3.3		
GEH Link Grouping	< 5	< 7	< 10	< 12
% in GEH Group	97.3	100	100	100



2006 Nelson-Tasman Transportation Model	**AM Screenline Scatterplots**	**Figure 24**
Gabites Porter		



2006 Nelson-Tasman Transportation Model	**INT Screenline Scatterplots**	**Figure 25**
Gabites Porter		



2006 Nelson-Tasman Transportation Model	**PM Screenline Scatterplots**	**Figure 26**
Gabites Porter		

12.2 Individual Link Validation

In addition to screenline validation as a whole, the PEM also requires that individual links within the screenlines are validated to the tolerances indicated in **Table 48.** This details the validation of the individual links within the true screenlines used in each of the three period models.

Individual Link Validation				Table 48
		Model % Compliance		
Individual Links (vpd)	**PEM**	**AMP Period**	**INT Period**	**PMP Period**
0-10,000	± 300	100%	100%	100%
10-20,000	± 400	100%	100%	100%
20-30,000	± 600	100%	100%	100%
30-50,000	± 750	N/A	N/A	N/A
50,000 +	± 1,000	N/A	N/A	N/A

12.3 Travel Time Validation

One of the primary uses of a transportation model is to compare the network operation of one roading scenario to another. To do this, travel times on the network and the corresponding vehicle operating costs are looked at. These then form an integral part of any economic assessment for benefit/cost analysis.

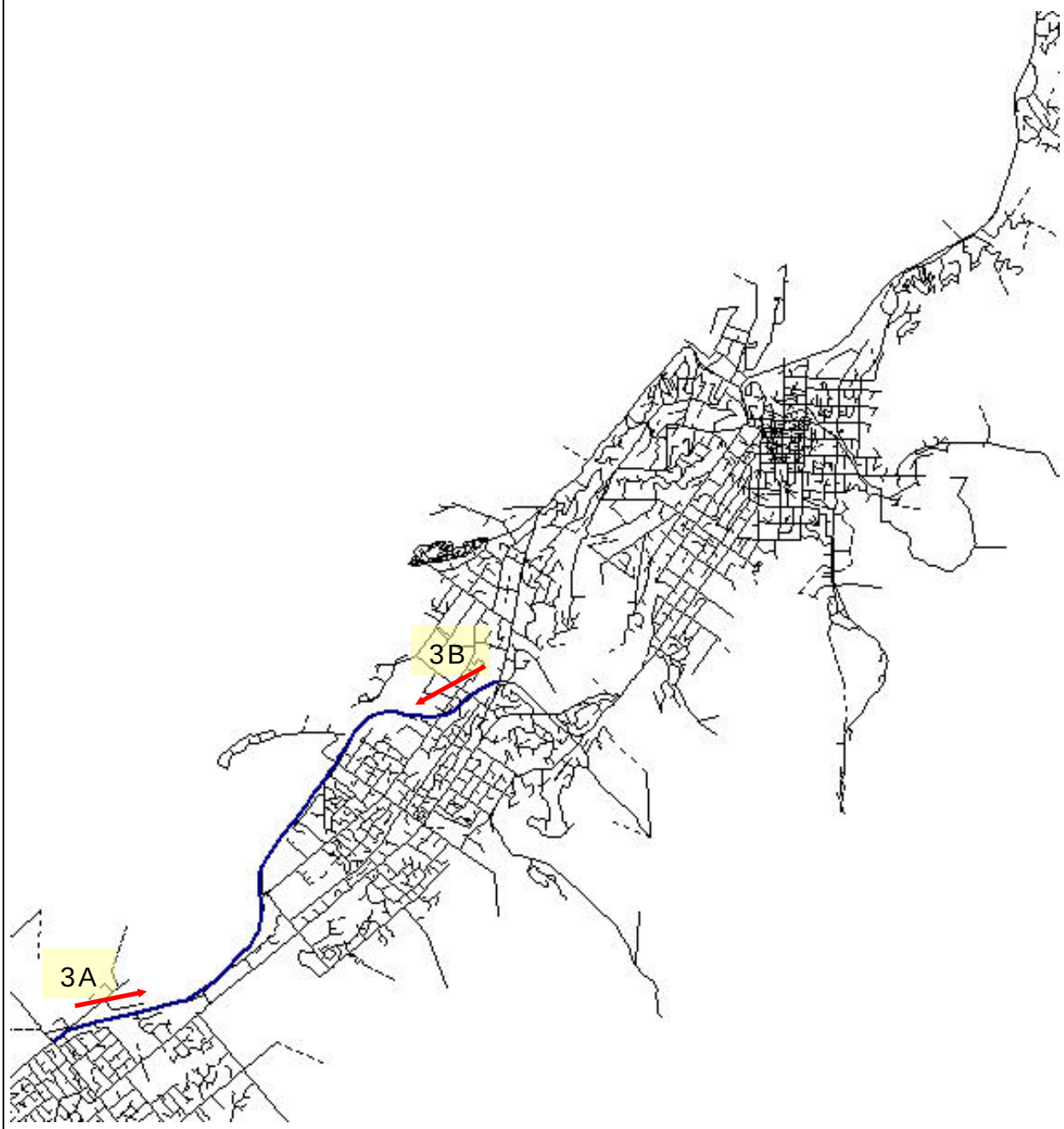
Hence, to have confidence in a model, it must realistically estimate the observed travel times on the road network. To validate this, surveys of the travel time for a vehicle over a set path or journey, taking into account both travel speed and delays at intersections, are performed. The resulting average speed over the journey is then compared to the modelled speed for the same journey. It must be remembered that the model is representing an "average weekday" situation. When surveying on any particular day there are many factors that may affect traffic flows such as accidents, weather, faulty traffic signals and road works. Hence surveyed values are in themselves only an approximation.

During the course of the study, extensive floating car travel time surveys were undertaken to establish vehicle speeds on the road network. Six routes were selected for the floating car travel time survey. Each route was surveyed between 13 and 25 times in 2006 by Nelson City Council. The vehicle travelled at a speed reflective of the average speed of the other vehicles and followed the general procedure for car following i.e. neutral regarding overtaking or being overtaken. This allowed the calculation of an average speed for each model period in each direction.

The routes are described in and illustrated in **Figure 27**, **Figure 28** and **Figure 29.**

2006 Nelson-Tasman Transportation Model	**Travel Time Survey Routes 1A and 1B**	**Figure 27**
Gabites Porter		

2006 Nelson-Tasman Transportation Model	**Travel Time Survey Routes 2A and 2B**	**Figure 28**
Gabites Porter		



2001 Nelson-Tasman Transportation Model	**Travel Time Survey Routes 3A and 3B**	**Figure 29**
Gabites Porter		

Table 49 shows the correlation between the surveyed and modelled travel times for each route.

Network Travel Times						Table 49
Route	**Distance (km)**	**95% Confidence Interval**				
		Mean (sec)	**Min (sec)**	**Max (sec)**	***Model (sec)***	***Within Criteria***
Route 1A (AM Peak)	5.9	543	458	652	471	ok
Route 1A (PM Peak)	5.9	498	449	648	450	ok
Route 1B (AM Peak)	5.9	470	438	504	446	ok
Route 1B (PM Peak)	5.9	553	358	951	483	ok
Route 2A (AM Peak)	5.1	515	358	951	507	ok
Route 2A (PM Peak)	5.1	366	341	392	401	too slow
Route 2B (AM Peak)	5.1	375	276	618	384	ok
Route 2B (PM Peak)	5.1	457	452	746	524	ok
Route 3A (AM Peak)	7.4	368	324	494	356	ok
Route 3A (PM Peak)	7.4	347	322	400	354	ok
Route 3B (AM Peak)	7.5	365	340	417	369	ok
Route 3B (PM Peak)	7.5	469	360	607	431	ok

It is clear from the results in the above table that nearly all of the routes are within 2-standard deviations of the surveyed means travel times. Routes 2A in the PM peak, which is outside the maximum limit, could not be improved as this would alter the other Route 2 routes and is therefore considered an optimal result.

12.4 Parking Validation Results

Section 5 of this report discusses the use of a Central Area Logistics Model (CALM) to redistribute vehicle trips destined to the parking spaces within Nelson CBD. It is therefore required that the model allocation of vehicles to parking spaces reflect that which occurs in reality.

The parking model is used for both the morning peak and shopping period models. The validation therefore is to match the number of parking spaces used at the end of each of those time periods, i.e, the parks used at 9am and 12 noon. Survey data is unavailable and has been used to validate onstreet and public offstreet parks. No private offstreet data was available so an occupancy rate of 85% has been assumed for all private parkings.

Table 50 shows the validation results for both models by comparing the model performance to survey results.

Parking Type Comparison — Table 50

Parking Type	Available Parking					
	9am			12pm		
	Surveyed	Modelled	Difference	Surveyed	Modelled	Difference
On Street Free	1604	1744	**+140**	1329	1440	**+111**
On Street Metered 60min	121	141	**+20**	14	127	**+113**
On Street Metered 120min	84	129	**+45**	53	95	**+42**
Pay & Display 180min	495	181	**-314**	15	53	**+38**
Pay & Display All Day	46	30	**-16**	42	13	**-29**
Off Street Private	506	477	**-29**	506	361	**-147**
Total	**2856**	**2702**	**-154**	**1959**	**2089**	**+130**

The model cannot achieve 100% accuracy but it can be seen that it does reflect the majority of parking demand reasonably well.

12.4.1 The Parking Occupancy

The parking occupancy has been analysed by parking type to show which types have greatest demand. **Table 51** summarises the parking occupancies for the parking periods in each town for 2006 separately.

Parking Occupancy Comparison — **Table 51**

Parking Type	Inventory	Parking Occupied					
		9am			12pm		
		Surveyed	Modelled	Difference	Surveyed	Modelled	Difference
On Street Free	**4367**	63%	60%	**-3%**	70%	67%	**-3%**
On Street Metered 60min	**180**	33%	22%	**-11%**	92%	29%	**-63%**
On Street Metered 120min	**204**	59%	37%	**-22%**	74%	53%	**-21%**
Pay & Display 180min	**750**	34%	76%	**+42%**	98%	93%	**-5%**
Pay & Display All Day	**145**	68%	79%	**+11%**	71%	91%	**+20%**
Off Street Private	**3372**	85%	86%	**+1%**	85%	89%	**+4%**
Total	**9018**	**68%**	**70%**	**+2%**	**78%**	**77%**	**-1%**

13. TRAFFIC RESULTS

Some key outputs of the transport model are summarised below to give a brief overview of traffic activity in the Nelson-Tasman Model. The indicators are as follows:

- Vehicle kms (TKM) is a measure of vehicle kilometres travelled for all road vehicles considered in this study. It is derived by multiplying vehicle trips by the distance travelled by each vehicle. The Ministry for the Environment uses TKM as a direct indicator of the pressure from road transport on the environment and as a basis for the calculation of vehicle emissions when combined with levels of service;

- Link Vehicle Minutes (TVM) is an aggregate measure of how long people are spending travelling in their cars along links. It does not include time spent by vehicles waiting at intersections. It is derived by multiplying vehicle trips by the time taken from origin to destination for each vehicle trip.

- Total Vehicle Trips is a measure how many trips are being made by people in vehicles each model period.

- Link Mean Running Speed is a measure of the average speed of vehicles travelling along a link. It does not take into account delays encountered by vehicles at intersections.

- Vehicles subject to intersection delay is a measure of how many vehicles experience any kind of delay at intersections. It is used to help calculate the average intersection delay per vehicle across the whole network.

- Total intersection vehicle delay in minutes is a measure of the total amount of intersection delay experience by all vehicles on the network. It is used to help calculate the average intersection delay per vehicle across the whole network.

- Intersection Delay per Vehicle is a measure of average delay experience by all vehicles at all intersections. This indicator provides a way to measure vehicle conflicts. As the number of vehicles increase on a network the number of gaps available to vehicles wanting make a conflicting movement are reduced which leads to increased delay.

- Network Total Vehicle Minutes is a measure of the total amount of time vehicles spend on the network. This includes time spent waiting at intersections.

- Network Mean Network Speed is a measure of the average speed of vehicles travelling through the network. It includes delays experienced by vehicles at intersections.

- Average Trip Distance is a measure of the length of each vehicle trip. It is derived from trip 'length' and 'trip' matrices. This has been used as an indicator of the level of urban spread in Tasman-Nelson as it means people locating their trip origins further from their trip destinations e.g. people are living further from their work and shopping places.

- Average Trip Minutes is closely related to Average Trip Distances in that the greater the trip distance the greater amount of time spent on the trip.

Network Wide Traffic Activity Indicators for 2006			Table 52
Traffic Activity Indicator	**AM Peak Hr**	**Interpeak Hr**	**PM Peak Hr**
Vehicle kms	171551	146840	191396
Link Vehicle Minutes	183954	141922	206054
Link Mean Running Speed (kph)	56.0	62.1	55.7
Vehicles subject to Intersection Delay	313161	270902	361767
Total Vehicle Intersection Delay (min)	23207	19284	27779
Intersection Delay per Vehicle (sec)	4.4	4.3	4.6
Total Vehicle Trips	24649	20832	26256
Vehicle Trips (excluding intrazonals)	22245	18094	23637
Average Trip Distance in kms	6.97	6.86	7.3
Average Trip Time in Minutes	8.40	8.01	8.89

14. CONCLUSION

The 2006 Nelson-Tasman 3-Step Transportation Model:

- Has been developed using TRACKS, which is the proprietary land use and transport planning software developed, maintained and marketed by Transportation and Traffic Systems Ltd.
- The study area covered the Nelson City and Tasman District urban areas. From Hira in the east, to Tophouse in the South, and Motueka in the west.
- Comprises three discrete models covering an average weekday: Morning Peak 0700 to 0900; Inter Peak 0900 to 1600; and Evening Peak 1600 to 1800;
- Includes trips made by private and commercial vehicles; and
- Has followed these stages of development: vehicle driver trip generation, distribution and assignment.

The model has been validated to the levels required by the Transfund NZ Project Evaluation Manual guidelines for overall validation and travel time validation, with the exception of a select few CBD counts which may be remedied by the inclusion of a CBD parking model.

This model has been created specifically for this study and is fully capable of any demand on it of strategic nature. However, additional local validation checks, including intersection movement validation, should be undertaken for any future detailed project analysis involving Transfund Funding.

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6. Land Transport Safety Authority. 2000. *Travel Survey Report – Increasing our understanding of New Zealanders' travel behaviour- 1997/1998*. Wellington, New Zealand.

APPENDICES

1. **Zone To Census Lookup Table**
2. **Zone Data File**
3. **Screenline Validation Outputs**

Appendix 1

Zone	Meshblock	Zone	Meshblock	Zone	Meshblock	Zone	Meshblock
1	2319700	43	2319100	85	2320800	127	2320600
2	2319700	44	2319000	86	2320800	128	2320500
3	2319700	45	2319000	87	2320700	129	2320400
4	2319700	46	2319000	88	2320700	130	2320300
5	2319700	47	2319000	89	2320700	131	2320200
6	2320300	48	2319000	90	2319200	132	2320100
7	2320300	49	2319000	91	2317300	133	2319100
8	2320300	50	2318900	92	2317200	134	2317300
9	2320300	51	2318900	93	2317100	135	2317200
10	2320300	52	2318900	94	2316900	136	2317600
11	2320300	53	2318900	95	2316900	137	2317700
12	2320300	54	2319400	96	2318900	138	2318300
13	2320300	55	2319400	97	2318900	139	2318400
14	2320300	56	2319400	98	2327300	140	2323700
15	2320200	57	2319300	99	2331500	141	2321500
16	2320200	58	2319400	100	2331600	142	2323600
17	2320200	59	2319400	101	2331700	143	2323500
18	2320200	60	2331800	102	2331900	144	2322100
19	2319600	61	2319800	103	2322700	145	2322000
20	2319600	62	2320000	104	2322800	146	2321900
21	2319600	63	2319800	105	2322900	147	2321800
22	2319600	64	2319900	106	2317800	148	2321700
23	2319500	65	2321600	107	2318700	149	2319900
24	2319500	66	2321700	108		150	2319800
25	2319500	67	2321800	109		151	2320000
26	2319500	68	2321900	110		152	2319700
27	2320100	69	2320600	111	2320700	153	2319600
28	2320100	70	2320600	112	2318700	154	2319500
29	2320100	71	2320600	113	2320800	155	2319000
30	2320100	72	2320400	114	2323200	156	2316900
31	2320100	73	2320400	115	2321100	157	2317100
32	2320100	74	2320500	116	2318800	158	2317500
33	2320100	75	2320500	117	2319200	159	2318200
34	2320100	76	2322200	118	2317800	160	2323900
35	2319600	77	2322200	119	2318500	161	2323800
36	2319600	78	2322000	120	2318600	162	2322200
37	2319600	79	2322100	121	2323400	163	2332500
38	2319600	80	2320900	122	2321400	164	2322900
39	2319100	81	2321000	123	2321300	165	2322800
40	2319100	82	2320800	124	2323300	166	2322700
41	2319100	83	2320800	125	2321000	167	2318900
42	2319100	84	2320800	126	2320900	168	2319300
169	2319400	209	2326900	252	2330600	296	2336002
170	2331800	210	2326600	253	2330700	297	2336001
171	2321600	211	2326500	254	2331200	298	2337600
172	2322300	212	2325202	255	2331100	299	2335500
173	2322500	213	2325400	256	2331001	300	2335602
174	2326700	214	2325300	256	2331002	301	2335603
175	2326801	215	2325900	257	2330800	302	2338300
175	2326802	216	2326400	258	2330900	303	2338400
176	2327001	217	2325000	259	2329000	304	2338200
176	2327002	218	2325500	260	2328900	305	2338000
177	2327300	219	2325700	261	2328600	306	2338100
178	2331500	220	2325800	262	2328700	307	2337700
179	2331600	221	2325600	263	2328500	308	2337900

Zone	Meshblock	Zone	Meshblock	Zone	Meshblock	Zone	Meshblock
180	2331700	222	2326002	264	2334900	309	2336801
181	2331900	223	2326300	265	2334800	310	2337100
182	2332400	224	2326100	266	2333100	311	2337000
183	2332300	225	2326200	267	2333400	312	2336900
184	2322400	226	2327803	268	2333700	313	2337400
185	2323000	226	2327804	269	2335000	314	2337302
186	2332600	226	2327805	270	2335200	315	2337200
187	2324100	227	2327802	271	2335301	316	2336803
188	2324200	228	2327900	272	2335302	316	2336804
189	2332701	229	2328000	273	2328801	316	2336805
190	2323100	230	2329100	274	2328802	316	2336806
191	2322600	231	2330100	275	2335604	317	2336602
192	2324700	232	2330000	276	2331300	318	2336601
193	2324900	233	2330200	277	2331401	319	2337301
194	2324600	234	2329900	278	2331403	320	2336701
195	2324500	235	2329800	279	2331402	321	2336702
196	2324400	236	2324800	280	2333300	322	2337800
197	2330300	237	2334300	281	2333200	323	2338600
198	2330400	238	2334400	282	2334200	324	2338500
199	2330500	239	2334500	283	2333500	325	2340301
200	2332200	240	2334600	284	2334100	325	2340302
201	2332100	241	2334700	285	2333600	326	2336400
202	2332000	242	2328100	286	2333800	327	2336500
203	2327700	243	2328200	287	2334000	328	2340500
204	2327601	244	2328300	288	2333900	329	2340400
204	2327602	245	2328400	289	2335100	330	2340600
204	2327603	246	2329200	290	2335400	331	2338700
204	2327604	247	2329300	291	2335601	332	2338800
205	2327500	248	2329400	292	2335900	333	2338900
206	2327400	249	2329500	293	2335801	334	2339100
207	2327100	250	2329600	294	2335802	335	2339200
208	2327200	251	2329700	295	2335803	336	2339300
337	2339900	374	2342400	416	2362100	461	2364600
338	2340000	375	2342100	417	2361900	462	2364700
339	2339800	376	2342300	418	2363000	463	2365704
340	2339600	377	2343702	419	2361800	464	2365705
341	2339400	378	2343800	420	2361500	465	2364000
342	2340100	379	2343900	421	2361200	466	2364300
343	2339700	380	2343500	422	2361400	467	2364500
344	2339500	381	2344000	423	2361300	468	2364900
345	2339000	382	2343600	424	2361700	469	2364800
346	2342700	383	2344100	425	2361600	470	2365100
347	2341000	384	2344200	426	2362000	471	2365002
348	2340700	385	2344600	427	2362200	472	2365001
349	2340801	386	2342600	428	2362300	473	2365707
350	2340802	387	2342500	429	2362400	474	2365708
351	2340900	388	2359601	430	2362500	475	2365709
352	2340803	389	2359603	431	2362900	476	2365710
353	2341100	390	2359604	432	2363600	477	2365711
354	2341200	391	2344500	433	2363700	478	2365712
355	2341300	392	2344300	434	2363800	480	2360100
356	2341400	393	2344400	435	2366405	480	2360200
357	2341500	394	2359706	436	2366403	480	2360300
358	2341600	395	2359704	437	2366404	482	2360400
359	2341700	396	2359710	438	2366106	483	2315400
360	2342800	397	2359709	439	2366104	484	2315500

Zone	Meshblock	Zone	Meshblock	Zone	Meshblock	Zone	Meshblock
361	2342900	398	2359708	440	2366110	485	2315600
362	2343000	399	2359707	441	2366109	486	2315700
363	2343100	400	2359605	442	2366103	487	2315800
364	2343400	401	2365400	443	2366107	488	2315901
365	2343300	402	2361100	444	2366202	488	2315902
366	2343200	403	2363101	445	2366108	489	2316001
367	2343701	403	2363102	446	2366201	490	2316100
368	2342200	404	2363204	447	2366203	491	2316200
369	2342000	404	2363205	448	2366301	492	2316300
370	2341800	405	2363203	449	2366306	493	2316400
371	2341900	406	2363301	450	2366305	494	2316501
372	2359504	407	2363206	451	2366304	494	2316502
372	2359505	407	2363207	452	2365714	494	2316503
372	2359506	408	2363302	453	2365703	495	2360501
372	2359507	409	2363902	454	2365800	496	2316600
372	2359508	410	2363901	455	2365900	497	2360604
372	2359509	411	2363500	456	2366000	498	2316700
373	2359510	412	2363400	457	2364100	499	2360605
373	2359511	413	2362800	458	2364200	500	2316802
373	2359512	414	2362700	459	2364400	501	2316803
373	2359513	415	2362600	460	2365200	502	2325201
503	2325100	538	2359404	580	2367302	583	2376900
504	2316002	539	2359407	580	2367400	583	2377000
505	2316804	540	2359501	580	2367500	583	2377100
506	2318100	543	2365300	580	2367700	583	2377200
507	2318000	546	2357202	580	2367800	583	2377300
508	2317900	547	2357300	580	2367900	583	2377400
509	2317400	548	2357400	580	2368000	583	2377500
510	2317000	549	2365501	580	2368100	583	2377600
511	2321200	549	2365502	580	2368200	583	2377700
513	2360502	550	2365600	580	2368300	584	2377800
513	2360603	551	2365713	580	2368400	584	2377901
514	2324000	552	2366303	580	2368500	584	2377902
515	2324300	553	2366401	580	2368600	584	2377903
516	2332702	554	2359402	580	2368700	584	2378000
517	2332801	554	2360003	580	2368800	584	2378101
517	2332802	556	2360001	580	2368901	584	2378102
518	2326001	556	2360002	580	2368902	584	2378201
518	2332901	557	2359300	580	2369000	584	2378202
519	2333000	558	2357101	580	2369100	584	2378300
520	2335701	558	2357102	580	2369200	584	2378400
520	2335702	558	2357103	580	2369300	584	2378500
520	2335703	559	2357201	580	2369400	584	2378700
520	2335704	560	2357500	580	2369500	584	2378800
521	2336103	561	2357600	580	2369700	584	2378900
523	2336201	562	2358200	581	2367303	584	2379000
524	2336300	563	2358001	581	2367304	584	2379100
525	2336104	564	2358002	581	2369600	584	2379200
525	2336202	565	2357900	581	2369800	584	2379300
525	2359406	566	2357800	581	2370000	584	2379400
525	2359408	567	2359100	582	2369900	584	2379500
525	2359409	568	2359000	582	2370602	584	2379600
526	2336105	569	2358900	582	2370700	584	2380500
526	2336106	570	2358800	582	2370800	586	2372600
527	2359903	571	2358700	582	2378600	586	2372801
528	2359904	572	2358600	582	2379700	586	2372802
529	2337500	573	2358100	583	2370500	586	2372803

Zone	Meshblock	Zone	Meshblock	Zone	Meshblock	Zone	Meshblock
530	2359905	574	2358300	583	2370601	586	2372804
531	2340201	575	2358400	583	2376300	586	2379800
531	2340202	576	2358501	583	2376400	586	2379900
531	2340203	577	2359201	583	2376500	586	2380000
532	2360602	578	2358502	583	2376600	586	2380100
534	2359800	579	2359202	583	2376701	586	2380200
535	2359906	580	2367100	583	2376702	586	2380300
536	2359702	580	2367201	583	2376801	586	2380400
537	2359703	580	2367202	583	2376802	589	2370900
589	2371000	599	2352500	606	2352300	613	2375800
589	2371100	599	2352600	606	2356500	614	2375600
590	2371200	600	2351600	607	2352700	614	2376101
590	2371800	589	2371000	607	2356600	615	2374700
590	2371900	600	2351700	607	2356800	615	2374800
591	2372700	600	2351800	608	2356700	615	2375900
591	2372900	600	2351900	609	2355301	615	2376000
591	2373000	601	2351400	609	2355303	616	2375400
591	2373100	601	2352000	609	2355304	616	2376102
592	2371300	601	2352100	609	2355305	616	2376201
592	2371400	601	2352200	609	2355400	616	2376202
592	2371500	602	2350705	609	2355800	617	2374901
593	2373200	602	2350800	609	2356900	617	2374902
593	2373300	602	2350900	609	2357000	617	2375001
593	2373501	602	2351100	610	2355500	617	2375002
593	2373502	602	2351200	610	2355601	618	2353700
593	2373600	602	2351300	610	2355602	618	2353800
593	2373800	602	2351500	610	2355701	618	2353900
593	2373900	603	2350000	610	2355702	619	2353200
593	2374000	603	2350100	610	2355703	619	2353300
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593	2374200	603	2350301	610	2356200	619	2353500
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594	2373400	603	2350306	611	2354102	619	2354802
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595	2372000	603	2350308	611	2354200	620	2354900
595	2372100	603	2350400	611	2354300	620	2355000
595	2372200	603	2350500	611	2354400	620	2355100
595	2372301	603	2350601	611	2354500	620	2356100
595	2372500	603	2350602	611	2354600	621	2356300
596	2370100	603	2350701	611	2354702	622	2355202
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596	2372302	604	2357701	612	2352900	623	2375203
596	2372401	604	2357704	612	2353000	624	2375301
596	2372402	604	2357705	612	2353100	624	2375302
597	2370400	605	2351000	613	2374400	624	2382900
597	2375500	605	2356401	613	2374500		
598	2374300	605	2356402	613	2374600		
599	2352400	605	2357703	613	2375700		

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\ZONEDTV5.20
NELSON 2006 LANDUSE
ZONE06.DAT
 650
Persons/HH
Cars/HH
1  Households
2  AGRI. JOBS
3  MANUFACTURING JOBS
4  WHOLESALE JOBS
5  RETAIL JOBS
6  OFFICE JOBS
7  EDUCATION JOBS
8  COMMUNITY JOBS
9  TOTAL JOBS
10 PORT RESIDUAL HGVINBOUN D TRIPS(ALLDA Y)
11 SCHOOL ROLL
12 TERTIARY ROLL
13 INDUSTRIAL
14 EXTERNAL AM LIT INBOUND (1HR)
15 EXTERNAL AM LIT OUTBOUND(1HR)
16 EXTERNAL INT LIT INBOUND(1HR)
17 EXTERNAL INT LIT OUTBOUND (1HR)
18 EXTERNAL PM LIT INBOUND (1HR)
19 EXTERNAL PM LIT OUTBOUND(1HR)
20 EXTERNAL AM HGV INBOUND (1HR)
21 EXTERNAL AM HGV OUTBOUND(1HR)
22 EXTERNAL INT HGV INBOUND(1HR)
23 EXTERNAL INT HGV OUTBOUND (1HR)
24 EXTERNAL PM HGV INBOUND (1HR)
25 EXTERNAL PM HGV OUTBOUND(1HR)
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0
   2        0      0      0      0      0      0      0      0      0      0      0
   3        0      0      0      0      0      0      0      0      0      0      0
   4        0      0      0      0      0      0      0      0      0      0      0
   5        0      0      0      0      0      0      0      0      0      0      0
   6        0      0      0      3     39     19    246    210      0     80    742             0
0
   7        0      0      0      0      0      0      0      0      0      0      0
   8        0      0      0      0      0      0      0      0      0      0      0
   9        0      0      0      0      0      0      0      0      0      0      0
  10        0      0      0      0      0      0      0      0      0      0      0
  11        0      0      0      0      0      0      0      0      0      0      0
  12        0      0      0      0      0      0      0      0      0      0      0
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  14        0      0      0      0      0      0      0      0      0      0      0
  15        0      0      0      3      3     12     56     65      0     41    210             0
0
  16        0      0      0      0      0      0      0      0      0      0      0
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  25        0      0      0      0      0      0      0      0      0      0      0
  26        0      0      0      0      6      0     28    235      0      3    290             0
0
  27        0      0      0      0      0      0      0      0      0      0      0
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  32        0      0      0      0     19      0     32    225      0    120    398             0
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  33        0      0      0      0      0      0      0      0      0      0      0
  34        0      0      0      0      0      0      0      0      0      0      0
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  37        0      0      0      0    127     16     98    153      0     16    440             0
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  38        0      0      0      0      0      0      0      0      0      0      0
  39        0      0      0      0      0      3     41     28      0     45    124             0
0
  40        0      0      0      0      0      0      0      0      0      0      0
  41        0      0      0      0      0      0      0      0      0      0      0
  42        0      0      0      0      0      0      0      0      0      0      0
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49	0	0	0	3	0	15	193	106	0	35	354	0
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53	0	0	0	0	0	0	0	0	0	0	0	
54	0	0	0	0	23	22	103	6	0	16	178	0
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56	0	0	0	0	0	0	0	0	0	0	0	
57	0	0	0	0	6	58	56	39	0	99	293	0
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59	0	0	0	0	0	0	0	0	0	0	0	
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18												
63	0	0	0	0	0	0	0	0	0	0	0	
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25												
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71	0	0	0	0	0	3	3	64	12	76	152	0
76												
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77	0	0	0	0	0	0	0	3	53	143	150	352
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79	0	0	0	1	1	1	2	2	0	1	12	0
0												
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1261												
81	0	0	0	2	4	2	4	6	0	5	33	0
0												
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83	0	0	0	0	3	12	16	120	8	237	425	0
55												
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89	0	0	0	0	0	0	0	0	0	0	0	
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0												
91	0	0	0	0	0	0	0	30	0	6	48	0
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92	0	0	0	2	4	2	4	6	0	5	30	0
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96	0	0	0	7	0	6	0	16	0	16	45	0
0												
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99	0	0	0	0	60	22	42	127	0	90	442	0
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102	0	0	0	0	0	0	0	0	0	0	3	0
103	0	0	0	1	1	1	2	2	0	1	12	0
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109	0	0	0	0	0	0	0	0	0	0	0	
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111	2.167	1.944	18	0	0	0	0	0	0	0	0	
112	2.955	1.167	66	0	0	0	0	0	0	0	0	
113	2.667	1.667	9	0	0	0	0	0	0	0	0	
114	2.667	1.667	9	0	0	0	6	3	5	5	18	32
115	2.077	1.051	39	1	1	1	1	1	0	1	8	0
116	1.727	1.242	33	1	1	1	1	1	0	1	9	0
117	2	1.667	3	0	0	0	0	0	0	0	0	
118	2.167	1.2	90	0	0	0	0	0	0	0	0	
119	3.222	1.136	81	0	0	0	18	3	0	77	102	0
120	2.143	0.952	63	0	1	0	1	1	0	1	6	0
121	2.545	1.606	33	0	1	0	1	1	0	1	6	0
122	2.516	1.097	93	1	2	1	2	4	0	2	15	0
123	2.222	1.519	27	0	0	0	0	0	0	0	3	0
124	1.958	1.153	72	1	1	1	2	2	0	1	12	0
125	2.385	0.923	39	0	0	0	0	0	0	0	0	
126	1.5	0.5	18	0	0	0	0	0	0	0	0	
127	3	0	0	0	0	0	0	0	0	0	0	
128	2	1.667	3	0	0	0	0	0	0	0	0	
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130	3	1.667	6	0	0	0	0	0	0	0	0	
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133	2	1.667	9	0	0	0	0	0	0	0	0	
134	2.667	1.667	9	0	0	0	0	0	0	0	0	
135	2.296	1.37	81	0	0	0	0	0	0	0	0	
136	2.143	1.143	42	2	3	2	3	6	0	4	27	0
137	2.238	1.222	63	1	1	1	1	1	0	1	9	0
138	2.304	1.261	69	2	3	1	3	5	0	4	20	0
139	2.533	1.467	45	1	1	1	2	2	0	1	12	0
140	2.429	1.548	42	1	1	1	2	2	0	1	12	0
141	2.643	1.786	42	1	1	1	2	2	0	1	12	0
142	2.5	1.438	48	1	2	1	2	4	0	2	15	0
143	2.3	1.2	30	0	1	0	1	1	0	1	6	0
144	1.923	1.205	39	0	0	0	0	0	0	0	0	
145	2	1.367	30	0	0	0	0	0	0	0	0	
146	2.571	1.476	63	0	0	0	0	0	0	0	0	
147	2.2	1.444	45	0	0	0	0	0	0	0	0	
148	2.4	1	15	0	0	0	0	0	0	0	0	
149	2.067	1.311	45	0	0	0	0	0	0	0	0	
150	4	1.667	3	0	0	0	0	0	0	0	0	
151	0	0	0	0	0	0	0	0	0	0	0	
152	9	1.667	3	0	0	0	0	0	0	0	0	
153	3	0	0	0	0	0	0	0	0	0	0	
154	0	0	0	0	0	0	0	0	0	0	0	
155	0	0	0	0	0	0	0	0	0	0	0	
156	1.833	1.611	18	0	0	0	0	0	0	0	0	
157	2.222	1.259	54	0	0	0	0	0	0	0	0	
158	2.148	1.21	81	2	3	2	3	6	0	4	27	0
159	2.143	1.071	42	1	1	1	2	2	0	1	12	0
160	2.545	1.697	33	1	1	1	2	2	0	1	12	0

161	2.5	1.583	24	0	0	0	0	0	0	0	3	0
0												
162	2.818	1.697	33	0	0	0	0	0	0	0	0	
163	2.667	1.578	45	1	1	1	1	1	0	1	8	0
0												
164	3.154	1.846	39	0	0	0	0	0	0	0	0	
165	2.611	1.704	54	0	0	0	0	0	0	0	0	
166	2.714	1.548	42	0	0	0	0	0	0	0	0	
167	1	1.667	3	0	0	0	0	0	0	0	0	
168	9	0	0	0	0	0	0	0	0	0	0	
169	6	0	0	0	0	0	0	0	0	0	0	
170	3.333	1	18	0	0	0	0	0	0	0	0	
171	2.125	0.875	24	0	0	0	0	0	0	0	0	
172	2.571	1.524	21	2	3	1	3	5	0	4	20	0
0												
173	2.045	1.121	66	2	4	2	4	6	0	5	33	0
0												
174	2.8	1.567	30	0	0	10	35	0	17	17	63	113
0												
175	2.333	1.444	27	2	4	2	4	7	0	5	33	0
0												
176	2.333	1.25	36	2	3	1	3	5	0	4	21	0
0												
177	2.313	1.167	48	0	0	0	0	0	0	0	0	
178	2	1.667	12	0	0	0	0	0	0	0	0	
179	2.9	1.367	30	0	0	0	0	0	0	0	0	
180	2.833	1.611	18	0	0	0	0	0	0	0	0	
181	2.857	1.524	21	0	0	0	0	0	0	0	0	
182	3.143	1.857	21	0	1	0	1	1	0	1	6	0
0												
183	2.765	1.647	51	1	1	1	1	1	0	1	8	0
0												
184	2.647	1.294	51	0	5	0	8	3	0	23	68	0
0												
185	2.632	1.895	57	2	3	2	3	6	0	4	26	0
0												
186	2.536	1.488	84	2	3	1	3	5	0	4	23	0
0												
187	2.565	1.435	69	2	3	1	3	5	0	4	20	0
0												
188	2.393	1.56	84	1	1	1	1	1	0	1	9	0
0												
189	2.303	1.333	99	1	1	1	1	1	0	1	8	0
0												
190	3	1.922	51	1	2	1	2	4	0	2	15	0
0												
191	3	1.6	45	1	2	1	2	4	61	64	79	403
0												
192	3.333	2.222	27	1	1	1	1	1	0	1	8	0
0												
193	2	1.667	3	0	0	0	0	0	0	16	21	0
0												
194	14	1.667	3	2	4	2	4	6	165	170	198	1089
0												
195	7	1.667	3	0	0	0	0	0	0	0	3	0
0												
196	1.882	0.98	51	0	0	0	0	9	0	62	88	0
0												
197	2.917	1.889	36	0	0	0	45	0	0	6	51	0
0												
198	2.615	1.513	39	1	1	1	2	2	0	1	12	0
0												
199	2.895	1.667	57	1	1	1	1	1	0	1	9	0
0												
200	2.417	1.472	36	0	1	0	1	1	0	1	6	0
0												
201	2.647	1.627	51	1	1	1	2	2	0	1	12	0
0												
202	2.636	1.424	33	0	76	28	120	16	0	3	275	0
0												
203	2.556	1	27	1	1	1	1	1	0	1	9	0
0												
204	2.61	1.249	177	0	0	0	0	0	0	0	10	0
0												
205	2.455	1.576	66	1	1	1	2	2	0	1	12	0
0												
206	2.857	1.405	42	0	0	0	0	0	0	0	3	0
0												
207	2.733	1.267	45	1	1	1	2	2	0	1	12	0
0												
208	2.417	1.389	36	0	1	0	1	1	0	1	6	0
0												
209	2.406	1.365	96	0	1	0	1	1	0	1	6	0
0												
210	2.556	1.481	54	2	4	2	4	6	0	5	33	0
0												
211	2.182	1.182	33	0	1	0	1	1	0	1	6	0
0												

212	1.962	1.423	78	3	19	0	16	12	0	0	57	0
0												
213	2.174	1.681	69	1	2	1	2	4	0	2	15	0
0												
214	2.412	1.824	51	0	1	0	1	1	0	1	6	0
0												
215	2.667	1.4	45	1	1	1	1	1	0	1	9	0
0												
216	2.478	1.116	69	0	0	0	0	0	0	0	0	0
0												
217	6	0	0	7	29	19	10	3	0	3	92	0
0												
218	1.938	1.229	48	0	0	0	0	34	0	3	67	0
0												
219	2.231	1.846	39	1	1	1	2	2	0	1	12	0
0												
220	2.778	1.556	27	0	0	0	0	0	0	0	0	0
0												
221	2.125	1.979	48	1	1	1	2	2	0	1	12	0
0												
222	2.375	1.979	48	1	2	1	2	4	0	3	18	0
0												
223	2.783	1.783	69	1	2	1	2	4	0	2	15	0
0												
224	2.571	2.19	63	2	4	2	4	6	0	5	30	0
0												
225	2.444	1.444	54	1	1	1	1	1	0	1	9	0
0												
226	2.886	1.629	132	0	2	0	2	2	0	2	16	0
0												
227	3.111	1.63	81	0	0	0	0	0	0	0	0	0
0												
228	2.765	2	51	0	0	0	0	0	0	0	0	0
0												
229	2.275	1.175	120	1	1	1	1	1	0	1	8	0
0												
230	2.786	1.524	84	1	2	1	2	4	0	3	18	0
0												
231	2.45	1.3	60	1	1	1	2	2	0	1	12	0
0												
232	2.6	1.267	30	0	3	0	3	3	44	44	58	291
0												
233	2.84	1.6	75	1	1	1	1	1	0	1	9	0
0												
234	2.4	1.578	45	0	0	0	3	3	0	189	199	0
0												
235	3.333	1.667	9	0	0	0	0	0	0	72	74	0
0												
236	3	0	0	0	0	0	0	19	0	623	651	0
0												
237	2.409	1.985	66	1	2	1	2	4	0	2	15	0
0												
238	2.2	2.111	45	1	1	1	2	2	0	1	12	0
0												
239	2.364	1.439	66	0	3	0	13	6	0	23	52	0
0												
240	2.737	2.053	57	1	2	1	2	4	0	3	18	0
0												
241	2.476	1.81	63	1	1	1	2	2	0	1	12	0
0												
242	2.5	1.8	30	0	0	0	0	0	0	0	0	0
0												
243	2.533	1.178	45	0	0	0	0	0	0	0	3	0
0												
244	2.556	1.519	27	0	0	0	0	0	0	0	3	0
0												
245	3.1	1.1	30	0	0	0	0	0	0	0	3	0
0												
246	2.615	1.359	39	0	0	0	0	0	0	0	3	0
0												
247	2.333	1.519	27	0	0	0	0	0	0	0	3	0
0												
248	3.8	1.533	15	2	3	1	3	5	0	4	23	0
0												
249	3	1.182	33	0	0	0	0	0	0	0	0	0
0												
250	2.167	1.222	36	0	0	0	0	0	61	61	66	405
0												
251	2.647	1.706	51	0	1	0	1	1	0	1	6	0
0												
252	2.227	1.076	66	1	2	1	2	4	0	3	18	0
0												
253	2.75	1.5	48	1	2	1	2	4	0	3	18	0
0												
254	2.962	1.923	78	1	2	1	2	4	0	2	15	0
0												
255	2.533	1.733	45	0	1	0	1	1	0	1	6	0
0												

256	2.343	1.505	105	0	0	0	0	0	0	0	6	0	0
257	2.353	1.412	51	1	1	1	2	2	0	1	12	0	0
258	2.786	1.619	42	0	0	0	0	0	0	0	0	0	0
259	2.526	1.14	57	1	1	1	1	1	0	1	9	0	0
260	3.059	0.882	51	0	0	0	0	0	0	0	3	0	0
261	2.769	1.59	39	0	0	0	0	0	0	0	3	0	0
262	2.25	1.479	48	0	1	0	1	1	0	1	6	0	0
263	2.333	1.467	45	1	1	1	2	2	0	1	12	0	0
264	2.444	2.111	54	1	1	1	2	2	0	1	12	0	0
265	2.25	1.667	48	1	2	1	2	4	0	3	18	0	0
266	2.833	1.639	36	0	3	0	50	4	0	14	193	0	0
267	2.37	1.333	81	1	1	1	2	2	0	1	12	0	0
268	2.429	1.405	42	1	2	1	2	5	0	3	19	0	0
269	2.8	1.9	30	0	0	0	0	0	0	0	3	0	0
270	2.818	1.727	33	0	0	0	0	0	0	0	3	0	0
271	2.412	2	51	1	1	1	2	2	0	1	12	0	0
272	2.429	1.976	42	1	1	1	1	1	0	1	9	0	0
273	3.5	2.5	12	1	1	1	1	1	0	1	8	0	0
274	6	0	0	0	0	0	0	0	0	0	0	0	0
275	3	0	0	0	0	0	0	0	0	0	0	0	0
276	3.182	0.909	33	0	1	0	1	1	0	1	6	0	0
277	3.19	1.794	63	0	0	0	0	17	0	43	60	0	0
278	2.286	1.5	42	0	0	0	22	3	0	31	60	0	0
279	2.375	1.736	72	2	3	1	3	5	0	4	20	0	0
280	2.1	1.267	30	1	2	1	2	5	0	2	16	0	0
281	2.042	1.111	72	1	1	1	1	1	0	1	9	0	0
282	2.348	1.304	69	1	2	1	2	5	0	3	19	0	0
283	2.444	1.5	54	0	1	0	1	1	0	1	7	0	0
284	2.357	1.5	42	1	2	1	2	5	0	2	16	0	0
285	2.5	1.5	78	0	1	0	1	1	0	1	7	0	0
286	2.529	1.471	51	0	22	3	18	10	50	66	124	331	0
287	2.386	1.402	132	0	3	3	7	4	0	3	50	0	0
288	2.548	1.409	93	0	10	7	13	0	0	7	93	0	0
289	2.455	1.545	33	0	0	0	0	0	0	0	3	0	0
290	2.808	2.077	78	1	2	1	2	4	0	3	18	0	0
291	2.5	1.667	6	0	0	0	0	0	0	0	0	0	0
292	2.85	1.583	60	1	1	1	1	1	0	1	9	0	0
293	2.5	1.333	18	3	385	137	54	279	0	29	1119	0	0
294	2	1.2	15	23	141	34	27	87	0	16	406	0	0
295	2.231	1.526	78	0	6	24	3	0	0	0	45	0	0
296	2.6	2.067	30	0	1	0	1	1	0	1	6	0	0
297	1	1.667	3	0	13	53	47	22	0	35	201	0	0
298	2.5	1.458	24	0	21	0	28	0	0	3	55	0	0
299	2.528	1.769	108	1	2	1	2	4	0	3	18	0	0

300	2.722	1.87	54	1	1	1	1	1	0	1	9	0
301	2	1.667	6	0	0	0	0	0	0	0	0	0
302	3.35	1.833	60	0	0	0	0	0	0	0	3	0
303	2.632	1.842	57	0	1	0	1	1	0	1	6	0
304	2.611	1.37	54	1	1	1	1	1	0	1	9	0
305	2.722	1.778	54	0	1	0	1	1	0	1	6	0
306	2.3	1.667	30	0	0	0	0	0	0	0	3	0
307	2.235	1.588	51	0	1	0	1	1	0	1	6	0
308	2.556	1.407	27	0	73	0	14	0	0	17	113	0
309	2.533	2	45	0	1	0	1	1	0	1	6	0
310	2.684	1.895	57	1	1	1	2	2	0	1	12	0
311	3.385	2.154	39	0	3	0	3	0	46	46	53	304
312	2.444	1.852	27	1	1	1	1	1	0	1	9	0
313	2.643	1.643	42	1	1	1	1	1	0	1	9	0
314	2.889	1.815	54	1	1	1	1	1	0	1	9	0
315	2.667	1.417	36	0	1	0	1	1	0	1	6	0
316	2.842	1.86	114	4	3	3	5	5	0	3	32	0
317	2.667	1.944	18	0	0	0	0	0	0	0	3	0
318	2.393	1.738	84	0	1	0	1	1	0	1	6	0
319	2.737	1.947	57	0	1	0	1	1	0	1	6	0
320	3	1.667	3	0	0	0	0	0	0	0	3	0
321	3	1.708	24	0	0	0	0	0	0	0	3	0
322	2.333	2.083	36	0	0	0	0	0	0	0	3	0
323	2.5	1.708	72	2	4	2	4	6	0	5	30	0
324	2.4	1.5	60	1	1	1	1	1	0	1	9	0
325	2.429	1.429	63	2	26	7	10	7	0	5	57	0
326	2.5	1.667	6	3	106	55	10	19	0	3	288	0
327	2.741	1.691	81	0	0	4	0	0	0	0	18	0
328	2.412	1.333	51	0	1	0	1	1	0	1	7	0
329	2.545	1.424	33	2	1	1	1	1	0	1	9	0
330	2.217	1.203	69	0	0	0	0	4	81	81	91	536
331	2.917	1.75	36	0	1	0	1	1	0	1	6	0
332	2.8	1.667	30	0	0	0	0	0	0	0	0	0
333	2.412	1.333	51	0	0	0	0	3	0	38	42	0
334	2.314	1.333	105	1	1	1	1	1	6	7	15	40
335	2.333	1.759	54	1	1	1	1	1	0	1	9	0
336	2.214	1.714	42	0	0	0	0	0	0	0	3	0
337	2.333	2.296	27	0	0	0	0	0	0	0	3	0
338	2.48	1.827	75	1	2	1	2	4	0	3	18	0
339	2.778	1.815	54	1	1	1	1	1	0	1	9	0
340	2.389	1.556	54	0	1	0	1	1	0	1	6	0
341	2.31	1.349	126	1	1	1	1	1	0	1	9	0
342	2.5	1.667	6	0	0	0	0	0	0	0	3	0
343	2.143	1.429	63	0	1	0	1	1	0	1	6	0

344	2.357	1.571	84	0	1	0	1	1	0	1	6	0
0												
345	2.533	1.667	45	1	1	1	2	2	0	1	12	0
0												
346	4.167	0.917	36	0	0	0	44	6	0	101	153	0
0												
347	3	1.317	63	0	0	3	10	7	61	133	161	405
0												
348	0	0	0	0	1	0	1	1	225	226	232	1487
0												
349	2.476	1.476	63	1	1	1	2	2	0	1	12	0
0												
350	2.556	1.444	54	1	1	1	1	1	0	1	9	0
0												
351	2.304	1.42	69	1	1	1	1	1	0	1	9	0
0												
352	3.143	1.381	21	0	0	0	0	0	0	0	0	0
0												
353	3.667	2.167	18	4	0	0	0	0	43	43	48	282
0												
354	3.083	1.667	36	0	0	0	0	0	0	0	3	0
0												
355	2.333	1.444	45	0	0	0	0	0	0	0	3	0
0												
356	2.417	1.75	36	0	0	0	0	0	0	0	0	0
0												
357	2.364	1.242	33	0	1	0	1	1	0	1	7	0
0												
358	2.435	1.435	69	0	0	0	0	0	0	0	3	0
0												
359	2.5	1.208	24	0	1	0	1	1	0	1	7	0
0												
360	1.313	0.688	48	0	6	10	175	79	0	44	337	0
0												
361	12	0	0	1	2	1	2	4	0	3	18	0
0												
362	2.375	1.833	24	0	1	0	1	1	0	1	6	0
0												
363	2.385	1.667	39	2	3	1	3	5	0	4	20	0
0												
364	2.522	1.435	69	1	2	1	2	4	0	2	15	0
0												
365	2.111	1.321	81	2	3	1	3	5	0	4	23	0
0												
366	1.933	1.244	45	0	0	0	15	9	0	31	57	0
0												
367	1.95	0.4	60	0	0	0	6	6	0	44	73	0
0												
368	2.179	1.524	84	1	2	1	2	5	0	2	16	0
0												
369	2.5	1.444	54	1	1	1	2	2	0	1	12	0
0												
370	3	2	24	0	0	0	0	0	0	0	0	0
0												
371	2.607	1.607	84	1	1	1	2	2	0	1	12	0
0												
372	2.621	1.667	174	2	4	2	4	8	0	5	49	0
0												
373	2.575	1.725	120	1	2	1	2	2	0	2	18	0
0												
374	2.1	1.7	60	0	0	0	0	0	0	0	3	0
0												
375	2.833	1.75	36	1	1	1	1	1	0	1	9	0
0												
376	2.917	2.056	36	1	1	1	1	1	0	1	9	0
0												
377	2.184	1.289	114	1	1	1	1	1	0	1	9	0
0												
378	2.4	1.383	60	3	4	2	5	7	24	30	59	161
0												
379	2.32	1.507	75	1	1	1	2	2	0	1	12	0
0												
380	3.538	0.923	39	0	1	0	1	1	0	1	6	0
0												
381	2	0.93	57	0	0	0	0	0	0	0	3	0
0												
382	4	1.778	27	0	0	0	0	0	0	0	3	0
0												
383	3.059	1.471	51	0	0	0	0	0	0	0	3	0
0												
384	2.333	1.389	36	0	0	0	0	0	0	0	3	0
0												
385	2.364	1.394	66	2	4	2	4	6	0	5	33	0
0												
386	4.778	2.111	27	2	4	2	3	7	0	5	28	0
0												
387	2.786	1.619	42	0	0	0	0	0	0	0	3	0
0												

388	2.348	1.522	69	0	0	0	0	0	0	0	3	0
389	2.5	1.786	42	1	1	1	2	2	0	1	12	0
390	2.308	1.59	39	0	0	0	0	0	0	0	3	0
391	2.583	1.833	36	3	17	0	0	0	0	31	54	0
392	2.6	1.72	75	1	1	1	1	1	0	1	9	0
393	2.333	1.556	36	0	0	0	0	0	0	0	3	0
394	3.75	3	12	1	2	1	2	4	0	2	15	0
395	5.625	1.875	24	3	13	6	6	6	0	35	76	0
396	2.741	1.988	81	2	3	1	3	5	0	4	20	0
397	2.333	1.556	81	1	1	1	2	2	0	1	12	0
398	2.556	1.944	54	1	2	1	2	4	0	2	15	0
399	2.96	1.787	75	1	2	1	2	4	0	2	15	0
400	3.087	2.203	69	66	31	19	26	10	0	38	262	0
401	2.611	1.704	54	107	49	57	22	16	0	7	317	0
402	2	1.667	3	0	105	27	51	16	0	3	350	0
403	2.712	1.686	156	3	5	2	5	9	49	57	92	324
404	2.98	2	153	1	5	1	2	11	372	375	414	2456
405	3.4	2.015	135	0	3	3	3	23	0	26	73	0
406	3.111	2.296	108	3	0	3	5	17	0	6	40	0
407	3.783	1.913	69	2	3	1	3	5	0	4	28	0
408	2.125	1.458	24	1	1	1	1	1	0	1	9	0
409	2.538	1.846	78	1	2	1	2	4	0	2	15	0
410	2.143	1.857	21	0	0	0	0	0	0	0	0	0
411	2.615	1.756	78	1	1	1	1	1	0	1	9	0
412	2.842	1.895	57	0	0	0	0	0	0	0	3	0
413	2.867	1.667	45	0	0	0	0	0	0	0	3	0
414	3.25	1.917	36	0	0	0	0	0	0	59	64	0
415	2.824	1.745	51	0	1	0	1	1	0	1	7	0
416	1.909	1.227	66	0	1	0	1	1	0	1	7	0
417	2.429	1.262	42	1	1	1	2	2	0	1	12	0
418	2.733	1.244	45	2	3	1	3	5	0	4	24	0
419	2.75	1.611	72	1	2	1	2	4	0	3	19	0
420	2.455	1.303	66	0	0	0	0	0	0	0	3	0
421	2.579	1.474	57	2	3	1	3	5	0	4	21	0
422	2.4	1.778	45	0	1	0	1	1	0	1	7	0
423	2.286	1.81	21	0	27	35	111	101	0	56	455	0
424	2.25	1.292	48	1	1	1	1	1	0	1	9	0
425	1.9	0.9	30	3	20	62	444	45	2	68	735	0
426	2.394	1.263	99	1	2	1	2	4	0	3	19	0
427	2.55	1.35	60	1	1	1	1	1	0	1	9	0
428	1.889	1.389	54	0	0	0	0	0	0	0	0	0
429	2.647	1.333	51	1	2	1	2	4	0	2	15	0
430	2.727	1.727	66	2	3	1	3	5	0	4	24	0
431	3.25	1.7	60	1	1	1	2	2	0	1	12	0

432	3	1.788	33	0	0	0	0	0	0	0	3	0
433	2.556	1.926	54	1	2	1	2	4	0	2	15	0
434	2.563	1.813	48	0	1	0	1	1	0	1	7	0
435	2.676	2.314	102	2	5	2	4	6	0	6	34	0
436	2	1.609	69	0	0	0	0	0	0	0	3	0
437	2.667	1.833	36	1	1	1	1	1	0	1	9	0
438	2.645	1.742	93	1	2	1	2	4	0	2	15	0
439	2.286	1.667	84	2	3	1	3	5	0	5	21	0
440	2.789	1.579	57	0	0	0	0	0	0	0	3	0
441	2.684	1.614	57	0	1	0	1	1	0	1	7	0
442	2.667	1.778	18	0	0	0	0	0	0	0	3	0
443	3	1.667	9	0	0	0	0	0	0	0	3	0
444	2	1.667	9	0	0	0	0	0	0	0	3	0
445	2.696	1.899	69	1	1	1	1	1	0	1	9	0
446	3.538	2.128	39	1	1	1	2	2	0	1	12	0
447	3.75	2.75	12	0	1	0	1	1	0	1	7	0
448	2.821	1.738	84	2	5	2	4	6	0	6	34	0
449	2.824	1.922	51	1	2	1	2	4	0	3	19	0
450	2.591	2	66	1	1	1	2	2	0	1	12	0
451	2.762	1.81	63	0	1	0	1	1	0	1	7	0
452	2.5	1.944	18	0	0	0	0	0	0	0	3	0
453	2.833	1.981	54	0	1	0	1	1	0	1	7	0
454	2.556	1.741	27	1	1	1	1	1	0	1	9	0
455	2.471	1.804	51	1	1	1	1	1	0	1	9	0
456	3	0	0	4	0	32	16	121	0	4	256	0
457	2.667	0.667	18	4	3	6	114	108	0	70	345	0
458	2.1	1.183	60	1	2	1	2	4	0	2	15	0
459	2.588	1.627	51	2	3	1	3	5	0	5	24	0
460	2.391	1.696	69	1	1	1	1	1	0	1	9	0
461	2.7	1.7	30	0	0	0	0	0	0	0	3	0
462	3	1.519	27	0	0	0	0	0	0	0	3	0
463	3.7	2.367	30	0	1	0	1	1	0	1	7	0
464	3	1.424	33	0	0	0	0	0	0	0	0	0
465	0	0	0	35	3	13	35	142	0	20	286	0
466	2.286	2	21	0	0	0	0	13	51	58	78	339
467	3.091	1.364	33	1	1	1	1	1	0	1	9	0
468	3.273	1.879	33	0	1	0	1	1	0	1	7	0
469	2.667	2.111	18	0	0	0	0	0	0	0	3	0
470	2.647	1.706	51	0	0	0	0	0	0	0	3	0
471	3.083	1.972	36	0	0	0	0	0	0	0	3	0
472	2.5	1.667	12	0	1	0	1	1	0	1	7	0
473	2.722	1.889	54	1	2	1	2	4	0	2	15	0
474	3	2	96	2	3	1	3	5	0	5	21	0
475	1.438	0.938	48	0	0	0	0	0	0	0	3	0

476	1.467	0.867	45	0	0	0	0	0	0	0	0	0	0
477	2.2	1.427	75	4	5	2	5	7	0	6	36	0	0
478	2.75	2.125	24	0	0	0	0	0	0	0	0	0	0
479	0	0	0	0	0	0	0	0	0	0	0		
480	2.865	1.949	156	6	8	4	8	16	0	11	61	0	0
481	0	0	0	0	0	0	0	0	0	0	0		
482	2.609	2.087	69	2	4	2	4	6	0	5	33	0	0
483	2.387	1.796	93	1	2	1	2	4	0	3	18	0	0
484	2.333	1.625	72	3	3	3	0	3	34	37	51	223	0
485	2.424	1.99	99	1	2	1	2	4	0	2	15	0	0
486	2.222	1.741	27	1	1	1	1	1	0	1	9	0	0
487	2.313	1.979	48	0	1	0	1	1	0	1	6	0	0
488	2.333	1.778	45	2	2	2	2	2	0	2	17	0	0
489	0	0	0	0	0	0	0	0	0	0	0	0	0
490	2.6	1.789	90	1	2	1	2	4	0	2	15	0	0
491	2.447	1.702	114	1	2	1	2	4	0	3	19	0	0
492	2.2	1.583	60	1	2	1	2	4	0	3	19	0	0
493	2.8	1.767	30	0	1	0	1	1	0	1	7	0	0
494	2.581	1.713	129	1	2	1	2	2	0	2	19	0	0
495	2.636	2.333	33	1	1	1	2	2	0	1	12	0	0
496	2.333	1.75	72	1	2	1	2	4	0	3	19	0	0
497	1.8	1.733	15	0	0	0	0	0	0	0	3	0	0
498	2.474	1.868	114	2	4	2	4	6	0	6	31	0	0
499	2.4	2	45	1	2	1	2	4	0	3	19	0	0
500	2.393	1.964	84	1	2	1	2	4	0	2	15	0	0
501	2.118	2	51	1	1	1	2	2	0	1	12	0	0
502	3	0	0	3	4	2	4	6	0	5	31	0	0
503	1.722	1.204	54	48	808	134	70	251	0	32	1662	0	0
504	2	1.667	6	1	1	1	1	1	0	1	9	0	0
505	2.429	2.032	63	1	2	1	2	4	0	3	19	0	0
506	2.464	1.667	84	1	2	1	2	4	0	3	18	0	0
507	2.324	1.314	102	0	13	0	0	3	0	19	45	0	0
508	2.037	1.185	81	1	1	1	1	1	0	1	9	0	0
509	2.105	0.737	57	1	1	1	1	1	0	1	9	0	0
510	2.1	1.183	60	2	3	1	3	5	0	4	20	0	0
511	2.364	1.424	33	1	1	1	1	1	0	1	8	0	0
512	0	0	0	0	0	0	0	0	0	0	0	0	
513	2	1.667	3	0	0	0	0	0	0	0	0	0	0
514	2.333	1.833	36	1	1	1	1	1	0	1	9	0	0
515	2.1	1.367	30	0	0	0	0	0	0	0	3	0	0
516	2.75	1.833	72	1	1	1	2	2	0	1	12	0	0
517	2.615	1.673	156	2	3	2	4	6	0	3	26	0	0
518	0	0	0	0	0	0	0	0	0	0	0	0	0
519	1.739	1.159	69	0	10	3	3	4	0	7	80	0	0
520	2.163	1.395	147	2	4	2	4	4	0	4	30	0	0

521	0	0	0	3	57	3	7	35	0	10	400	400	0
0													
522	0	0	0	0	0	0	0	0	0	0	0		
523	2.395	1.763	114	2	4	1	3	6	0	5	25		0
0													
524	2.5	1.667	12	2	4	1	3	6	0	5	25		0
0													
525	0	0	0	0	0	0	0	0	0	0	0		0
0													
526	2.946	1.802	111	5	2	1	2	8	0	7	59		0
0													
527	0	0	0	0	0	0	0	0	0	0	0		0
0													
528	3.444	2.63	27	1	2	1	2	4	0	2	15		0
0													
529	2.571	1.929	84	1	1	1	1	1	0	1	9		0
0													
530	3	1.667	9	1	1	1	1	1	0	1	9		0
0													
531	2.789	2.105	57	0	1	0	1	1	0	1	13		0
0													
532	3.667	1.667	9	1	1	1	1	1	0	1	8		0
0													
533	0	0	0	0	0	0	0	0	0	0	0		
534	2.722	1.87	54	2	4	2	4	6	20	25	50		132
0													
535	2	1.667	3	0	0	0	0	0	0	0	3		0
0													
536	0	0	0	0	0	0	0	0	0	0	0		0
0													
537	2.579	2.123	114	4	0	4	4	0	0	9	38		0
0													
538	3	2.152	33	10	3	6	6	10	63	72	130		415
0													
539	5	1.667	3	0	225	47	55	13	0	72	455		0
0													
540	2.949	1.94	117	133	35	136	3	17	0	6	328		0
0													
541	0	0	0	0	0	0	0	0	0	0	0		
542	0	0	0	0	0	0	0	0	0	0	0		
543	2.667	2.5	18	10	3	0	10	3	8	14	45		0
55													
544	0	0	0	0	0	0	0	0	0	0	0		
545	0	0	0	0	0	0	0	0	0	0	0		
546	2.667	1.667	36	7	247	0	3	0	0	0	269		0
0													
547	3	2.182	33	3	4	2	5	7	0	6	35		0
0													
548	2.556	1.63	27	22	17	0	17	3	0	3	64		0
0													
549	1.88	0.978	225	9	3	11	13	8	0	73	146		0
0													
550	2.875	1.208	24	7	67	116	59	43	4	8	372		0
27													
551	3.25	2.183	60	2	3	1	3	5	0	5	24		0
0													
552	2.5	2	18	1	1	1	1	1	0	1	9		0
0													
553	2.792	2.236	72	2	3	2	3	6	0	5	28		0
0													
554	2	1.667	3	0	0	0	0	0	0	0	3		0
0													
555	0	0	0	0	0	0	0	0	0	0	0		
556	12	0	0	148	20	0	0	0	0	11	210		0
0													
557	3.167	1.444	18	3	6	3	6	10	0	6	46		0
0													
558	2.231	1.974	39	1	1	1	2	2	0	1	12		0
0													
559	3.333	2.5	18	77	15	3	3	6	0	0	112		0
0													
560	2.545	1.909	33	2	4	2	4	6	0	6	33		0
0													
561	2.7	2.267	30	2	3	2	3	6	0	5	27		0
0													
562	3	1.667	3	0	1	0	1	1	0	1	6		0
0													
563	2.909	2.364	33	2	4	2	4	6	0	6	33		0
0													
564	3	2.296	27	18	14	0	4	5	0	0	41		0
0													
565	3	2.167	48	17	0	0	0	0	28	31	59		187
0													
566	2.647	1.882	51	10	0	3	23	7	0	0	92		0
0													
567	3.304	2.029	69	2	5	2	4	7	0	7	32		0
0													

568	2.857	2.095	21	1	2	1	2	5	0	4	19	0
569	3.25	1.667	12	0	0	0	0	0	0	0	3	0
570	3.063	1.792	48	2	5	2	4	7	0	7	32	0
571	3.375	2.125	24	50	0	10	3	3	0	0	68	0
572	2.565	1.957	69	57	4	0	3	0	0	0	68	0
573	2.421	2.158	57	65	22	7	3	3	14	17	142	90
574	3.333	1.667	9	0	1	0	1	1	0	1	7	0
575	3.267	2.467	90	17	5	8	0	13	0	0	51	0
576	3.583	1.889	36	2	3	1	4	5	0	5	22	0
577	2.95	2.333	60	1	2	1	2	4	0	4	19	0
578	3	1.667	9	1	1	1	1	1	0	1	9	0
579	2.6	1.6	30	2	5	2	4	7	0	7	32	0
580	2.669	1.772	426	150	38	15	42	57	30	90	465	198
581	2.757	1.932	222	69	27	1	5	4	12	16	153	77
582	2.875	1.859	192	91	26	5	10	20	0	17	175	0
583	2.42	1.576	957	95	38	18	126	64	0	72	500	0
584	2.511	1.511	1140	40	82	88	431	225	131	369	1474	867
585	0	0	0	0	0	0	0	0	0	0	0	
586	2.652	1.757	423	49	233	54	70	42	55	143	665	363
587	0	0	0	0	0	0	0	0	0	0	0	
588	0	0	0	0	0	0	0	0	0	0	0	
589	2.577	1.987	78	71	5	2	5	9	0	10	102	0
590	2.395	2.061	114	52	5	2	4	12	0	6	91	0
591	2.389	1.66	162	86	3	3	7	4	23	30	143	151
592	2.633	1.889	90	34	8	1	7	13	0	6	71	0
593	2.5	1.88	300	46	16	8	17	32	19	44	193	126
594	2.826	2.007	138	102	39	1	4	11	0	4	165	0
595	2.773	1.932	132	32	9	5	12	16	10	21	131	65
596	2.882	1.817	153	10	14	7	13	19	1	20	107	9
597	3	1.889	18	1	2	1	2	5	0	2	19	0
598	3	2.152	33	2	3	1	3	6	0	5	25	0
599	2.568	1.802	111	6	10	4	9	16	7	20	81	43
600	2.761	1.928	138	8	12	5	12	19	0	15	85	0
601	2.8	2.126	135	35	30	2	8	25	17	28	136	110
602	2.698	2.022	318	138	21	10	16	33	9	32	265	60
603	2.47	1.862	804	62	44	26	88	78	31	94	472	206
604	6	0	0	0	0	0	0	0	0	0	6	0
605	2.974	1.991	114	54	7	3	7	10	0	11	106	0
606	3	2.324	102	35	5	1	2	10	0	1	58	0
607	2.971	2.314	105	93	102	4	7	4	0	4	225	0
608	3.077	2.231	39	18	13	0	0	0	17	20	54	111
609	2.921	2.029	456	60	27	6	34	28	0	22	200	0
610	2.962	2.11	318	14	133	14	20	39	36	58	350	237
611	2.964	1.941	507	11	18	9	17	28	0	21	135	0
612	3.043	2.486	138	5	8	4	8	15	0	7	58	0

613	2.818	1.606	165	32	11	4	18	18	34	46	147	224	0
614	2.438	1.938	48	42	1	0	1	5	0	1	54	0	0
615	3.156	2.26	96	7	10	4	10	17	0	13	67	0	0
616	2.15	1.7	60	2	3	2	6	5	0	4	38	0	0
617	2.857	1.667	21	1	54	4	1	1	0	1	66	0	0
618	2.759	2.253	87	7	10	4	10	17	0	12	76	0	0
619	2.872	2.096	282	58	10	7	44	20	40	90	262	263	0
620	3.385	1.667	39	2	2	2	2	2	0	2	28	0	0
621	2.636	2.091	66	2	4	2	4	6	0	5	31	0	0
622	3.5	1.667	12	0	2	0	2	2	0	2	13	0	0
623	2.8	1.933	15	2	3	2	3	6	0	5	28	0	0
624	2	1.667	12	2	4	2	6	5	0	5	32	0	0
625	0	0	0	0	0	0	0	0	0	0	0		
626	0	0	0	0	0	0	0	0	0	0	0		
627	0	0	0	0	0	0	0	0	0	0	0		
628	0	0	0	0	0	0	0	0	0	0	0		
629	0	0	0	0	0	0	0	0	0	0	0		
630	0	0	0	0	0	0	0	0	0	0	0		
631	0	0	0	0	0	0	0	0	0	0	0		
632	0	0	0	0	0	0	0	0	0	0	0		
633	0	0	0	0	0	0	0	0	0	0	0		
634	0	0	0	0	0	0	0	0	0	0	0		
635	0	0	0	0	0	0	0	0	0	0	0		
636	0	0	0	0	0	0	0	0	0	0	0		
637	0	0	0	0	0	0	0	0	0	0	0		
638	0	0	0	0	0	0	0	0	0	0	0		
639	0	0	0	0	0	0	0	0	0	0	0		
640	0	0	0	0	0	0	0	0	0	0	0		
641	0	0	0	0	0	0	0	0	0	0	0		
642	0	0	0	0	0	0	0	0	0	0	0		
643	0	0	0	0	0	0	0	0	0	0	0		
644	0	0	0	0	0	0	0	0	0	0	0		
645	0	0	0	0	0	0	0	0	0	0	0	0	0
646	0	0	0	0	0	0	0	0	0	0	0	0	0
647	0	0	0	0	0	0	0	0	0	0	0	0	0
648	0	0	0	0	0	0	0	0	0	0	0	0	0
649	0	0	0	0	0	0	0	0	0	0	0	0	0
650	0	0	0	0	0	0	0	0	0	0	0	0	0

88	79	108	99	126	128	21	24	22	26	20	19		
70	50	114	114	108	128	0	0	0	0	0	0		
145	23	110	127	23	157	0	0	0	0	0	0		
6	6	7	7	9	9	4	3	2	2	2	3		
8	13	29	34	37	27	6	7	8	8	7	8		
86	112	90	104	117	135	22	13	15	17	8	18		

APPENDIX 3
AM PEAK SCREENLINES

```
                              +-------------------------------------------+
                              | TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
                              |  TRACKS +-------------------------+ TRACKS  |
                              | S TRACKS|                         |S TRACKS |
                              | KS TRACK|   Program  :     CORDON  |KS TRACK |
                              | CKS TRAC|   Version  :      V7.08  |CKS TRAC |
                              | ACKS TRA|                         |ACKS TRA |
                              | RACKS TR|   Date run :  11-Aug-09  |RACKS TR |
                              | TRACKS T|   Time run :   09:52:58  |TRACKS T |
                              |  TRACKS |   Platform :  Win 95/NT  | TRACKS  |
                              | S TRACKS+-------------------------+S TRACKS |
                              | KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
                              +-------------------------------------------+
                              +-------------------------------------------+
                              |            TRACKS Licenced to             |
                              |  Gabites Porter                           |
                              |         at :   Christchurch, N.Z.         |
                              +-------------------------------------------+
                                          Build Date : 22/04/09 01:30
                                          Parameter version : V5.20


 Network Period Factor :  1.000

  Cordon Period Factor :  1.000

     GEH Period Factor :  1.000

   CSV Output File :


 Cordon Data File  : NM06CD.DATNELSON Model - Morning Peak (8-9AM) - 2006
 Loaded Network    : NM06NL.000     NELSON ROADING STUDY 2006 0800-0900
                    9921 Links in network


 Cordon Number :  1
 Description   :  1  Atawhai Dr

                     FORWARD                       BACK                          TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  3831  3826     303.    343     40. 113.2     735.    768     33. 104.5    1038.   1111     73. 107.0   2.2   00600114 Nelson Nth - Atawhai Cemetry
  3843  3839      37.     43      6. 116.2      55.    106     51. 192.7      92.    149     57. 162.0   5.2   ATAWHAI DRIVE  (27) btw INTERSEC. LEG
  5297  3865     147.    125    -22.  85.0     274.    302     28. 110.2     421.    427      6. 101.4    .3   Atawhai Dr - Btwn Iwa Rd & Weka St (02

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS
```

COUNT	487.	1064.	1551.
VOLUME	511.	1176.	1687.
CHANGE	24.	112.	136.
%	105.	111.	109.
CORREL.			
COEFF.	.988	1.000	.998
%RMS	20.06	13.34	12.69
r^2	.976	.999	.996
GEH	1.1	3.3	3.4

GEH	<5	<7	<10	<12	>12
#	2	3	3	3	0
%	66.7	100.0	100.0	100.0	.0

Cordon Number : 2
Description : 2 Maitai River

		FORWARD				BACK				TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	GEH	
4114	5496	64.	100	36.	156.3	148.	160	12.	108.1	212.	260	48.	122.6	3.1	NILE STREET (EAST) (253) btw DOMETT S
4058	4059	94.	46	-48.	48.9	62.	66	4.	106.5	156.	112	-44.	71.8	3.8	HARDY STREET EAST (139) btw AVON TCE
4007	4011	96.	98	2.	102.1	212.	234	22.	110.4	308.	332	24.	107.8	1.3	BRIDGE STREET (52) btw TASMAN ST BRID
3941	3924	236.	237	1.	100.4	502.	524	22.	104.4	738.	761	23.	103.1	.8	TRAFALGAR STREET (NORTH) (374) btw SH

Number of links = 4 Number of forward links = 4 Number of back links = 4

TOTALS	FORWARD	BACK	TOTALS
COUNT	490.	924.	1414.
VOLUME	481.	984.	1465.
CHANGE	-9.	60.	51.
%	98.	106.	104.
CORREL.			
COEFF.	.907	1.000	.991
%RMS	28.30	8.39	11.94
r^2	.822	.999	.982
GEH	.4	1.9	1.3

GEH	<5	<7	<10	<12	>12
#	4	4	4	4	0
%	100.0	100.0	100.0	100.0	.0

Cordon Number : 3
Description : 3 South CBD

		FORWARD				BACK				TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	GEH	
6108	5024	215.	212	-3.	98.6	144.	106	-38.	73.6	359.	318	-41.	88.6	2.2	TASMAN STREET (SOUTH) (350) btw NILE
4146	4962	282.	313	31.	111.0	293.	205	-88.	70.0	575.	518	-57.	90.1	2.4	COLLINGWOOD STREET (87) btw NILE ST a
4144	4101	707.	716	9.	101.3	367.	463	96.	126.2	1074.	1179	105.	109.8	3.1	RUTHERFORD STREET (314) b tw NILE ST

Number of links = 3 Number of forward links = 3 Number of back links = 3

TOTALS	FORWARD	BACK	TOTALS
COUNT	1204.	804.	2008.
VOLUME	1241.	774.	2015.

```
 CHANGE      37.      -30.        7.
   %        103.       96.      100.
CORREL.
 COEFF.     .998      .903      .997
 %RMS      5.71     35.79     13.34
  r^2       .996      .816      .994
  GEH        1.1       1.1        .2

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number :  4
 Description   :  4  East CBD

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4110  5024     164.    118    -46.  72.0     326.    239    -87.  73.3     490.    357   -133.  72.9   6.5   Nile St - Btwn Alton St and Tasman St
  4053  4054      70.     73      3. 104.3     104.    158     54. 151.9     174.    231     57. 132.8   4.0   HARDY STREET (WEST)  (138) btw COLLING
  4499  4999     176.    147    -29.  83.5     252.    306     54. 121.4     428.    453     25. 105.8   1.2   BRIDGE STREET  (52) btw COLLINGWOOD ST

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      410.      682.     1092.
 VOLUME     338.      703.     1041.
 CHANGE     -72.       21.      -51.
   %         82.      103.       95.
CORREL.
 COEFF.     .957      .695      .807
 %RMS      28.18     36.01     28.53
  r^2       .915      .483      .651
  GEH        3.7        .8       1.6

  GEH  <5    <7   <10   <12   >12
  #     2     3     3     3     0
  %  66.7 100.0 100.0 100.0    .0

 Cordon Number :  5
 Description   :  5  CBD

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4070  4071     315.    289    -26.  91.7      79.     51    -28.  64.6     394.    340    -54.  86.3   2.8   SELWYN PLACE  Btw TRAFALGAR SQ and TRA
  4041  1197     343.    376     33. 109.6     171.    183     12. 107.0     514.    559     45. 108.8   1.9   HARDY STREET (WEST)  (138) btw RUTHERF
  3988  3989     253.    262      9. 103.6     169.    165     -4.  97.6     422.    427      5. 101.2    .2   BRIDGE STREET  (52) btw TRAFALGAR ST a

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      911.      419.     1330.
 VOLUME     927.      399.     1326.
 CHANGE      16.      -20.       -4.
   %        102.       95.      100.
CORREL.
 COEFF.     .873      .994      .984
```

```
 %RMS      10.00     15.56     11.24
  r^2       .762      .989      .968
  GEH         .5       1.0        .1

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number :  6
 Description   :  6  Waimea Rd

                    FORWARD                       BACK                        TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4202  5393      45.     28    -17.  62.2      30.     19    -11.  63.3      75.     47    -28.  62.7   3.6   RUTHERFORD STREET  (314) btw WAIMEA RD
  4236  5534     209.    173    -36.  82.8     140.    154     14. 110.0     349.    327    -22.  93.7   1.2   VAN DIEMEN STREET  (383) btw WAIMEA RD
  2597  4384      23.      4    -19.  17.4      35.     33     -2.  94.3      58.     37    -21.  63.8   3.0   MOTUEKA STREET  (231) btw WAIMEA RD an
  5001  4446      88.     95      7. 108.0     131.    174     43. 132.8     219.    269     50. 122.8   3.2   MARKET ROAD  (207) btw WAIMEA RD and B

Number of links =     4 Number of forward links =     4 Number of back links =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      365.      336.      701.
 VOLUME     300.      380.      680.
 CHANGE     -65.       44.      -21.
   %         82.      113.       97.
CORREL.
 COEFF.     .979      .986      .971
 %RMS      28.26     32.02     21.37
  r^2       .959      .972      .943
  GEH        3.6       2.3        .8

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number :  7
 Description   :  7  Washington Valley

                    FORWARD                       BACK                        TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4041  1197     343.    376     33. 109.6     171.    183     12. 107.0     514.    559     45. 108.8   1.9   HARDY STREET (WEST)  (138) btw RUTHERF
  4796  4961     788.    781     -7.  99.1     341.    333     -8.  97.7    1129.   1114    -15.  98.7    .4   VANGUARD STREET  (384) btw HARDY ST an
  4958  5554     570.    644     74. 113.0     240.    230    -10.  95.8     810.    874     64. 107.9   2.2   GLOUCESTER STREET  (124) btw ST VINCEN
  2098  4064     352.    462    110. 131.3     235.    244      9. 103.8     587.    706    119. 120.3   4.7   ST VINCENT STREET  (318) btw GLOUCESTE
  2100  4923      34.     28     -6.  82.4      50.     54      4. 108.0      84.     82     -2.  97.6    .2   ABRAHAM HEIGHTS  (6) btw QUEBEC RD and
  4088  5025      38.     45      7. 118.4      25.     27      2. 108.0      63.     72      9. 114.3   1.1   QUEBEC ROAD  (285) btw END OF KCC RHS
  4089  4088     180.    209     29. 116.1      43.     64     21. 148.8     223.    273     50. 122.4   3.2   PRINCES DRIVE  (280) btw QUEBEC ROAD A
  4919  3944    1192.   1153    -39.  96.7     556.    471    -85.  84.7    1748.   1624   -124.  92.9   3.0   00600118 Basin Reserve(Rocks Rd) 26Mar

Number of links =     8 Number of forward links =     8 Number of back links =     8

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     3497.     1661.     5158.
 VOLUME    3698.     1606.     5304.
 CHANGE     201.      -55.      146.
   %        106.       97.      103.
```

```
CORREL.
 COEFF.     .993      .994      .994
 %RMS     12.58     16.36     11.50
  r^2      .986      .987      .989
  GEH       3.4       1.4       2.0

  GEH  <5    <7   <10   <12   >12
  #     8     8     8     8     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number :  8
 Description   :  8  Moana

                    FORWARD                     BACK                      TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4989  5480    1536.   1562     26. 101.7     750.    690    -60.  92.0    2286.   2252    -34.  98.5    .7   WAIMEA ROAD  (391) btw BOUNDARY RD and
  4162  4179     182.    220     38. 120.9     121.     75    -46.  62.0     303.    295     -8.  97.4    .5   TOI TOI STREET  (365) btw MONTREAL RD
  4089  4088     180.    209     29. 116.1      43.     64     21. 148.8     223.    273     50. 122.4   3.2   PRINCES DRIVE  (280) btw QUEBEC ROAD A
  4263  3196      62.     49    -13.  79.0      12.     20      8. 166.7      74.     69     -5.  93.2    .6   STANSELL AVENUE  (338) btw MOANA AVENU
  4966  1994     127.     95    -32.  74.8      85.     90      5. 105.9     212.    185    -27.  87.3   1.9   BISLEY AVENUE  (43) btw ROCKS RD and C

Number of links =     5 Number of forward links =     5 Number of back links =     5

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     2087.     1011.     3098.
 VOLUME    2135.      939.     3074.
 CHANGE      48.      -72.      -24.
   %        102.       93.       99.
CORREL.
 COEFF.     .999      .997     1.000
 %RMS       7.72     19.54      5.40
  r^2       .998      .993      .999
  GEH        1.0       2.3        .4

  GEH  <5    <7   <10   <12   >12
  #     5     5     5     5     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number :  9
 Description   :  9  Moana

                    FORWARD                     BACK                      TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4989  5480    1536.   1562     26. 101.7     750.    690    -60.  92.0    2286.   2252    -34.  98.5    .7   WAIMEA ROAD  (391) btw BOUNDARY RD and
  4089  4088     180.    209     29. 116.1      43.     64     21. 148.8     223.    273     50. 122.4   3.2   PRINCES DRIVE  (280) btw QUEBEC ROAD A
  4919  3944    1192.   1153    -39.  96.7     556.    471    -85.  84.7    1748.   1624   -124.  92.9   3.0   00600118 Basin Reserve(Rocks Rd) 26Mar

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     2908.     1349.     4257.
 VOLUME    2924.     1225.     4149.
 CHANGE      16.     -124.     -108.
   %        101.       91.       97.
CORREL.
 COEFF.     .999      .997      .998
```

```
 %RMS       4.02     16.69      6.87
  r^2       .997      .993      .996
  GEH         .3       3.5       1.7

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number : 10
 Description   :  10  Main Road Stoke

                     FORWARD                       BACK                        TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4545  4518     336.    316    -20.  94.0      91.    100      9. 109.9     427.    416    -11.  97.4    .5   THE RIDGEWAY (NORTH)  (357) btw WAIMEA
  4515  4501      56.     92     36. 164.3      38.     43      5. 113.2      94.    135     41. 143.6   3.8   WATERHOUSE STREET  (399) btw WAIMEA RD
  4555  4612      25.     36     11. 144.0      66.     91     25. 137.9      91.    127     36. 139.6   3.4   ARAPIKI ROAD  (23) btw MAIN RD STOKE a
  4608  4623      36.     32     -4.  88.9      53.     98     45. 184.9      89.    130     41. 146.1   3.9   MAITLAND AVENUE  (198) btw MAIN RD STO
  4651  4659      39.     43      4. 110.3      61.     96     35. 157.4     100.    139     39. 139.0   3.6   MARSDEN ROAD  (208) btw MAIN RD STOKE
  4747  5489     205.    184    -21.  89.8     137.    149     12. 108.8     342.    333     -9.  97.4    .5   SONGER STREET  (331) btw MAIN RD STOKE
  4816  4821     113.    133     20. 117.7     167.    188     21. 112.6     280.    321     41. 114.6   2.4   POLSTEAD ROAD  (277) btw MAIN RD STOKE
  5111  5112     127.    116    -11.  91.3     190.    195      5. 102.6     317.    311     -6.  98.1    .3   SAXTON ROAD  (319) btw MAIN RD STK: S-

Number of links =     8 Number of forward links =     8 Number of back links =     8

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      937.      803.     1740.
 VOLUME     952.      960.     1912.
 CHANGE      15.      157.      172.
   %        102.      120.      110.
CORREL.
 COEFF.     .987      .967      .994
 %RMS      17.11     25.51     15.64
  r^2       .975      .936      .988
  GEH         .5       5.3       4.0

  GEH  <5    <7   <10   <12   >12
  #     8     8     8     8     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number : 11
 Description   :  11  Tahunanui Dr (SH6)

                     FORWARD                       BACK                        TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4919  3944    1192.   1153    -39.  96.7     556.    471    -85.  84.7    1748.   1624   -124.  92.9   3.0   00600118 Basin Reserve(Rocks Rd) 26Mar
  4966  1994     127.     95    -32.  74.8      85.     90      5. 105.9     212.    185    -27.  87.3   1.9   BISLEY AVENUE  (43) btw ROCKS RD and C
  4312  6113      27.     33      6. 122.2      51.     71     20. 139.2      78.    104     26. 133.3   2.7   TOSSWILL ROAD  (368) btw TAHUNANUI DR
  4972  4973      12.     22     10. 183.3      45.     35    -10.  77.8      57.     57      0. 100.0    .0   MAIRE STREET  (195) btw ANNESBROOK DR

Number of links =     4 Number of forward links =     4 Number of back links =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     1358.      737.     2095.
 VOLUME    1303.      667.     1970.
 CHANGE     -55.      -70.     -125.
   %         96.       91.       94.
```

```
CORREL.
 COEFF.    1.000      .998     1.000
 %RMS       8.81     27.59     14.28
  r^2       .999      .996      .999
  GEH        1.5       2.6       2.8

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number : 12
 Description   :  12  Quarantine Rd

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4462  3399     500.    480    -20.  96.0     166.    161     -5.  97.0     666.    641    -25.  96.2   1.0   PASCOE STREET  (268) btw PARKERS RD an
  5118  4459     225.    227      2. 100.9     150.    166     16. 110.7     375.    393     18. 104.8    .9   QUARANTINE ROAD  (284) btw BOLT RD and
  5119  5118     199.    182    -17.  91.5     132.    162     30. 122.7     331.    344     13. 103.9    .7   TRENT DRIVE  (376) btw BOLT RD and END

Number of links =     3 Number of forward links =     3 Number of back links =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      924.      448.     1372.
 VOLUME     889.      489.     1378.
 CHANGE     -35.       41.        6.
   %         96.      109.      100.
CORREL.
 COEFF.     .998     -.156      .999
 %RMS       6.04     16.27      5.17
  r^2       .996      .024      .999
  GEH        1.2       1.9        .2

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number : 13
 Description   :  13  Whakatu Dr / Nayland Rd / Main Road Stoke

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  5478  5462     898.    983     85. 109.5     628.    456   -172.  72.6    1526.   1439    -87.  94.3   2.3   00600122 Stoke-Telemetry Site 81 - Wha
  5180  4783     180.    202     22. 112.2     334.    318    -16.  95.2     514.    520      6. 101.2    .3   Nayland Rd - Kendall Vw & Holdcroft Pl
  2699  5111      94.     59    -35.  62.8     380.    415     35. 109.2     474.    474      0. 100.0    .0   Saxton Rd West - Railway Reserve & Mai
  5188  5176    1173.   1143    -30.  97.4     391.    445     54. 113.8    1564.   1588     24. 101.5    .6   MAIN ROAD STOKE  (7805) btw SAXTON CUL

Number of links =     4 Number of forward links =     4 Number of back links =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     2345.     1733.     4078.
 VOLUME    2387.     1634.     4021.
 CHANGE      42.      -99.      -57.
   %        102.       94.       99.
CORREL.
 COEFF.     .995      .657      .997
 %RMS       9.77     24.57      5.12
```

```
 r^2       .990      .431      .994
 GEH         .9       2.4        .9

 GEH  <5    <7   <10   <12   >12
 #     4     4     4     4     0
 % 100.0 100.0 100.0 100.0    .0

 Cordon Number : 14
 Description   :  14 State Highway counts

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  2675  2678     116.    104    -12.  89.7      84.     63    -21.  75.0     200.    167    -33.  83.5   2.4   00600144 Eighty Eight Vly Stm bridge 2
  2937  2826      50.     67     17. 134.0      44.     40     -4.  90.9      94.    107     13. 113.8   1.3   00600153 Spooners Hill (Higgins Cul) 2
  1654  1655     424.    528    104. 124.5     228.    167    -61.  73.2     652.    695     43. 106.6   1.7   00600138 Brightwater (Pitfure bridge)
  1555  1554     594.    643     49. 108.2     229.    194    -35.  84.7     823.    837     14. 101.7    .5   00600135 Wairoa Rr (Burkes Bank) 14Jun
  1523  1518     261.    256     -5.  98.1     338.    444    106. 131.4     599.    700    101. 116.9   4.0   06000000 Start of State Highway 60 21J
  1623  1619     388.    273   -115.  70.4     653.    729     76. 111.6    1041.   1002    -39.  96.3   1.2   06000005 Appleby Bridge 28Mar07
  1807  1603     500.    560     60. 112.0     250.    236    -14.  94.4     750.    796     46. 106.1   1.7   06000008 Research Orchard Rd
  1745  1737     335.    413     78. 123.3     215.    230     15. 107.0     550.    643     93. 116.9   3.8   06000018 Ruby Bay 14Jun06
  1865  1864     321.    286    -35.  89.1     201.    278     77. 138.3     522.    564     42. 108.0   1.8   06000036 Motueka Nth (Bridge)
  5478  5462     950.    983     33. 103.5     595.    456   -139.  76.6    1545.   1439   -106.  93.1   2.7   00600122 Stoke-Telemetry Site 81 - Wha
  4919  3944    1192.   1153    -39.  96.7     556.    471    -85.  84.7    1748.   1624   -124.  92.9   3.0   00600118 Basin Reserve(Rocks Rd) 26Mar
  3831  3826     328.    343     15. 104.6     733.    768     35. 104.8    1061.   1111     50. 104.7   1.5   00600114 Nelson Nth - Atawhai Cemetry

Number of links =    12 Number of forward links =    12 Number of back links =    12

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     5459.     4126.     9585.
 VOLUME    5609.     4076.     9685.
 CHANGE     150.      -50.      100.
   %        103.       99.      101.
CORREL.
 COEFF.     .984      .954      .992
 %RMS     13.36     20.85      8.99
  r^2       .968      .910      .985
  GEH        2.0        .8       1.0

  GEH  <5    <7   <10   <12   >12
  #    12    12    12    12     0
  % 100.0 100.0 100.0 100.0    .0

 Cordon Number : 15
 Description   :  15 Richmond spot counts

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  1129  1130     721.    861    140. 119.4     704.    486   -218.  69.0    1425.   1347    -78.  94.5   2.1   Salisbury Road (723) 2008 Fri
  1252  6115     294.    316     22. 107.5     240.    212    -28.  88.3     534.    528     -6.  98.9    .3   Queen Street (676) 2008 wed
  1523  1439     119.     89    -30.  74.8     120.    148     28. 123.3     239.    237     -2.  99.2    .1   Bateup Road (171) 2008 wed
  1015  1019     159.    124    -35.  78.0     183.    232     49. 126.8     342.    356     14. 104.1    .7   Champion Road (243a) 2008 wed
  1277  1320     198.    141    -57.  71.2     132.    196     64. 148.5     330.    337      7. 102.1    .4   McGlashen (574) 2008 wed 17 dec
  1512  1517      19.     13     -6.  68.4      19.      2    -17.  10.5      38.     15    -23.  39.5   4.5   McShane Road (69) 2008
  1150  1155      92.     97      5. 105.4      92.     61    -31.  66.3     184.    158    -26.  85.9   2.0   Hill Street (454a) 2008
  1003  1011     101.    144     43. 142.6      67.     23    -44.  34.3     168.    167     -1.  99.4    .1   Hill Street (454b) 2008
  1427  3897      48.     58     10. 120.8      72.     83     11. 115.3     120.    141     21. 117.5   1.8   Hart Road (427) 2008
  1524  1525      29.     39     10. 134.5      29.     28     -1.  96.6      58.     67      9. 115.5   1.1   Paton Road (644) 2008
```

4091	1548	40.	62	22.	155.0	27.	23	-4.	85.2	67.	85	18.	126.9	2.1	Clover Road East (260) 2008

Number of links = 11 Number of forward links = 11 Number of back links = 11

TOTALS	FORWARD	BACK	TOTALS
COUNT	1820.	1685.	3505.
VOLUME	1944.	1494.	3438.
CHANGE	124.	-191.	-67.
%	107.	89.	98.
CORREL.			
COEFF.	.988	.949	.999
%RMS	32.01	50.11	9.11
r^2	.976	.900	.998
GEH	2.9	4.8	1.1

GEH	<5	<7	<10	<12	>12
#	11	11	11	11	0
%	100.0	100.0	100.0	100.0	.0

Cordon Number : 16
Description : 16 All

		FORWARD				BACK				TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	GEH	
3831	3826	303.	343	40.	113.2	735.	768	33.	104.5	1038.	1111	73.	107.0	2.2	00600114 Nelson Nth - Atawhai Cemetry
3843	3839	37.	43	6.	116.2	55.	106	51.	192.7	92.	149	57.	162.0	5.2	ATAWHAI DRIVE (27) btw INTERSEC. LEG
5297	3865	147.	125	-22.	85.0	274.	302	28.	110.2	421.	427	6.	101.4	.3	Atawhai Dr - Btwn Iwa Rd & Weka St (02
4114	5496	64.	100	36.	156.3	148.	160	12.	108.1	212.	260	48.	122.6	3.1	NILE STREET (EAST) (253) btw DOMETT S
4058	4059	94.	46	-48.	48.9	62.	66	4.	106.5	156.	112	-44.	71.8	3.8	HARDY STREET EAST (139) btw AVON TCE
4007	4011	96.	98	2.	102.1	212.	234	22.	110.4	308.	332	24.	107.8	1.3	BRIDGE STREET (52) btw TASMAN ST BRID
3941	3924	236.	237	1.	100.4	502.	524	22.	104.4	738.	761	23.	103.1	.8	TRAFALGAR STREET (NORTH) (374) btw SH
6108	5024	215.	212	-3.	98.6	144.	106	-38.	73.6	359.	318	-41.	88.6	2.2	TASMAN STREET (SOUTH) (350) btw NILE
4146	4962	282.	313	31.	111.0	293.	205	-88.	70.0	575.	518	-57.	90.1	2.4	COLLINGWOOD STREET (87) btw NILE ST a
4144	4101	707.	716	9.	101.3	367.	463	96.	126.2	1074.	1179	105.	109.8	3.1	RUTHERFORD STREET (314) b tw NILE ST
4110	5024	164.	118	-46.	72.0	326.	239	-87.	73.3	490.	357	-133.	72.9	6.5	Nile St - Btwn Alton St and Tasman St
4053	4054	70.	73	3.	104.3	104.	158	54.	151.9	174.	231	57.	132.8	4.0	HARDY STREET (WEST) (138) btw COLLING
4499	4999	176.	147	-29.	83.5	252.	306	54.	121.4	428.	453	25.	105.8	1.2	BRIDGE STREET (52) btw COLLINGWOOD ST
4070	4071	315.	289	-26.	91.7	79.	51	-28.	64.6	394.	340	-54.	86.3	2.8	SELWYN PLACE Btw TRAFALGAR SQ and TRA
4041	1197	343.	376	33.	109.6	171.	183	12.	107.0	514.	559	45.	108.8	1.9	HARDY STREET (WEST) (138) btw RUTHERF
3988	3989	253.	262	9.	103.6	169.	165	-4.	97.6	422.	427	5.	101.2	.2	BRIDGE STREET (52) btw TRAFALGAR ST a
4202	5393	45.	28	-17.	62.2	30.	19	-11.	63.3	75.	47	-28.	62.7	3.6	RUTHERFORD STREET (314) btw WAIMEA RD
4236	5534	209.	173	-36.	82.8	140.	154	14.	110.0	349.	327	-22.	93.7	1.2	VAN DIEMEN STREET (383) btw WAIMEA RD
2597	4384	23.	4	-19.	17.4	35.	33	-2.	94.3	58.	37	-21.	63.8	3.0	MOTUEKA STREET (231) btw WAIMEA RD an
5001	4446	88.	95	7.	108.0	131.	174	43.	132.8	219.	269	50.	122.8	3.2	MARKET ROAD (207) btw WAIMEA RD and B
4041	1197	343.	376	33.	109.6	171.	183	12.	107.0	514.	559	45.	108.8	1.9	HARDY STREET (WEST) (138) btw RUTHERF
4796	4961	788.	781	-7.	99.1	341.	333	-8.	97.7	1129.	1114	-15.	98.7	.4	VANGUARD STREET (384) btw HARDY ST an
4958	5554	570.	644	74.	113.0	240.	230	-10.	95.8	810.	874	64.	107.9	2.2	GLOUCESTER STREET (124) btw ST VINCEN
2098	4064	352.	462	110.	131.3	235.	244	9.	103.8	587.	706	119.	120.3	4.7	ST VINCENT STREET (318) btw GLOUCESTE
2100	4923	34.	28	-6.	82.4	50.	54	4.	108.0	84.	82	-2.	97.6	.2	ABRAHAM HEIGHTS (6) btw QUEBEC RD and
4088	5025	38.	45	7.	118.4	25.	27	2.	108.0	63.	72	9.	114.3	1.1	QUEBEC ROAD (285) btw END OF KCC RHS
4089	4088	180.	209	29.	116.1	43.	64	21.	148.8	223.	273	50.	122.4	3.2	PRINCES DRIVE (280) btw QUEBEC ROAD A
4989	5480	1536.	1562	26.	101.7	750.	690	-60.	92.0	2286.	2252	-34.	98.5	.7	WAIMEA ROAD (391) btw BOUNDARY RD and
4162	4179	182.	220	38.	120.9	121.	75	-46.	62.0	303.	295	-8.	97.4	.5	TOI TOI STREET (365) btw MONTREAL RD
4089	4088	180.	209	29.	116.1	43.	64	21.	148.8	223.	273	50.	122.4	3.2	PRINCES DRIVE (280) btw QUEBEC ROAD A
4263	3196	62.	49	-13.	79.0	12.	20	8.	166.7	74.	69	-5.	93.2	.6	STANSELL AVENUE (338) btw MOANA AVENU
4966	1994	127.	95	-32.	74.8	85.	90	5.	105.9	212.	185	-27.	87.3	1.9	BISLEY AVENUE (43) btw ROCKS RD and C
4989	5480	1536.	1562	26.	101.7	750.	690	-60.	92.0	2286.	2252	-34.	98.5	.7	WAIMEA ROAD (391) btw BOUNDARY RD and
4089	4088	180.	209	29.	116.1	43.	64	21.	148.8	223.	273	50.	122.4	3.2	PRINCES DRIVE (280) btw QUEBEC ROAD A

4545	4518	336.	316	-20.	94.0	91.	100	9.	109.9	427.	416	-11.	97.4	.5	THE RIDGEWAY (NORTH) (357) btw WAIMEA
4515	4501	56.	92	36.	164.3	38.	43	5.	113.2	94.	135	41.	143.6	3.8	WATERHOUSE STREET (399) btw WAIMEA RD
4555	4612	25.	36	11.	144.0	66.	91	25.	137.9	91.	127	36.	139.6	3.4	ARAPIKI ROAD (23) btw MAIN RD STOKE a
4608	4623	36.	32	-4.	88.9	53.	98	45.	184.9	89.	130	41.	146.1	3.9	MAITLAND AVENUE (198) btw MAIN RD STO
4651	4659	39.	43	4.	110.3	61.	96	35.	157.4	100.	139	39.	139.0	3.6	MARSDEN ROAD (208) btw MAIN RD STOKE
4747	5489	205.	184	-21.	89.8	137.	149	12.	108.8	342.	333	-9.	97.4	.5	SONGER STREET (331) btw MAIN RD STOKE
4816	4821	113.	133	20.	117.7	167.	188	21.	112.6	280.	321	41.	114.6	2.4	POLSTEAD ROAD (277) btw MAIN RD STOKE
5111	5112	127.	116	-11.	91.3	190.	195	5.	102.6	317.	311	-6.	98.1	.3	SAXTON ROAD (319) btw MAIN RD STK: S-
4966	1994	127.	95	-32.	74.8	85.	90	5.	105.9	212.	185	-27.	87.3	1.9	BISLEY AVENUE (43) btw ROCKS RD and C
4312	6113	27.	33	6.	122.2	51.	71	20.	139.2	78.	104	26.	133.3	2.7	TOSSWILL ROAD (368) btw TAHUNANUI DR
4972	4973	12.	22	10.	183.3	45.	35	-10.	77.8	57.	57	0.	100.0	.0	MAIRE STREET (195) btw ANNESBROOK DR
4462	3399	500.	480	-20.	96.0	166.	161	-5.	97.0	666.	641	-25.	96.2	1.0	PASCOE STREET (268) btw PARKERS RD an
5118	4459	225.	227	2.	100.9	150.	166	16.	110.7	375.	393	18.	104.8	.9	QUARANTINE ROAD (284) btw BOLT RD and
5119	5118	199.	182	-17.	91.5	132.	162	30.	122.7	331.	344	13.	103.9	.7	TRENT DRIVE (376) btw BOLT RD and END
5180	4783	180.	202	22.	112.2	334.	318	-16.	95.2	514.	520	6.	101.2	.3	Nayland Rd - Kendall Vw & Holdcroft Pl
2699	5111	94.	59	-35.	62.8	380.	415	35.	109.2	474.	474	0.	100.0	.0	Saxton Rd West - Railway Reserve & Mai
5188	5176	1173.	1143	-30.	97.4	391.	445	54.	113.8	1564.	1588	24.	101.5	.6	MAIN ROAD STOKE (7805) btw SAXTON CUL
2675	2678	116.	104	-12.	89.7	84.	63	-21.	75.0	200.	167	-33.	83.5	2.4	00600144 Eighty Eight Vly Stm bridge 2
2937	2826	50.	67	17.	134.0	44.	40	-4.	90.9	94.	107	13.	113.8	1.3	00600153 Spooners Hill (Higgins Cul) 2
1654	1655	424.	528	104.	124.5	228.	167	-61.	73.2	652.	695	43.	106.6	1.7	00600138 Brightwater (Pitfure bridge)
1555	1554	594.	643	49.	108.2	229.	194	-35.	84.7	823.	837	14.	101.7	.5	00600135 Wairoa Rr (Burkes Bank) 14Jun
1523	1518	261.	256	-5.	98.1	338.	444	106.	131.4	599.	700	101.	116.9	4.0	06000000 Start of State Highway 60 21J
1623	1619	388.	273	-115.	70.4	653.	729	76.	111.6	1041.	1002	-39.	96.3	1.2	06000005 Appleby Bridge 28Mar07
1807	1603	500.	560	60.	112.0	250.	236	-14.	94.4	750.	796	46.	106.1	1.7	06000008 Research Orchard Rd
1745	1737	335.	413	78.	123.3	215.	230	15.	107.0	550.	643	93.	116.9	3.8	06000018 Ruby Bay 14Jun06
1865	1864	321.	286	-35.	89.1	201.	278	77.	138.3	522.	564	42.	108.0	1.8	06000036 Motueka Nth (Bridge)
5478	5462	950.	983	33.	103.5	595.	456	-139.	76.6	1545.	1439	-106.	93.1	2.7	00600122 Stoke-Telemetry Site 81 - Wha
4919	3944	1192.	1153	-39.	96.7	556.	471	-85.	84.7	1748.	1624	-124.	92.9	3.0	00600118 Basin Reserve(Rocks Rd) 26Mar
3831	3826	328.	343	15.	104.6	733.	768	35.	104.8	1061.	1111	50.	104.7	1.5	00600114 Nelson Nth - Atawhai Cemetry
1129	1130	721.	861	140.	119.4	704.	486	-218.	69.0	1425.	1347	-78.	94.5	2.1	Salisbury Road (723) 2008 Fri
1252	6115	294.	316	22.	107.5	240.	212	-28.	88.3	534.	528	-6.	98.9	.3	Queen Street (676) 2008 wed
1523	1439	119.	89	-30.	74.8	120.	148	28.	123.3	239.	237	-2.	99.2	.1	Bateup Road (171) 2008 wed
1015	1019	159.	124	-35.	78.0	183.	232	49.	126.8	342.	356	14.	104.1	.7	Champion Road (243a) 2008 wed
1277	1320	198.	141	-57.	71.2	132.	196	64.	148.5	330.	337	7.	102.1	.4	McGlashen (574) 2008 wed 17 dec
1512	1517	19.	13	-6.	68.4	19.	2	-17.	10.5	38.	15	-23.	39.5	4.5	McShane Road (69) 2008
1150	1155	92.	97	5.	105.4	92.	61	-31.	66.3	184.	158	-26.	85.9	2.0	Hill Street (454a) 2008
1003	1011	101.	144	43.	142.6	67.	23	-44.	34.3	168.	167	-1.	99.4	.1	Hill Street (454b) 2008
1427	3897	48.	58	10.	120.8	72.	83	11.	115.3	120.	141	21.	117.5	1.8	Hart Road (427) 2008
1524	1525	29.	39	10.	134.5	29.	28	-1.	96.6	58.	67	9.	115.5	1.1	Paton Road (644) 2008
4091	1548	40.	62	22.	155.0	27.	23	-4.	85.2	67.	85	18.	126.9	2.1	Clover Road East (260) 2008

Number of links = 74 Number of forward links = 74 Number of back links = 74

TOTALS	FORWARD	BACK	TOTALS
COUNT	20728.	15486.	36214.
VOLUME	21197.	15637.	36834.
CHANGE	469.	151.	620.
%	102.	101.	102.
CORREL.			
COEFF.	.993	.969	.995
%RMS	14.16	23.58	9.81
r^2	.987	.938	.991
GEH	3.2	1.2	3.2

GEH	<5	<7	<10	<12	>12
#	72	74	74	74	0
%	97.3	100.0	100.0	100.0	.0

```
CORDON terminated successfully
```

INTER PEAK SCREENLINES

```
+-------------------------------------------+
| TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
|  TRACKS +-------------------------+ TRACKS  |
| S TRACKS|                         |S TRACKS |
| KS TRACK|   PROGRAM  :     CORDON  |KS TRACK |
| CKS TRAC|   VERSION  :      V7.08  |CKS TRAC |
| ACKS TRA|                         |ACKS TRA |
| RACKS TR|   DATE RUN :  11-AUG-09  |RACKS TR |
| TRACKS T|   TIME RUN :   10:00:23  |TRACKS T |
|  TRACKS |   PLATFORM :  WIN 95/NT  | TRACKS  |
| S TRACKS+-------------------------+S TRACKS |
| KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
+-------------------------------------------+
+-------------------------------------------+
|            TRACKS LICENCED TO             |
|  GABITES PORTER                           |
|         AT :   CHRISTCHURCH, N.Z.         |
+-------------------------------------------+
           BUILD DATE : 22/04/09 01:30
           PARAMETER VERSION : V5.20
```

```
 NETWORK PERIOD FACTOR :  1.000

  CORDON PERIOD FACTOR :  1.000

     GEH PERIOD FACTOR :  1.000

   CSV OUTPUT FILE :


 CORDON DATA FILE  : NS06CD.DATNELSON MODEL - INTERPEAK - 2006
 LOADED NETWORK    : NS06NL.000     NELSON ROADING STUDY 2006 1200-1300
                    9921 LINKS IN NETWORK


 CORDON NUMBER :  1
 DESCRIPTION   :  1  ATAWHAI DR

                    FORWARD                      BACK                         TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  3831  3826     386.    458     72. 118.7     417.    498     81. 119.4     803.    956    153. 119.1   5.2   00600114 NELSON NTH - ATAWHAI CEMETRY
  3843  3839      41.     39     -2.  95.1      42.     44      2. 104.8      83.     83      0. 100.0    .0   ATAWHAI DRIVE  (27) BTW INTERSEC. LEG
  5297  3865     113.    100    -13.  88.5     170.    114    -56.  67.1     283.    214    -69.  75.6   4.4   ATAWHAI DR - BTWN IWA RD & WEKA ST (02

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      540.      629.     1169.
 VOLUME     597.      656.     1253.
```

```
 CHANGE      57.       27.       84.
   %        111.      104.      107.
CORREL.
 COEFF.     .998      .980      .991
 %RMS      28.75     33.22     30.46
  R^2       .996      .961      .982
  GEH        2.4       1.1       2.4

  GEH  <5    <7   <10   <12   >12
  #     2     3     3     3     0
  %  66.7 100.0 100.0 100.0    .0

 CORDON NUMBER :  2
 DESCRIPTION   :  2  MAITAI RIVER

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4114  5496     142.    160     18. 112.7     130.    165     35. 126.9     272.    325     53. 119.5   3.1   NILE STREET (EAST)  (253) BTW DOMETT S
  4058  4059      62.     46    -16.  74.2      63.     48    -15.  76.2     125.     94    -31.  75.2   3.0   HARDY STREET EAST  (139) BTW AVON TCE
  4007  4011     135.     88    -47.  65.2      99.     79    -20.  79.8     234.    167    -67.  71.4   4.7   BRIDGE STREET  (52) BTW TASMAN ST BRID
  3941  3924     325.    310    -15.  95.4     307.    338     31. 110.1     632.    648     16. 102.5    .6   TRAFALGAR STREET (NORTH)  (374) BTW SH

NUMBER OF LINKS =     4 NUMBER OF FORWARD LINKS =     4 NUMBER OF BACK LINKS =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      664.      599.     1263.
 VOLUME     604.      630.     1234.
 CHANGE     -60.       31.      -29.
   %         91.      105.       98.
CORREL.
 COEFF.     .973      .986      .981
 %RMS      19.09     20.44     16.87
  R^2       .948      .973      .962
  GEH        2.4       1.3        .8

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  3
 DESCRIPTION   :  3  SOUTH CBD

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  6108  5024     134.    169     35. 126.1     134.    129     -5.  96.3     268.    298     30. 111.2   1.8   TASMAN STREET (SOUTH)  (350) BTW NILE
  4146  4962     183.    212     29. 115.8     227.    216    -11.  95.2     410.    428     18. 104.4    .9   COLLINGWOOD STREET  (87) BTW NILE ST A
  4144  4101     679.    660    -19.  97.2     632.    665     33. 105.2    1311.   1325     14. 101.1    .4   RUTHERFORD STREET  (314) B TW NILE ST

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      996.      993.     1989.
 VOLUME    1041.     1010.     2051.
 CHANGE      45.       17.       62.
   %        105.      102.      103.
CORREL.
```

```
 COEFF.    1.000     1.000     1.000
 %RMS      10.49      7.51      4.02
  R^2      1.000      .999     1.000
  GEH        1.4        .5       1.4

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  4
 DESCRIPTION   :  4  EAST CBD

                    FORWARD                    BACK                     TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4110  5024     192.    183     -9.  95.3     174.    227     53. 130.5     366.    410     44. 112.0   2.2   NILE ST - BTWN ALTON ST AND TASMAN ST
  4053  4054      87.     77    -10.  88.5      87.     85     -2.  97.7     174.    162    -12.  93.1    .9   HARDY STREET (WEST)  (138) BTW COLLING
  4499  4999     226.    169    -57.  74.8     202.    205      3. 101.5     428.    374    -54.  87.4   2.7   BRIDGE STREET  (52) BTW COLLINGWOOD ST

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      505.      463.      968.
 VOLUME     429.      517.      946.
 CHANGE     -76.       54.      -22.
   %         85.      112.       98.
CORREL.
 COEFF.     .936      .929      .932
 %RMS      24.60     24.34     15.49
  R^2       .877      .862      .869
  GEH        3.5       2.4        .7

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  5
 DESCRIPTION   :  5  CBD

                    FORWARD                    BACK                     TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4070  4071     208.    225     17. 108.2     138.    132     -6.  95.7     346.    357     11. 103.2    .6   SELWYN PLACE  BTW TRAFALGAR SQ AND TRA
  4041  1197     290.    248    -42.  85.5     241.    310     69. 128.6     531.    558     27. 105.1   1.2   HARDY STREET (WEST)  (138) BTW RUTHERF
  3988  3989     236.    222    -14.  94.1     157.    181     24. 115.3     393.    403     10. 102.5    .5   BRIDGE STREET  (52) BTW TRAFALGAR ST A

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      734.      536.     1270.
 VOLUME     695.      623.     1318.
 CHANGE     -39.       87.       48.
   %         95.      116.      104.
CORREL.
 COEFF.     .901      .995     1.000
 %RMS      13.71     29.01      5.15
  R^2       .812      .991      .999
  GEH        1.5       3.6       1.3
```

GEH	<5	<7	<10	<12	>12
#	3	3	3	3	0
%	100.0	100.0	100.0	100.0	.0

CORDON NUMBER : 6
DESCRIPTION : 6 WAIMEA RD

		FORWARD				BACK				TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	GEH	
4202	5393	34.	35	1.	102.9	33.	45	12.	136.4	67.	80	13.	119.4	1.5	RUTHERFORD STREET (314) BTW WAIMEA RD
4236	5534	162.	139	-23.	85.8	162.	134	-28.	82.7	324.	273	-51.	84.3	3.0	VAN DIEMEN STREET (383) BTW WAIMEA RD
2597	4384	25.	6	-19.	24.0	25.	9	-16.	36.0	50.	15	-35.	30.0	6.1	MOTUEKA STREET (231) BTW WAIMEA RD AN
5001	4446	117.	85	-32.	72.6	118.	133	15.	112.7	235.	218	-17.	92.8	1.1	MARKET ROAD (207) BTW WAIMEA RD AND B

NUMBER OF LINKS = 4 NUMBER OF FORWARD LINKS = 4 NUMBER OF BACK LINKS = 4

TOTALS	FORWARD	BACK	TOTALS
COUNT	338.	338.	676.
VOLUME	265.	321.	586.
CHANGE	-73.	-17.	-90.
%	78.	95.	87.
CORREL.			
COEFF.	.983	.948	.982
%RMS	29.90	25.65	22.36
R^2	.966	.900	.964
GEH	4.2	.9	3.6

GEH	<5	<7	<10	<12	>12
#	3	4	4	4	0
%	75.0	100.0	100.0	100.0	.0

CORDON NUMBER : 7
DESCRIPTION : 7 WASHINGTON VALLEY

		FORWARD				BACK				TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	GEH	
4041	1197	290.	248	-42.	85.5	241.	310	69.	128.6	531.	558	27.	105.1	1.2	HARDY STREET (WEST) (138) BTW RUTHERF
4796	4961	589.	491	-98.	83.4	591.	438	-153.	74.1	1180.	929	-251.	78.7	7.7	VANGUARD STREET (384) BTW HARDY ST AN
4958	5554	341.	379	38.	111.1	339.	315	-24.	92.9	680.	694	14.	102.1	.5	GLOUCESTER STREET (124) BTW ST VINCEN
2098	4064	297.	294	-3.	99.0	297.	249	-48.	83.8	593.	543	-50.	91.6	2.1	ST VINCENT STREET (318) BTW GLOUCESTE
2100	4923	31.	20	-11.	64.5	31.	26	-5.	83.9	62.	46	-16.	74.2	2.2	ABRAHAM HEIGHTS (6) BTW QUEBEC RD AND
4088	5025	37.	25	-12.	67.6	37.	19	-18.	51.4	74.	44	-30.	59.5	3.9	QUEBEC ROAD (285) BTW END OF KCC RHS
4089	4088	103.	106	3.	102.9	63.	86	23.	136.5	166.	192	26.	115.7	1.9	PRINCES DRIVE (280) BTW RICHARDSON ST
4919	3944	853.	847	-6.	99.3	731.	776	45.	106.2	1584.	1623	39.	102.5	1.0	00600118 BASIN RESERVE(ROCKS RD) 26MAR

NUMBER OF LINKS = 8 NUMBER OF FORWARD LINKS = 8 NUMBER OF BACK LINKS = 8

TOTALS	FORWARD	BACK	TOTALS
COUNT	2541.	2330.	4870.
VOLUME	2410.	2219.	4629.
CHANGE	-131.	-111.	-241.
%	95.	95.	95.
CORREL.			
COEFF.	.990	.965	.985
%RMS	13.64	23.91	16.40

```
 R^2       .981      .931      .970
 GEH        2.6       2.3       3.5

 GEH  <5    <7   <10   <12   >12
 #     7     7     8     8     0
 %  87.5  87.5 100.0 100.0    .0

CORDON NUMBER :  8
DESCRIPTION   :  8  MOANA

                    FORWARD                      BACK                       TOTAL
NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

 4989  5480    1047.   1128     81. 107.7     980.   1079     99. 110.1    2027.   2207    180. 108.9   3.9   WAIMEA ROAD  (391) BTW BOUNDARY RD AND
 4162  4179     114.    109     -5.  95.6     114.     91    -23.  79.8     228.    200    -28.  87.7   1.9   TOI TOI STREET  (365) BTW MONTREAL RD
 4089  4088     103.    106      3. 102.9      63.     86     23. 136.5     166.    192     26. 115.7   1.9   PRINCES DRIVE  (280) BTW QUEBEC ROAD A
 4263  3196      31.     24     -7.  77.4      31.     20    -11.  64.5      62.     44    -18.  71.0   2.5   STANSELL AVENUE  (338) BTW MOANA AVENU
 4966  1994      75.     72     -3.  96.0      75.     69     -6.  92.0     150.    141     -9.  94.0    .7   BISLEY AVENUE  (43) BTW ROCKS RD AND C

NUMBER OF LINKS =     5 NUMBER OF FORWARD LINKS =     5 NUMBER OF BACK LINKS =     5

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     1370.     1263.     2633.
 VOLUME    1439.     1345.     2784.
 CHANGE      69.       82.      151.
   %        105.      106.      106.
CORREL.
 COEFF.    1.000      .999     1.000
 %RMS      14.88     20.78     17.58
  R^2      1.000      .998      .999
  GEH        1.8       2.3       2.9

  GEH  <5    <7   <10   <12   >12
  #     5     5     5     5     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  9
 DESCRIPTION   :  9  MOANA

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4989  5480    1047.   1128     81. 107.7     980.   1079     99. 110.1    2027.   2207    180. 108.9   3.9   WAIMEA ROAD  (391) BTW BOUNDARY RD AND
  4089  4088     124.    106    -18.  85.5      72.     86     14. 119.4     196.    192     -4.  98.0    .3   PRINCES DRIVE  (280) BTW QUEBEC ROAD A
  4919  3944     853.    847     -6.  99.3     771.    776      5. 100.6    1624.   1623     -1.  99.9    .0   00600118 BASIN RESERVE(ROCKS RD) 26MAR

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     2024.     1823.     3847.
 VOLUME    2081.     1941.     4022.
 CHANGE      57.      118.      175.
   %        103.      106.      105.
CORREL.
 COEFF.     .998      .997      .997
 %RMS      8.72     11.65      9.93
  R^2       .995      .994      .994
  GEH        1.3       2.7       2.8
```

```
 GEH  <5    <7   <10   <12   >12
 #     3     3     3     3     0
 % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER : 10
 DESCRIPTION   :  10  MAIN ROAD STOKE

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4545  4518      96.    163     67. 169.8     137.    168     31. 122.6     233.    331     98. 142.1   5.8   THE RIDGEWAY (NORTH)  (357) BTW WAIMEA
  4515  4501      49.     41     -8.  83.7      49.     37    -12.  75.5      98.     78    -20.  79.6   2.1   WATERHOUSE STREET  (399) BTW WAIMEA RD
  4555  4612      34.     25     -9.  73.5      41.     31    -10.  75.6      74.     56    -18.  75.7   2.2   ARAPIKI ROAD  (23) BTW MAIN RD STOKE A
  4608  4623      47.     33    -14.  70.2      47.     44     -3.  93.6      94.     77    -17.  81.9   1.8   MAITLAND AVENUE  (198) BTW MAIN RD STO
  4651  4659      49.     37    -12.  75.5      63.     43    -20.  68.3     112.     80    -32.  71.4   3.3   MARSDEN ROAD  (208) BTW MAIN RD STOKE
  4747  5489     115.    118      3. 102.6     115.    113     -2.  98.3     230.    231      1. 100.4    .1   SONGER STREET  (331) BTW MAIN RD STOKE
  4816  4821     123.     92    -31.  74.8     104.     99     -5.  95.2     227.    191    -36.  84.1   2.5   POLSTEAD ROAD  (277) BTW MAIN RD STOKE
  5111  5112     138.     83    -55.  60.1     138.     88    -50.  63.8     276.    171   -105.  62.0   7.0   SAXTON ROAD  (319) BTW MAIN RD STK: S-

NUMBER OF LINKS =     8 NUMBER OF FORWARD LINKS =     8 NUMBER OF BACK LINKS =     8

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      651.      694.     1344.
 VOLUME     592.      623.     1215.
 CHANGE     -59.      -71.     -129.
   %         91.       90.       90.
CORREL.
 COEFF.     .713      .885      .817
 %RMS      43.99     28.04     34.83
  R^2       .508      .783      .667
  GEH        2.4       2.8       3.6

  GEH  <5    <7   <10   <12   >12
  #     6     7     8     8     0
  %  75.0  87.5 100.0 100.0    .0

 CORDON NUMBER : 11
 DESCRIPTION   :  11  TAHUNANUI DR (SH6)

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4919  3944     853.    847     -6.  99.3     731.    776     45. 106.2    1584.   1623     39. 102.5   1.0   00600118 BASIN RESERVE(ROCKS RD) 26MAR
  4966  1994      75.     72     -3.  96.0      75.     69     -6.  92.0     150.    141     -9.  94.0    .7   BISLEY AVENUE  (43) BTW ROCKS RD AND C
  4312  6113      50.     37    -13.  74.0      30.     40     10. 133.3      80.     77     -3.  96.3    .3   TOSSWILL ROAD  (368) BTW TAHUNANUI DR
  4972  4973      36.     17    -19.  47.2      42.     20    -22.  47.6      78.     37    -41.  47.4   5.4   MAIRE STREET  (195) BTW ANNESBROOK DR

NUMBER OF LINKS =     4 NUMBER OF FORWARD LINKS =     4 NUMBER OF BACK LINKS =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     1014.      878.     1892.
 VOLUME     973.      905.     1878.
 CHANGE     -41.       27.      -14.
   %         96.      103.       99.
CORREL.
 COEFF.    1.000      .999     1.000
 %RMS       5.46     13.53      7.00
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```
 R^2      1.000      .999     1.000
 GEH        1.3        .9        .3

 GEH  <5    <7   <10   <12   >12
 #     3     4     4     4     0
 %  75.0 100.0 100.0 100.0    .0

CORDON NUMBER : 12
DESCRIPTION   :  12  QUARANTINE RD

                    FORWARD                    BACK                     TOTAL
NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

 4462  3399     262.    269      7. 102.7     173.    187     14. 108.1     435.    456     21. 104.8   1.0   PASCOE STREET  (268) BTW PARKERS RD AN
 5118  4459     276.    265    -11.  96.0     276.    234    -42.  84.8     552.    499    -53.  90.4   2.3   QUARANTINE ROAD  (284) BTW BOLT RD AND
 5119  5118     179.    222     43. 124.0     180.    271     91. 150.6     359.    493    134. 137.3   6.5   TRENT DRIVE  (376) BTW BOLT RD AND END

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      717.      629.     1346.
 VOLUME     756.      692.     1448.
 CHANGE      39.       63.      102.
   %        105.      110.      108.
CORREL.
 COEFF.     .978      .129      .249
 %RMS      13.29     34.13     22.95
  R^2       .956      .017      .062
  GEH        1.4       2.5       2.7

  GEH  <5    <7   <10   <12   >12
  #     2     3     3     3     0
  %  66.7 100.0 100.0 100.0    .0

 CORDON NUMBER : 13
 DESCRIPTION   :  13  WHAKATU DR / NAYLAND RD / MAIN ROAD STOKE

                    FORWARD                    BACK                     TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  5478  5462     843.    848      5. 100.6     768.    800     32. 104.2    1611.   1648     37. 102.3    .9   00600122 STOKE-TELEMETRY SITE 81 - WHA
  5180  4783     152.    108    -44.  71.1     168.    231     63. 137.5     320.    339     19. 105.9   1.0   NAYLAND RD - KENDALL VW & HOLDCROFT PL
  2699  5111     146.     80    -66.  54.8     232.    211    -21.  90.9     378.    291    -87.  77.0   4.8   SAXTON RD WEST - RAILWAY RESERVE & MAI
  5188  5176     747.    719    -28.  96.3     511.    433    -78.  84.7    1258.   1152   -106.  91.6   3.1   MAIN ROAD STOKE  (7805) BTW SAXTON CUL

NUMBER OF LINKS =     4 NUMBER OF FORWARD LINKS =     4 NUMBER OF BACK LINKS =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     1888.     1679.     3567.
 VOLUME    1755.     1675.     3430.
 CHANGE    -133.       -4.     -137.
   %         93.      100.       96.
CORREL.
 COEFF.     .999      .975      .994
 %RMS      10.31     14.76      9.28
  R^2       .999      .950      .988
  GEH        3.1        .1       2.3
```

```
 GEH  <5    <7   <10   <12   >12
 #     4     4     4     4     0
 % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER : 14
 DESCRIPTION   :  14 STATE HIGHWAY COUNTS

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  2675  2678      79.     99     20. 125.3      80.     86      6. 107.5     159.    185     26. 116.4   2.0   00600144 EIGHTY EIGHT VLY STM BRIDGE 2
  2937  2826      47.     70     23. 148.9      41.     66     25. 161.0      88.    136     48. 154.5   4.5   00600153 SPOONERS HILL (HIGGINS CUL) 2
  1654  1655     268.    264     -4.  98.5     230.    234      4. 101.7     498.    498      0. 100.0    .0   00600138 BRIGHTWATER (PITFURE BRIDGE)
  1555  1554     272.    292     20. 107.4     275.    268     -7.  97.5     547.    560     13. 102.4    .6   00600135 WAIROA RR (BURKES BANK) 14JUN
  1523  1518     261.    262      1. 100.4     306.    289    -17.  94.4     567.    551    -16.  97.2    .7   06000000 START OF STATE HIGHWAY 60 21J
  1623  1619     369.    325    -44.  88.1     354.    374     20. 105.6     723.    699    -24.  96.7    .9   06000005 APPLEBY BRIDGE 28MAR07
  1807  1603     281.    320     39. 113.9     265.    283     18. 106.8     546.    603     57. 110.4   2.4   06000008 RESEARCH ORCHARD RD
  1745  1737     241.    232     -9.  96.3     215.    215      0. 100.0     456.    447     -9.  98.0    .4   06000018 RUBY BAY 14JUN06
  1865  1864     173.    194     21. 112.1     191.    180    -11.  94.2     364.    374     10. 102.7    .5   06000036 MOTUEKA NTH (BRIDGE)
  5478  5462     843.    848      5. 100.6     768.    800     32. 104.2    1611.   1648     37. 102.3    .9   00600122 STOKE-TELEMETRY SITE 81 - WHA
  4919  3944     853.    847     -6.  99.3     771.    776      5. 100.6    1624.   1623     -1.  99.9    .0   00600118 BASIN RESERVE(ROCKS RD) 26MAR
  3831  3826     386.    458     72. 118.7     417.    498     81. 119.4     803.    956    153. 119.1   5.2   00600114 NELSON NTH - ATAWHAI CEMETRY

NUMBER OF LINKS =    12 NUMBER OF FORWARD LINKS =    12 NUMBER OF BACK LINKS =    12

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     4073.     3913.     7986.
 VOLUME    4211.     4069.     8280.
 CHANGE     138.      156.      294.
   %        103.      104.      104.
CORREL.
 COEFF.     .994      .994      .995
 %RMS      9.13      9.00      8.13
  R^2       .988      .989      .991
  GEH       2.1       2.5       3.3

  GEH  <5    <7   <10   <12   >12
  #    11    12    12    12     0
  %  91.7 100.0 100.0 100.0    .0

 CORDON NUMBER : 15
 DESCRIPTION   :  15 RICHMOND SPOT COUNTS

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  1129  1130     631.    691     60. 109.5     616.    565    -51.  91.7    1247.   1256      9. 100.7    .3   SALISBURY ROAD (723) 2008 FRI
  1252  6115     246.    245     -1.  99.6     201.    164    -37.  81.6     447.    409    -38.  91.5   1.8   QUEEN STREET (676) 2008 WED
  1523  1439     104.     71    -33.  68.3      88.     81     -7.  92.0     192.    152    -40.  79.2   3.0   BATEUP ROAD (171) 2008 WED
  1015  1019     156.    114    -42.  73.1     137.    114    -23.  83.2     293.    228    -65.  77.8   4.0   CHAMPION ROAD (243A) 2008 WED
  1277  1320     141.    160     19. 113.5     141.    168     27. 119.1     282.    328     46. 116.3   2.6   MCGLASHEN (574) 2008 WED 17 DEC
  1512  1517      18.      5    -13.  27.8      18.      2    -16.  11.1      36.      7    -29.  19.4   6.3   MCSHANE ROAD (69) 2008
  1150  1155      42.     33     -9.  78.6      42.     33     -9.  78.6      84.     66    -18.  78.6   2.1   HILL STREET (454A) 2008
  1003  1011      23.     24      1. 104.3      23.     22     -1.  95.7      46.     46      0. 100.0    .0   HILL STREET (454B) 2008
  1427  3897      32.     30     -2.  93.8      32.     33      1. 103.1      64.     63     -1.  98.4    .1   HART ROAD (427) 2008
  1524  1525      20.     20      0. 100.0      20.     20      0. 100.0      40.     40      0. 100.0    .0   PATON ROAD (644) 2008
  4091  1548      26.     18     -8.  69.2      26.     19     -7.  73.1      52.     37    -15.  71.2   2.2   CLOVER ROAD EAST (260) 2008

NUMBER OF LINKS =    11 NUMBER OF FORWARD LINKS =    11 NUMBER OF BACK LINKS =    11
```

TOTALS	FORWARD	BACK	TOTALS
COUNT	1439.	1344.	2783.
VOLUME	1411.	1221.	2632.
CHANGE	-28.	-123.	-151.
%	98.	91.	95.
CORREL.			
COEFF.	.995	.996	.997
%RMS	20.42	19.48	13.02
R^2	.991	.991	.993
GEH	.7	3.4	2.9

GEH	<5	<7	<10	<12	>12
#	10	11	11	11	0
%	90.9	100.0	100.0	100.0	.0

CORDON NUMBER : 16
DESCRIPTION : 16 ALL

		FORWARD				BACK				TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	GEH	
3843	3839	41.	39	-2.	95.1	42.	44	2.	104.8	83.	83	0.	100.0	.0	ATAWHAI DRIVE (27) BTW INTERSEC. LEG
5297	3865	113.	100	-13.	88.5	170.	114	-56.	67.1	283.	214	-69.	75.6	4.4	ATAWHAI DR - BTWN IWA RD & WEKA ST (02
4114	5496	142.	160	18.	112.7	130.	165	35.	126.9	272.	325	53.	119.5	3.1	NILE STREET (EAST) (253) BTW DOMETT S
4058	4059	62.	46	-16.	74.2	63.	48	-15.	76.2	125.	94	-31.	75.2	3.0	HARDY STREET EAST (139) BTW AVON TCE
4007	4011	135.	88	-47.	65.2	99.	79	-20.	79.8	234.	167	-67.	71.4	4.7	BRIDGE STREET (52) BTW TASMAN ST BRID
3941	3924	325.	310	-15.	95.4	307.	338	31.	110.1	632.	648	16.	102.5	.6	TRAFALGAR STREET (NORTH) (374) BTW SH
6108	5024	134.	169	35.	126.1	134.	129	-5.	96.3	268.	298	30.	111.2	1.8	TASMAN STREET (SOUTH) (350) BTW NILE
4146	4962	183.	212	29.	115.8	227.	216	-11.	95.2	410.	428	18.	104.4	.9	COLLINGWOOD STREET (87) BTW NILE ST A
4144	4101	679.	660	-19.	97.2	632.	665	33.	105.2	1311.	1325	14.	101.1	.4	RUTHERFORD STREET (314) B TW NILE ST
4110	5024	192.	183	-9.	95.3	174.	227	53.	130.5	366.	410	44.	112.0	2.2	NILE ST - BTWN ALTON ST AND TASMAN ST
4053	4054	87.	77	-10.	88.5	87.	85	-2.	97.7	174.	162	-12.	93.1	.9	HARDY STREET (WEST) (138) BTW COLLING
4499	4999	226.	169	-57.	74.8	202.	205	3.	101.5	428.	374	-54.	87.4	2.7	BRIDGE STREET (52) BTW COLLINGWOOD ST
4070	4071	208.	225	17.	108.2	138.	132	-6.	95.7	346.	357	11.	103.2	.6	SELWYN PLACE BTW TRAFALGAR SQ AND TRA
4041	1197	290.	248	-42.	85.5	241.	310	69.	128.6	531.	558	27.	105.1	1.2	HARDY STREET (WEST) (138) BTW RUTHERF
3988	3989	236.	222	-14.	94.1	157.	181	24.	115.3	393.	403	10.	102.5	.5	BRIDGE STREET (52) BTW TRAFALGAR ST A
4202	5393	34.	35	1.	102.9	33.	45	12.	136.4	67.	80	13.	119.4	1.5	RUTHERFORD STREET (314) BTW WAIMEA RD
4236	5534	162.	139	-23.	85.8	162.	134	-28.	82.7	324.	273	-51.	84.3	3.0	VAN DIEMEN STREET (383) BTW WAIMEA RD
2597	4384	25.	6	-19.	24.0	25.	9	-16.	36.0	50.	15	-35.	30.0	6.1	MOTUEKA STREET (231) BTW WAIMEA RD AN
5001	4446	117.	85	-32.	72.6	118.	133	15.	112.7	235.	218	-17.	92.8	1.1	MARKET ROAD (207) BTW WAIMEA RD AND B
4041	1197	290.	248	-42.	85.5	241.	310	69.	128.6	531.	558	27.	105.1	1.2	HARDY STREET (WEST) (138) BTW RUTHERF
4796	4961	589.	491	-98.	83.4	591.	438	-153.	74.1	1180.	929	-251.	78.7	7.7	VANGUARD STREET (384) BTW HARDY ST AN
4958	5554	341.	379	38.	111.1	339.	315	-24.	92.9	680.	694	14.	102.1	.5	GLOUCESTER STREET (124) BTW ST VINCEN
2098	4064	297.	294	-3.	99.0	297.	249	-48.	83.8	593.	543	-50.	91.6	2.1	ST VINCENT STREET (318) BTW GLOUCESTE
2100	4923	31.	20	-11.	64.5	31.	26	-5.	83.9	62.	46	-16.	74.2	2.2	ABRAHAM HEIGHTS (6) BTW QUEBEC RD AND
4088	5025	37.	25	-12.	67.6	37.	19	-18.	51.4	74.	44	-30.	59.5	3.9	QUEBEC ROAD (285) BTW END OF KCC RHS
4089	4088	103.	106	3.	102.9	63.	86	23.	136.5	166.	192	26.	115.7	1.9	PRINCES DRIVE (280) BTW RICHARDSON ST
4989	5480	1047.	1128	81.	107.7	980.	1079	99.	110.1	2027.	2207	180.	108.9	3.9	WAIMEA ROAD (391) BTW BOUNDARY RD AND
4162	4179	114.	109	-5.	95.6	114.	91	-23.	79.8	228.	200	-28.	87.7	1.9	TOI TOI STREET (365) BTW MONTREAL RD
4089	4088	124.	106	-18.	85.5	72.	86	14.	119.4	196.	192	-4.	98.0	.3	PRINCES DRIVE (280) BTW QUEBEC ROAD A
4263	3196	31.	24	-7.	77.4	31.	20	-11.	64.5	62.	44	-18.	71.0	2.5	STANSELL AVENUE (338) BTW MOANA AVENU
4966	1994	75.	72	-3.	96.0	75.	69	-6.	92.0	150.	141	-9.	94.0	.7	BISLEY AVENUE (43) BTW ROCKS RD AND C
4989	5480	1047.	1128	81.	107.7	980.	1079	99.	110.1	2027.	2207	180.	108.9	3.9	WAIMEA ROAD (391) BTW BOUNDARY RD AND
4089	4088	103.	106	3.	102.9	63.	86	23.	136.5	166.	192	26.	115.7	1.9	PRINCES DRIVE (280) BTW QUEBEC ROAD A
4545	4518	96.	163	67.	169.8	137.	168	31.	122.6	233.	331	98.	142.1	5.8	THE RIDGEWAY (NORTH) (357) BTW WAIMEA
4515	4501	49.	41	-8.	83.7	49.	37	-12.	75.5	98.	78	-20.	79.6	2.1	WATERHOUSE STREET (399) BTW WAIMEA RD
4555	4612	34.	25	-9.	73.5	41.	31	-10.	75.6	74.	56	-18.	75.7	2.2	ARAPIKI ROAD (23) BTW MAIN RD STOKE A
4608	4623	47.	33	-14.	70.2	47.	44	-3.	93.6	94.	77	-17.	81.9	1.8	MAITLAND AVENUE (198) BTW MAIN RD STO

4651	4659	49.	37	-12.	75.5	63.	43	-20.	68.3	112.	80	-32.	71.4	3.3	MARSDEN ROAD (208) BTW MAIN RD STOKE
4747	5489	115.	118	3.	102.6	115.	113	-2.	98.3	230.	231	1.	100.4	.1	SONGER STREET (331) BTW MAIN RD STOKE
4816	4821	123.	92	-31.	74.8	104.	99	-5.	95.2	227.	191	-36.	84.1	2.5	POLSTEAD ROAD (277) BTW MAIN RD STOKE
5111	5112	138.	83	-55.	60.1	138.	88	-50.	63.8	276.	171	-105.	62.0	7.0	SAXTON ROAD (319) BTW MAIN RD STK: S-
4966	1994	75.	72	-3.	96.0	75.	69	-6.	92.0	150.	141	-9.	94.0	.7	BISLEY AVENUE (43) BTW ROCKS RD AND C
4312	6113	50.	37	-13.	74.0	30.	40	10.	133.3	80.	77	-3.	96.3	.3	TOSSWILL ROAD (368) BTW TAHUNANUI DR
4972	4973	36.	17	-19.	47.2	42.	20	-22.	47.6	78.	37	-41.	47.4	5.4	MAIRE STREET (195) BTW ANNESBROOK DR
4462	3399	262.	269	7.	102.7	173.	187	14.	108.1	435.	456	21.	104.8	1.0	PASCOE STREET (268) BTW PARKERS RD AN
5118	4459	276.	265	-11.	96.0	276.	234	-42.	84.8	552.	499	-53.	90.4	2.3	QUARANTINE ROAD (284) BTW BOLT RD AND
5119	5118	179.	222	43.	124.0	180.	271	91.	150.6	359.	493	134.	137.3	6.5	TRENT DRIVE (376) BTW BOLT RD AND END
5180	4783	152.	108	-44.	71.1	168.	231	63.	137.5	320.	339	19.	105.9	1.0	NAYLAND RD - KENDALL VW & HOLDCROFT PL
2699	5111	146.	80	-66.	54.8	232.	211	-21.	90.9	378.	291	-87.	77.0	4.8	SAXTON RD WEST - RAILWAY RESERVE & MAI
5188	5176	747.	719	-28.	96.3	511.	433	-78.	84.7	1258.	1152	-106.	91.6	3.1	MAIN ROAD STOKE (7805) BTW SAXTON CUL
2675	2678	79.	99	20.	125.3	80.	86	6.	107.5	159.	185	26.	116.4	2.0	00600144 EIGHTY EIGHT VLY STM BRIDGE 2
2937	2826	47.	70	23.	148.9	41.	66	25.	161.0	88.	136	48.	154.5	4.5	00600153 SPOONERS HILL (HIGGINS CUL) 2
1654	1655	268.	264	-4.	98.5	230.	234	4.	101.7	498.	498	0.	100.0	.0	00600138 BRIGHTWATER (PITFURE BRIDGE)
1555	1554	272.	292	20.	107.4	275.	268	-7.	97.5	547.	560	13.	102.4	.6	00600135 WAIROA RR (BURKES BANK) 14JUN
1523	1518	261.	262	1.	100.4	306.	289	-17.	94.4	567.	551	-16.	97.2	.7	06000000 START OF STATE HIGHWAY 60 21J
1623	1619	369.	325	-44.	88.1	354.	374	20.	105.6	723.	699	-24.	96.7	.9	06000005 APPLEBY BRIDGE 28MAR07
1807	1603	281.	320	39.	113.9	265.	283	18.	106.8	546.	603	57.	110.4	2.4	06000008 RESEARCH ORCHARD RD
1745	1737	241.	232	-9.	96.3	215.	215	0.	100.0	456.	447	-9.	98.0	.4	06000018 RUBY BAY 14JUN06
1865	1864	173.	194	21.	112.1	191.	180	-11.	94.2	364.	374	10.	102.7	.5	06000036 MOTUEKA NTH (BRIDGE)
5478	5462	843.	848	5.	100.6	768.	800	32.	104.2	1611.	1648	37.	102.3	.9	00600122 STOKE-TELEMETRY SITE 81 - WHA
4919	3944	853.	847	-6.	99.3	771.	776	5.	100.6	1624.	1623	-1.	99.9	.0	00600118 BASIN RESERVE(ROCKS RD) 26MAR
3831	3826	386.	458	72.	118.7	417.	498	81.	119.4	803.	956	153.	119.1	5.2	00600114 NELSON NTH - ATAWHAI CEMETRY
1129	1130	631.	691	60.	109.5	616.	565	-51.	91.7	1247.	1256	9.	100.7	.3	SALISBURY ROAD (723) 2008 FRI
1252	6115	246.	245	-1.	99.6	201.	164	-37.	81.6	447.	409	-38.	91.5	1.8	QUEEN STREET (676) 2008 WED
1523	1439	104.	71	-33.	68.3	88.	81	-7.	92.0	192.	152	-40.	79.2	3.0	BATEUP ROAD (171) 2008 WED
1015	1019	156.	114	-42.	73.1	137.	114	-23.	83.2	293.	228	-65.	77.8	4.0	CHAMPION ROAD (243A) 2008 WED
1277	1320	141.	160	19.	113.5	141.	168	27.	119.1	282.	328	46.	116.3	2.6	MCGLASHEN (574) 2008 WED 17 DEC
1512	1517	18.	5	-13.	27.8	18.	2	-16.	11.1	36.	7	-29.	19.4	6.3	MCSHANE ROAD (69) 2008
1150	1155	42.	33	-9.	78.6	42.	33	-9.	78.6	84.	66	-18.	78.6	2.1	HILL STREET (454A) 2008
1003	1011	23.	24	1.	104.3	23.	22	-1.	95.7	46.	46	0.	100.0	.0	HILL STREET (454B) 2008
1427	3897	32.	30	-2.	93.8	32.	33	1.	103.1	64.	63	-1.	98.4	.1	HART ROAD (427) 2008
1524	1525	20.	20	0.	100.0	20.	20	0.	100.0	40.	40	0.	100.0	.0	PATON ROAD (644) 2008
4091	1548	26.	18	-8.	69.2	26.	19	-7.	73.1	52.	37	-15.	71.2	2.2	CLOVER ROAD EAST (260) 2008

NUMBER OF LINKS = 73 NUMBER OF FORWARD LINKS = 73 NUMBER OF BACK LINKS = 73

TOTALS	FORWARD	BACK	TOTALS
COUNT	15706.	14693.	30397.
VOLUME	15412.	14821.	30233.
CHANGE	-294.	128.	-164.
%	98.	101.	99.
CORREL.			
COEFF.	.992	.985	.992
%RMS	15.12	19.45	14.68
R^2	.984	.971	.984
GEH	2.4	1.1	.9

GEH	<5	<7	<10	<12	>12
#	65	71	73	73	0
%	89.0	97.3	100.0	100.0	.0

CORDON TERMINATED SUCCESSFULLY

PM PEAK SCREENLINES

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+-------------------------------------------+
| TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS TR |
|  TRACKS +-------------------------+ TRACKS  |
| S TRACKS|                         |S TRACKS |
| KS TRACK|   PROGRAM  :     CORDON  |KS TRACK |
| CKS TRAC|   VERSION  :      V7.08  |CKS TRAC |
| ACKS TRA|                         |ACKS TRA |
| RACKS TR|   DATE RUN :  11-AUG-09  |RACKS TR |
| TRACKS T|   TIME RUN :   10:00:59  |TRACKS T |
|  TRACKS |   PLATFORM :  WIN 95/NT  | TRACKS  |
| S TRACKS+-------------------------+S TRACKS |
| KS TRACKS TRACKS TRACKS TRACKS TRACKS TRACKS |
+-------------------------------------------+
+-------------------------------------------+
|             TRACKS LICENCED TO            |
|  GABITES PORTER                           |
|         AT :   CHRISTCHURCH, N.Z.         |
+-------------------------------------------+
           BUILD DATE : 22/04/09 01:30
           PARAMETER VERSION : V5.20
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 NETWORK PERIOD FACTOR :  1.000

  CORDON PERIOD FACTOR :  1.000

     GEH PERIOD FACTOR :  1.000

   CSV OUTPUT FILE :


 CORDON DATA FILE  : NE06CD.DATNELSON MODEL - EVENING PEAK (5-6PM) - 2006
 LOADED NETWORK    : NE06NL.000     NELSON ROADING STUDY 2006 1700-1800
```

14.1.1 9921 Links in network

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 CORDON NUMBER :  1
 DESCRIPTION   :  1  ATAWHAI DR

                    FORWARD                    BACK                     TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  3831  3826     749.    741     -8.  98.9     382.    433     51. 113.4    1131.   1174     43. 103.8   1.3   00600114 NELSON NTH-ATAWHAR CEMETRY
  3843  3839      44.    109     65. 247.7      67.     58     -9.  86.6     111.    167     56. 150.5   4.7   ATAWHAI DRIVE  (27) BTW INTERSEC. LEG
  5297  3865     264.    288     24. 109.1     153.    159      6. 103.9     417.    447     30. 107.2   1.4   ATAWHAI DR - BTWN IWA RD & WEKA ST (02

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS
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```
 COUNT     1057.      602.     1659.
 VOLUME    1138.      650.     1788.
 CHANGE      81.       48.      129.
   %        108.      108.      108.
CORREL.
 COEFF.    1.000     1.000     1.000
 %RMS      14.00     18.37      9.81
  R^2       .999     1.000      .999
  GEH        2.4       1.9       3.1

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  2
 DESCRIPTION   :  2  MAITAI RIVER

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4114  5496     154.    171     17. 111.0     102.    125     23. 122.5     256.    296     40. 115.6   2.4   NILE STREET (EAST)  (253) BTW DOMETT S
  4058  4059      66.     74      8. 112.1      99.     60    -39.  60.6     165.    134    -31.  81.2   2.5   HARDY STREET EAST  (139) BTW AVON TCE
  4007  4011     207.    246     39. 118.8     101.    100     -1.  99.0     308.    346     38. 112.3   2.1   BRIDGE STREET  (52) BTW TASMAN ST BRID
  3941  3924     508.    498    -10.  98.0     363.    340    -23.  93.7     871.    838    -33.  96.2   1.1   TRAFALGAR STREET (NORTH)  (374) BTW SH

NUMBER OF LINKS =     4 NUMBER OF FORWARD LINKS =     4 NUMBER OF BACK LINKS =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      935.      665.     1600.
 VOLUME     989.      625.     1614.
 CHANGE      54.      -40.       14.
   %        106.       94.      101.
CORREL.
 COEFF.     .996      .979      .993
 %RMS      10.97     17.64     10.30
  R^2       .991      .958      .985
  GEH        1.7       1.6        .3

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  3
 DESCRIPTION   :  3  SOUTH CBD

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  6108  5024     162.    172     10. 106.2     244.    215    -29.  88.1     406.    387    -19.  95.3   1.0   TASMAN STREET (SOUTH)  (350) BTW NILE
  4146  4962     198.    213     15. 107.6     311.    334     23. 107.4     509.    547     38. 107.5   1.7   COLLINGWOOD STREET  (87) BTW NILE ST A
  4144  4101     607.    552    -55.  90.9     934.    815   -119.  87.3    1541.   1367   -174.  88.7   4.6   RUTHERFORD STREET  (314) B TW NILE ST

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      967.     1489.     2456.
 VOLUME     937.     1364.     2301.
 CHANGE     -30.     -125.     -155.
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```
   %         97.       92.       94.
CORREL.
 COEFF.    1.000      .995      .998
 %RMS      12.70     17.75     15.47
  R^2       .999      .990      .995
  GEH        1.0       3.3       3.2

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  4
 DESCRIPTION   :  4  EAST CBD

                     FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4110  5024     286.    237    -49.  82.9     168.    176      8. 104.8     454.    413    -41.  91.0   2.0   NILE ST - BTWN ALTON ST AND TASMAN ST
  4053  4054      75.    142     67. 189.3     113.     84    -29.  74.3     188.    226     38. 120.2   2.6   HARDY STREET (WEST)  (138) BTW COLLING
  4499  4999     308.    290    -18.  94.2     238.    221    -17.  92.9     546.    511    -35.  93.6   1.5   BRIDGE STREET  (52) BTW COLLINGWOOD ST

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      669.      519.     1188.
 VOLUME     669.      481.     1150.
 CHANGE       0.      -38.      -38.
   %        100.       93.       97.
CORREL.
 COEFF.     .962      .965      .995
 %RMS      26.93     14.12     11.78
  R^2       .926      .932      .991
  GEH         .0       1.7       1.1

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  5
 DESCRIPTION   :  5  CBD

                     FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4070  4071     126.    179     53. 142.1     188.    138    -50.  73.4     314.    317      3. 101.0    .2   SELWYN PLACE  BTW TRAFALGAR SQ AND TRA
  4041  1197     192.    207     15. 107.8     426.    427      1. 100.2     618.    634     16. 102.6    .6   HARDY STREET (WEST)  (138) BTW RUTHERF
  3988  3989     159.    216     57. 135.8     239.    240      1. 100.4     398.    456     58. 114.6   2.8   BRIDGE STREET  (52) BTW TRAFALGAR ST A

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      477.      853.     1330.
 VOLUME     602.      805.     1407.
 CHANGE     125.      -48.       77.
   %        126.       94.      106.
CORREL.
 COEFF.     .726      .989      .984
 %RMS      35.25     12.44      9.61
```

```
 R^2       .526      .978      .967
 GEH        5.4       1.7       2.1

 GEH  <5    <7   <10   <12   >12
 #     3     3     3     3     0
 % 100.0 100.0 100.0 100.0    .0

CORDON NUMBER :  6
DESCRIPTION   :  6  WAIMEA RD

                    FORWARD                    BACK                    TOTAL
NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

 4202  5393     27.     36      9. 133.3     40.     42      2. 105.0     67.     78     11. 116.4   1.3   RUTHERFORD STREET  (314) BTW WAIMEA RD
 4236  5534    200.    202      2. 101.0    299.    221    -78.  73.9    499.    423    -76.  84.8   3.5   VAN DIEMEN STREET  (383) BTW WAIMEA RD
 2597  4384     38.     41      3. 107.9     26.      6    -20.  23.1     64.     47    -17.  73.4   2.3   MOTUEKA STREET  (231) BTW WAIMEA RD AN
 5001  4446    134.    107    -27.  79.9     90.    160     70. 177.8    224.    267     43. 119.2   2.7   MARKET ROAD  (207) BTW WAIMEA RD AND B

NUMBER OF LINKS =     4 NUMBER OF FORWARD LINKS =     4 NUMBER OF BACK LINKS =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      399.      455.      854.
 VOLUME     386.      429.      815.
 CHANGE     -13.      -26.      -39.
   %         97.       94.       95.
CORREL.
 COEFF.     .981      .880      .976
 %RMS      16.60     54.16     24.24
  R^2       .963      .774      .953
  GEH         .7       1.2       1.4

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  7
 DESCRIPTION   :  7  WASHINGTON VALLEY

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4041  1197    192.    207     15. 107.8    426.    427      1. 100.2    618.    634     16. 102.6    .6   HARDY STREET (WEST)  (138) BTW RUTHERF
  4796  4961    492.    431    -61.  87.6    655.    743     88. 113.4   1147.   1174     27. 102.4    .8   VANGUARD STREET  (384) BTW HARDY ST AN
  4958  5554    414.    322    -92.  77.8    416.    574    158. 138.0    830.    896     66. 108.0   2.2   GLOUCESTER STREET  (124) BTW ST VINCEN
  2098  4064    329.    309    -20.  93.9    424.    442     18. 104.2    753.    751     -2.  99.7    .1   ST VINCENT STREET  (318) BTW GLOUCESTE
  2100  4923     66.     48    -18.  72.7     44.     44      0. 100.0    110.     92    -18.  83.6   1.8   ABRAHAM HEIGHTS  (6) BTW QUEBEC RD AND
  4088  5025     49.     45     -4.  91.8     74.     43    -31.  58.1    123.     88    -35.  71.5   3.4   QUEBEC ROAD  (285) BTW END OF KCC RHS
  4089  4088     83.    109     26. 131.3    267.    181    -86.  67.8    350.    290    -60.  82.9   3.4   PRINCES DRIVE  (280) BTW QUEBEC ROAD A
  4919  3944    736.    675    -61.  91.7   1019.   1167    148. 114.5   1755.   1842     87. 105.0   2.1   00600118 BASIN RESERVE(ROCKS RD) 26MAR

NUMBER OF LINKS =     8 NUMBER OF FORWARD LINKS =     8 NUMBER OF BACK LINKS =     8

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     2361.     3325.     5686.
 VOLUME    2146.     3621.     5767.
 CHANGE    -215.      296.       81.
   %         91.      109.      101.
CORREL.
```

```
 COEFF.     .992      .987      .999
 %RMS     16.96     22.88      7.15
  R^2      .984      .974      .998
  GEH       4.5       5.0       1.1

  GEH  <5    <7   <10   <12   >12
  #     8     8     8     8     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  8
 DESCRIPTION   :  8  MOANA

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4989  5480    1068.     991    -77.  92.8    1534.   1756    222. 114.5    2602.   2747    145. 105.6   2.8   WAIMEA ROAD  (391) BTW BOUNDARY RD AND
  4162  4179     138.     109    -29.  79.0     207.    212      5. 102.4     345.    321    -24.  93.0   1.3   TOI TOI STREET  (365) BTW MONTREAL RD
  4089  4088      83.     109     26. 131.3     267.    181    -86.  67.8     350.    290    -60.  82.9   3.4   PRINCES DRIVE  (280) BTW QUEBEC ROAD A
  4263  3196      36.      28     -8.  77.8      49.     42     -7.  85.7      85.     70    -15.  82.4   1.7   STANSELL AVENUE  (338) BTW MOANA AVENU
  4966  1994      96.     125     29. 130.2     143.     97    -46.  67.8     239.    222    -17.  92.9   1.1   BISLEY AVENUE  (43) BTW ROCKS RD AND C

NUMBER OF LINKS =     5 NUMBER OF FORWARD LINKS =     5 NUMBER OF BACK LINKS =     5

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     1421.     2200.     3621.
 VOLUME    1362.     2288.     3650.
 CHANGE     -59.       88.       29.
   %         96.      104.      101.
CORREL.
 COEFF.     .998      .998     1.000
 %RMS     16.08     27.57     11.07
  R^2      .997      .996     1.000
  GEH       1.6       1.9        .5

  GEH  <5    <7   <10   <12   >12
  #     5     5     5     5     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER :  9
 DESCRIPTION   :  9  MOANA

                    FORWARD                    BACK                    TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4989  5480    1068.     991    -77.  92.8    1534.   1756    222. 114.5    2602.   2747    145. 105.6   2.8   WAIMEA ROAD  (391) BTW BOUNDARY RD AND
  4089  4088      83.     109     26. 131.3     267.    181    -86.  67.8     350.    290    -60.  82.9   3.4   PRINCES DRIVE  (280) BTW QUEBEC ROAD A
  4919  3944     736.     675    -61.  91.7    1019.   1167    148. 114.5    1755.   1842     87. 105.0   2.1   00600118 BASIN RESERVE(ROCKS RD) 26MAR

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     1887.     2820.     4707.
 VOLUME    1775.     3104.     4879.
 CHANGE    -112.      284.      172.
   %         94.      110.      104.
CORREL.
 COEFF.    1.000      .999     1.000
 %RMS      11.42     21.09      8.09
```

```
  R^2       .999      .999     1.000
  GEH        2.6       5.2       2.5

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER : 10
 DESCRIPTION   :  10  MAIN ROAD STOKE

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4545  4518     102.    134     32. 131.4     289.    325     36. 112.5     391.    459     68. 117.4   3.3   THE RIDGEWAY (NORTH)  (357) BTW WAIMEA
  4515  4501      68.     54    -14.  79.4     103.     88    -15.  85.4     171.    142    -29.  83.0   2.3   WATERHOUSE STREET  (399) BTW WAIMEA RD
  4555  4612      84.     76     -8.  90.5      51.     46     -5.  90.2     135.    122    -13.  90.4   1.1   ARAPIKI ROAD  (23) BTW MAIN RD STOKE A
  4608  4623      54.     89     35. 164.8      80.     51    -29.  63.8     134.    140      6. 104.5    .5   MAITLAND AVENUE  (198) BTW MAIN RD STO
  4651  4659     111.    103     -8.  92.8      64.     61     -3.  95.3     175.    164    -11.  93.7    .8   MARSDEN ROAD  (208) BTW MAIN RD STOKE
  4747  5489     142.    168     26. 118.3     214.    238     24. 111.2     356.    406     50. 114.0   2.6   SONGER STREET  (331) BTW MAIN RD STOKE
  4816  4821     225.    200    -25.  88.9     122.    153     31. 125.4     347.    353      6. 101.7    .3   POLSTEAD ROAD  (277) BTW MAIN RD STOKE
  5111  5112     228.    195    -33.  85.5     152.    135    -17.  88.8     380.    330    -50.  86.8   2.7   SAXTON ROAD  (319) BTW MAIN RD STK: S-

NUMBER OF LINKS =     8 NUMBER OF FORWARD LINKS =     8 NUMBER OF BACK LINKS =     8

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     1014.     1075.     2089.
 VOLUME    1019.     1097.     2116.
 CHANGE       5.       22.       27.
   %        100.      102.      101.
CORREL.
 COEFF.     .923      .984      .965
 %RMS      21.01     18.28     15.06
  R^2       .852      .968      .931
  GEH         .2        .7        .6

  GEH  <5    <7   <10   <12   >12
  #     8     8     8     8     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER : 11
 DESCRIPTION   :  11  TAHUNANUI DR (SH6)

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4919  3944     736.    675    -61.  91.7    1019.   1167    148. 114.5    1755.   1842     87. 105.0   2.1   00600118 BASIN RESERVE(ROCKS RD) 26MAR
  4966  1994      96.    125     29. 130.2     143.     97    -46.  67.8     239.    222    -17.  92.9   1.1   BISLEY AVENUE  (43) BTW ROCKS RD AND C
  4312  6113      74.     79      5. 106.8      51.     43     -8.  84.3     125.    122     -3.  97.6    .3   TOSSWILL ROAD  (368) BTW TAHUNANUI DR
  4972  4973      60.     41    -19.  68.3      36.     29     -7.  80.6      96.     70    -26.  72.9   2.9   MAIRE STREET  (195) BTW ANNESBROOK DR

NUMBER OF LINKS =     4 NUMBER OF FORWARD LINKS =     4 NUMBER OF BACK LINKS =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      966.     1249.     2215.
 VOLUME     920.     1336.     2256.
 CHANGE     -46.       87.       41.
   %         95.      107.      102.
CORREL.
```

```
 COEFF.     .998      .999     1.000
 %RMS      16.82     28.72      9.64
  R^2       .995      .998     1.000
  GEH        1.5       2.4        .9

  GEH  <5    <7   <10   <12   >12
  #     4     4     4     4     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER : 12
 DESCRIPTION   :  12  QUARANTINE RD

                    FORWARD                    BACK                     TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  4462  3399     267.    232    -35.  86.9     164.    231     67. 140.9     431.    463     32. 107.4   1.5   PASCOE STREET  (268) BTW PARKERS RD AN
  5118  4459     359.    400     41. 111.4     240.    181    -59.  75.4     599.    581    -18.  97.0    .7   QUARANTINE ROAD  (284) BTW BOLT RD AND
  5119  5118     105.    146     41. 139.0     158.    155     -3.  98.1     263.    301     38. 114.4   2.3   TRENT DRIVE  (376) BTW BOLT RD AND END

NUMBER OF LINKS =     3 NUMBER OF FORWARD LINKS =     3 NUMBER OF BACK LINKS =     3

 TOTALS   FORWARD    BACK      TOTALS

 COUNT      731.      562.     1293.
 VOLUME     778.      567.     1345.
 CHANGE      47.        5.       52.
   %        106.      101.      104.
CORREL.
 COEFF.     .942     -.114      .996
 %RMS      19.65     33.72      8.67
  R^2       .887      .013      .992
  GEH        1.7        .2       1.4

  GEH  <5    <7   <10   <12   >12
  #     3     3     3     3     0
  % 100.0 100.0 100.0 100.0    .0

 CORDON NUMBER : 13
 DESCRIPTION   :  13  WHAKATU DR / NAYLAND RD / MAIN ROAD STOKE

                    FORWARD                    BACK                     TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  5478  5462     764.    649   -115.  84.9    1145.   1207     62. 105.4    1909.   1856    -53.  97.2   1.2   00600122 STOKE-TELEMETRY SITE 81 - WHA
  5180  4783     220.    206    -14.  93.6     409.    446     37. 109.0     629.    652     23. 103.7    .9   NAYLAND RD - KENDALL VW & HOLDCROFT PL
  2699  5111     184.    150    -34.  81.5     277.    257    -20.  92.8     461.    407    -54.  88.3   2.6   SAXTON RD WEST - RAILWAY RESERVE & MAI
  5188  5176     963.    994     31. 103.2     708.    745     37. 105.2    1671.   1739     68. 104.1   1.6   MAIN ROAD STOKE  (7805) BTW SAXTON CUL

NUMBER OF LINKS =     4 NUMBER OF FORWARD LINKS =     4 NUMBER OF BACK LINKS =     4

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     2131.     2539.     4670.
 VOLUME    1999.     2655.     4654.
 CHANGE    -132.      116.      -16.
   %         94.      105.      100.
CORREL.
 COEFF.     .988      .999      .997
 %RMS      13.51      7.60      5.16
  R^2       .977      .998      .994
```

```
 GEH        2.9       2.3        .2

 GEH  <5    <7   <10   <12   >12
 #     4     4     4     4     0
 % 100.0 100.0 100.0 100.0    .0

CORDON NUMBER : 14
DESCRIPTION   :  14 STATE HIGHWAY COUNTS

                    FORWARD                      BACK                       TOTAL
NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

 2675  2678      91.     74    -17.  81.3     162.    111    -51.  68.5     253.    185    -68.  73.1   4.6   00600144 EIGHTY EIGHT VLY STM BRIDGE 2
 2937  2826      44.     48      4. 109.1      66.     73      7. 110.6     110.    121     11. 110.0   1.0   00600153 SPOONERS HILL (HIGGINS CUL) 2
 1654  1655     244.    230    -14.  94.3     428.    511     83. 119.4     672.    741     69. 110.3   2.6   00600138 BRIGHTWATER (PITFURE BRIDGE)
 1555  1554     233.    274     41. 117.6     617.    613     -4.  99.4     850.    887     37. 104.4   1.3   00600135 WAIROA RR (BURKES BANK) 14JUN
 1523  1518     452.    509     57. 112.6     255.    282     27. 110.6     707.    791     84. 111.9   3.1   06000000 START OF STATE HIGHWAY 60 21J
 1623  1619     479.    772    293. 161.2     784.    358   -426.  45.7    1263.   1130   -133.  89.5   3.8   06000005 APPLEBY BRIDGE 28MAR07
 1807  1603     320.    295    -25.  92.2     488.    620     132. 127.0     808.    915     107. 113.2   3.6   06000008 RESEARCH ORCHARD RD
 1745  1737     361.    278    -83.  77.0     241.    463     222. 192.1     602.    741     139. 123.1   5.4   06000018 RUBY BAY 14JUN06
 1865  1864     201.    295     94. 146.8     325.    263    -62.  80.9     526.    558      32. 106.1   1.4   06000036 MOTUEKA NTH (BRIDGE)
 5478  5462     764.    649   -115.  84.9    1145.   1207     62. 105.4    1909.   1856    -53.  97.2   1.2   00600122 STOKE-TELEMETRY SITE 81 - WHA
 4919  3944     736.    675    -61.  91.7    1019.   1167    148. 114.5    1755.   1842     87. 105.0   2.1   00600118 BASIN RESERVE(ROCKS RD) 26MAR
 3831  3826     749.    741     -8.  98.9     382.    433     51. 113.4    1131.   1174     43. 103.8   1.3   00600114 NELSON NTH - ATAWHAI CEMETRY

NUMBER OF LINKS =    12 NUMBER OF FORWARD LINKS =    12 NUMBER OF BACK LINKS =    12

 TOTALS   FORWARD    BACK      TOTALS

 COUNT     4674.     5912.    10586.
 VOLUME    4840.     6101.    10941.
 CHANGE     166.      189.      355.
   %        104.      103.      103.
CORREL.
 COEFF.     .913      .895      .989
 %RMS     27.33     32.99      9.65
  R^2      .834      .801      .979
  GEH       2.4       2.4       3.4

  GEH  <5    <7   <10   <12   >12
  #    11    12    12    12     0
  %  91.7 100.0 100.0 100.0    .0

 CORDON NUMBER : 15
 DESCRIPTION   :  15 RICHMOND SPOT COUNTS

                    FORWARD                      BACK                       TOTAL
 NODE1 NODE2   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %   COUNT  VOLUME  CHANGE     %  GEH

  1129  1130     837.    811    -26.  96.9     817.    968    151. 118.5    1654.   1779    125. 107.6   3.0   SALISBURY ROAD (723) 2008 FRI
  1252  6115     341.    348      7. 102.1     285.    322     37. 113.0     626.    670     44. 107.0   1.7   QUEEN STREET (676) 2008 WED
  1523  1439     136.    149     13. 109.6     113.    111     -2.  98.2     249.    260     11. 104.4    .7   BATEUP ROAD (171) 2008 WED
  1015  1019     205.    170    -35.  82.9     180.    127    -53.  70.6     385.    297    -88.  77.1   4.8   CHAMPION ROAD (243A) 2008 WED
  1277  1320     124.    191     67. 154.0     124.    107    -17.  86.3     248.    298     50. 120.2   3.0   MCGLASHEN (574) 2008 WED 17 DEC
  1512  1517      10.      6     -4.  60.0      48.     65     17. 135.4      58.     71     13. 122.4   1.6   MCSHANE ROAD (69) 2008
  1150  1155      90.     81     -9.  90.0      90.    109     19. 121.1     180.    190     10. 105.6    .7   HILL STREET (454A) 2008
  1003  1011      60.     33    -27.  55.0      89.     65    -24.  73.0     149.     98    -51.  65.8   4.6   HILL STREET (454B) 2008
  1427  3897      65.     94     29. 144.6      43.     74     31. 172.1     108.    168     60. 155.6   5.1   HART ROAD (427) 2008
  1524  1525      43.     39     -4.  90.7      43.     44      1. 102.3      86.     83     -3.  96.5    .3   PATON ROAD (644) 2008
  4091  1548      37.     31     -6.  83.8      56.     50     -6.  89.3      73.     81      8. 111.0    .9   CLOVER ROAD EAST (260) 2008
```

NUMBER OF LINKS = 11 NUMBER OF FORWARD LINKS = 11 NUMBER OF BACK LINKS = 11

TOTALS	FORWARD	BACK	TOTALS
COUNT	1948.	1888.	3816.
VOLUME	1953.	2042.	3995.
CHANGE	5.	154.	179.
%	100.	108.	105.
CORREL.			
COEFF.	.993	.994	.996
%RMS	16.29	31.64	16.92
R^2	.986	.988	.992
GEH	.1	3.5	2.9

GEH	<5	<7	<10	<12	>12
#	10	11	11	11	0
%	90.9	100.0	100.0	100.0	.0

CORDON NUMBER : 16
DESCRIPTION : 16 ALL

		FORWARD				BACK				TOTAL					
NODE1	NODE2	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	COUNT	VOLUME	CHANGE	%	GEH	
3843	3839	44.	109	65.	247.7	67.	58	-9.	86.6	111.	167	56.	150.5	4.7	ATAWHAI DRIVE (27) BTW INTERSEC. LEG
5297	3865	264.	288	24.	109.1	153.	159	6.	103.9	417.	447	30.	107.2	1.4	ATAWHAI DR - BTWN IWA RD & WEKA ST (02
4114	5496	154.	171	17.	111.0	102.	125	23.	122.5	256.	296	40.	115.6	2.4	NILE STREET (EAST) (253) BTW DOMETT S
4058	4059	66.	74	8.	112.1	99.	60	-39.	60.6	165.	134	-31.	81.2	2.5	HARDY STREET EAST (139) BTW AVON TCE
4007	4011	207.	246	39.	118.8	101.	100	-1.	99.0	308.	346	38.	112.3	2.1	BRIDGE STREET (52) BTW TASMAN ST BRID
3941	3924	508.	498	-10.	98.0	363.	340	-23.	93.7	871.	838	-33.	96.2	1.1	TRAFALGAR STREET (NORTH) (374) BTW SH
6108	5024	162.	172	10.	106.2	244.	215	-29.	88.1	406.	387	-19.	95.3	1.0	TASMAN STREET (SOUTH) (350) BTW NILE
4146	4962	198.	213	15.	107.6	311.	334	23.	107.4	509.	547	38.	107.5	1.7	COLLINGWOOD STREET (87) BTW NILE ST A
4144	4101	607.	552	-55.	90.9	934.	815	-119.	87.3	1541.	1367	-174.	88.7	4.6	RUTHERFORD STREET (314) B TW NILE ST
4110	5024	286.	237	-49.	82.9	168.	176	8.	104.8	454.	413	-41.	91.0	2.0	NILE ST - BTWN ALTON ST AND TASMAN ST
4053	4054	75.	142	67.	189.3	113.	84	-29.	74.3	188.	226	38.	120.2	2.6	HARDY STREET (WEST) (138) BTW COLLING
4499	4999	308.	290	-18.	94.2	238.	221	-17.	92.9	546.	511	-35.	93.6	1.5	BRIDGE STREET (52) BTW COLLINGWOOD ST
4070	4071	126.	179	53.	142.1	188.	138	-50.	73.4	314.	317	3.	101.0	.2	SELWYN PLACE BTW TRAFALGAR SQ AND TRA
4041	1197	192.	207	15.	107.8	426.	427	1.	100.2	618.	634	16.	102.6	.6	HARDY STREET (WEST) (138) BTW RUTHERF
3988	3989	159.	216	57.	135.8	239.	240	1.	100.4	398.	456	58.	114.6	2.8	BRIDGE STREET (52) BTW TRAFALGAR ST A
4202	5393	27.	36	9.	133.3	40.	42	2.	105.0	67.	78	11.	116.4	1.3	RUTHERFORD STREET (314) BTW WAIMEA RD
4236	5534	200.	202	2.	101.0	299.	221	-78.	73.9	499.	423	-76.	84.8	3.5	VAN DIEMEN STREET (383) BTW WAIMEA RD
2597	4384	38.	41	3.	107.9	26.	6	-20.	23.1	64.	47	-17.	73.4	2.3	MOTUEKA STREET (231) BTW WAIMEA RD AN
5001	4446	134.	107	-27.	79.9	90.	160	70.	177.8	224.	267	43.	119.2	2.7	MARKET ROAD (207) BTW WAIMEA RD AND B
4041	1197	192.	207	15.	107.8	426.	427	1.	100.2	618.	634	16.	102.6	.6	HARDY STREET (WEST) (138) BTW RUTHERF
4796	4961	492.	431	-61.	87.6	655.	743	88.	113.4	1147.	1174	27.	102.4	.8	VANGUARD STREET (384) BTW HARDY ST AN
4958	5554	414.	322	-92.	77.8	416.	574	158.	138.0	830.	896	66.	108.0	2.2	GLOUCESTER STREET (124) BTW ST VINCEN
2098	4064	329.	309	-20.	93.9	424.	442	18.	104.2	753.	751	-2.	99.7	.1	ST VINCENT STREET (318) BTW GLOUCESTE
2100	4923	66.	48	-18.	72.7	44.	44	0.	100.0	110.	92	-18.	83.6	1.8	ABRAHAM HEIGHTS (6) BTW QUEBEC RD AND
4088	5025	49.	45	-4.	91.8	74.	43	-31.	58.1	123.	88	-35.	71.5	3.4	QUEBEC ROAD (285) BTW END OF KCC RHS
4089	4088	83.	109	26.	131.3	267.	181	-86.	67.8	350.	290	-60.	82.9	3.4	PRINCES DRIVE (280) BTW QUEBEC ROAD A
4989	5480	1068.	991	-77.	92.8	1534.	1756	222.	114.5	2602.	2747	145.	105.6	2.8	WAIMEA ROAD (391) BTW BOUNDARY RD AND
4162	4179	138.	109	-29.	79.0	207.	212	5.	102.4	345.	321	-24.	93.0	1.3	TOI TOI STREET (365) BTW MONTREAL RD
4089	4088	83.	109	26.	131.3	267.	181	-86.	67.8	350.	290	-60.	82.9	3.4	PRINCES DRIVE (280) BTW QUEBEC ROAD A
4263	3196	36.	28	-8.	77.8	49.	42	-7.	85.7	85.	70	-15.	82.4	1.7	STANSELL AVENUE (338) BTW MOANA AVENU
4966	1994	96.	125	29.	130.2	143.	97	-46.	67.8	239.	222	-17.	92.9	1.1	BISLEY AVENUE (43) BTW ROCKS RD AND C
4989	5480	1068.	991	-77.	92.8	1534.	1756	222.	114.5	2602.	2747	145.	105.6	2.8	WAIMEA ROAD (391) BTW BOUNDARY RD AND
4089	4088	83.	109	26.	131.3	267.	181	-86.	67.8	350.	290	-60.	82.9	3.4	PRINCES DRIVE (280) BTW QUEBEC ROAD A
4545	4518	102.	134	32.	131.4	289.	325	36.	112.5	391.	459	68.	117.4	3.3	THE RIDGEWAY (NORTH) (357) BTW WAIMEA
4515	4501	68.	54	-14.	79.4	103.	88	-15.	85.4	171.	142	-29.	83.0	2.3	WATERHOUSE STREET (399) BTW WAIMEA RD

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  4555  4612      84.     76     -8.  90.5      51.     46     -5.  90.2     135.    122    -13.  90.4   1.1   ARAPIKI ROAD  (23) BTW MAIN RD STOKE A
  4608  4623      54.     89     35. 164.8      80.     51    -29.  63.8     134.    140      6. 104.5    .5   MAITLAND AVENUE  (198) BTW MAIN RD STO
  4651  4659     111.    103     -8.  92.8      64.     61     -3.  95.3     175.    164    -11.  93.7    .8   MARSDEN ROAD  (208) BTW MAIN RD STOKE
  4747  5489     142.    168     26. 118.3     214.    238     24. 111.2     356.    406     50. 114.0   2.6   SONGER STREET  (331) BTW MAIN RD STOKE
  4816  4821     225.    200    -25.  88.9     122.    153     31. 125.4     347.    353      6. 101.7    .3   POLSTEAD ROAD  (277) BTW MAIN RD STOKE
  5111  5112     228.    195    -33.  85.5     152.    135    -17.  88.8     380.    330    -50.  86.8   2.7   SAXTON ROAD  (319) BTW MAIN RD STK: S-
  4966  1994      96.    125     29. 130.2     143.     97    -46.  67.8     239.    222    -17.  92.9   1.1   BISLEY AVENUE  (43) BTW ROCKS RD AND C
  4312  6113      74.     79      5. 106.8      51.     43     -8.  84.3     125.    122     -3.  97.6    .3   TOSSWILL ROAD  (368) BTW TAHUNANUI DR
  4972  4973      60.     41    -19.  68.3      36.     29     -7.  80.6      96.     70    -26.  72.9   2.9   MAIRE STREET  (195) BTW ANNESBROOK DR
  4462  3399     267.    232    -35.  86.9     164.    231     67. 140.9     431.    463     32. 107.4   1.5   PASCOE STREET  (268) BTW PARKERS RD AN
  5118  4459     359.    400     41. 111.4     240.    181    -59.  75.4     599.    581    -18.  97.0    .7   QUARANTINE ROAD  (284) BTW BOLT RD AND
  5119  5118     105.    146     41. 139.0     158.    155     -3.  98.1     263.    301     38. 114.4   2.3   TRENT DRIVE  (376) BTW BOLT RD AND END
  5180  4783     220.    206    -14.  93.6     409.    446     37. 109.0     629.    652     23. 103.7    .9   NAYLAND RD - KENDALL VW & HOLDCROFT PL
  2699  5111     184.    150    -34.  81.5     277.    257    -20.  92.8     461.    407    -54.  88.3   2.6   SAXTON RD WEST - RAILWAY RESERVE & MAI
  5188  5176     963.    994     31. 103.2     708.    745     37. 105.2    1671.   1739     68. 104.1   1.6   MAIN ROAD STOKE  (7805) BTW SAXTON CUL
  2675  2678      91.     74    -17.  81.3     162.    111    -51.  68.5     253.    185    -68.  73.1   4.6   00600144 EIGHTY EIGHT VLY STM BRIDGE 2
  2937  2826      44.     48      4. 109.1      66.     73      7. 110.6     110.    121     11. 110.0   1.0   00600153 SPOONERS HILL (HIGGINS CUL) 2
  1654  1655     244.    230    -14.  94.3     428.    511     83. 119.4     672.    741     69. 110.3   2.6   00600138 BRIGHTWATER (PITFURE BRIDGE)
  1555  1554     233.    274     41. 117.6     617.    613     -4.  99.4     850.    887     37. 104.4   1.3   00600135 WAIROA RR (BURKES BANK) 14JUN
  1523  1518     452.    509     57. 112.6     255.    282     27. 110.6     707.    791     84. 111.9   3.1   06000000 START OF STATE HIGHWAY 60 21J
  1623  1619     479.    772    293. 161.2     784.    358   -426.  45.7    1263.   1130   -133.  89.5   3.8   06000005 APPLEBY BRIDGE 28MAR07
  1807  1603     320.    295    -25.  92.2     488.    620    132. 127.0     808.    915    107. 113.2   3.6   06000008 RESEARCH ORCHARD RD
  1745  1737     361.    278    -83.  77.0     241.    463    222. 192.1     602.    741    139. 123.1   5.4   06000018 RUBY BAY 14JUN06
  1865  1864     201.    295     94. 146.8     325.    263    -62.  80.9     526.    558     32. 106.1   1.4   06000036 MOTUEKA NTH (BRIDGE)
  5478  5462     764.    649   -115.  84.9    1145.   1207     62. 105.4    1909.   1856    -53.  97.2   1.2   00600122 STOKE-TELEMETRY SITE 81 - WHA
  4919  3944     736.    675    -61.  91.7    1019.   1167    148. 114.5    1755.   1842     87. 105.0   2.1   00600118 BASIN RESERVE(ROCKS RD) 26MAR
  3831  3826     749.    741     -8.  98.9     382.    433     51. 113.4    1131.   1174     43. 103.8   1.3   00600114 NELSON NTH - ATAWHAI CEMETRY
  1129  1130     837.    811    -26.  96.9     817.    968    151. 118.5    1654.   1779    125. 107.6   3.0   SALISBURY ROAD (723) 2008 FRI
  1252  6115     341.    348      7. 102.1     285.    322     37. 113.0     626.    670     44. 107.0   1.7   QUEEN STREET (676) 2008 WED
  1523  1439     136.    149     13. 109.6     113.    111     -2.  98.2     249.    260     11. 104.4    .7   BATEUP ROAD (171) 2008 WED
  1015  1019     205.    170    -35.  82.9     180.    127    -53.  70.6     385.    297    -88.  77.1   4.8   CHAMPION ROAD (243A) 2008 WED
  1277  1320     124.    191     67. 154.0     124.    107    -17.  86.3     248.    298     50. 120.2   3.0   MCGLASHEN (574) 2008 WED 17 DEC
  1512  1517      10.      6     -4.  60.0      48.     65     17. 135.4      58.     71     13. 122.4   1.6   MCSHANE ROAD (69) 2008
  1150  1155      90.     81     -9.  90.0      90.    109     19. 121.1     180.    190     10. 105.6    .7   HILL STREET (454A) 2008
  1003  1011      60.     33    -27.  55.0      89.     65    -24.  73.0     149.     98    -51.  65.8   4.6   HILL STREET (454B) 2008
  1427  3897      65.     94     29. 144.6      43.     74     31. 172.1     108.    168     60. 155.6   5.1   HART ROAD (427) 2008
  1524  1525      43.     39     -4.  90.7      43.     44      1. 102.3      86.     83     -3.  96.5    .3   PATON ROAD (644) 2008
  4091  1548      37.     31     -6.  83.8      56.     50     -6.  89.3      73.     81      8. 111.0    .9   CLOVER ROAD EAST (260) 2008

NUMBER OF LINKS =    73 NUMBER OF FORWARD LINKS =    73 NUMBER OF BACK LINKS =    73

 TOTALS   FORWARD    BACK      TOTALS

 COUNT    17916.    21569.    39465.
 VOLUME   18098.    22024.    40122.
 CHANGE     182.      455.      657.
   %        101.      102.      102.
CORREL.
 COEFF.     .978      .974      .995
 %RMS      21.44     28.98     11.00
  R^2       .956      .949      .990
  GEH        1.4       3.1       3.3

  GEH  <5    <7   <10   <12   >12
  #    71    73    73    73     0
  %  97.3 100.0 100.0 100.0    .0
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CORDON terminated successfully