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## CHRISTCHURCH TRAFFIC SCREENLINE SURVEY 1988

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1. SUMMARY

The Traffic Screenline Survey has been conducted in March annually since 1986. Morning peak hour traffic at 46 railway crossings throughout Christchurch is recorded by vehicle type ("mode"). The following summarises the conclusions of the 1988 survey:

- (i) The composition of morning peak hour traffic in Christchurch has not changed much over the last two years. The survey recorded over 40,000 vehicles and pedestrians as follows:

Cars	67%
Cycles	13%
Light Trade Vehicles	10%
Other	10%

- (ii) The road hierarchy is generally performing as planned. Average peak hour motor vehicle volumes for the roads sampled were:

Major Arterials	1700
Minor Arterials	950
Local Distributors	450
Locals	100

- (iii) Cycle flows of about 160 per road in the morning peak hour are found on major and minor arterial roads and local distributor roads. Lower flows on arterial roads would be desirable.
- (iv) Existing policies and proposals in the Canterbury Urban Transport Operational Plan to improve the efficiency of the road and cycle route networks are supported by the survey.
- (v) Encouraging cycling, bus use and ride sharing, which can also increase the efficiency of the arterial road network, are included in the Operational Plan too and are supported by the survey.
- (vi) The Traffic Screenline Survey is now well established. The survey should be done every five years to coincide with the National Census.



## 2. INTRODUCTION

The Traffic Screenline Survey records morning peak hour traffic at 46 railway crossings throughout Christchurch. Each vehicle type ("mode") is recorded separately. The railway tracks form a screenline in the shape of a large tee (see Figure 1), giving a wide sample of Christchurch suburbs.

### CHRISTCHURCH TRAFFIC SCREENLINE

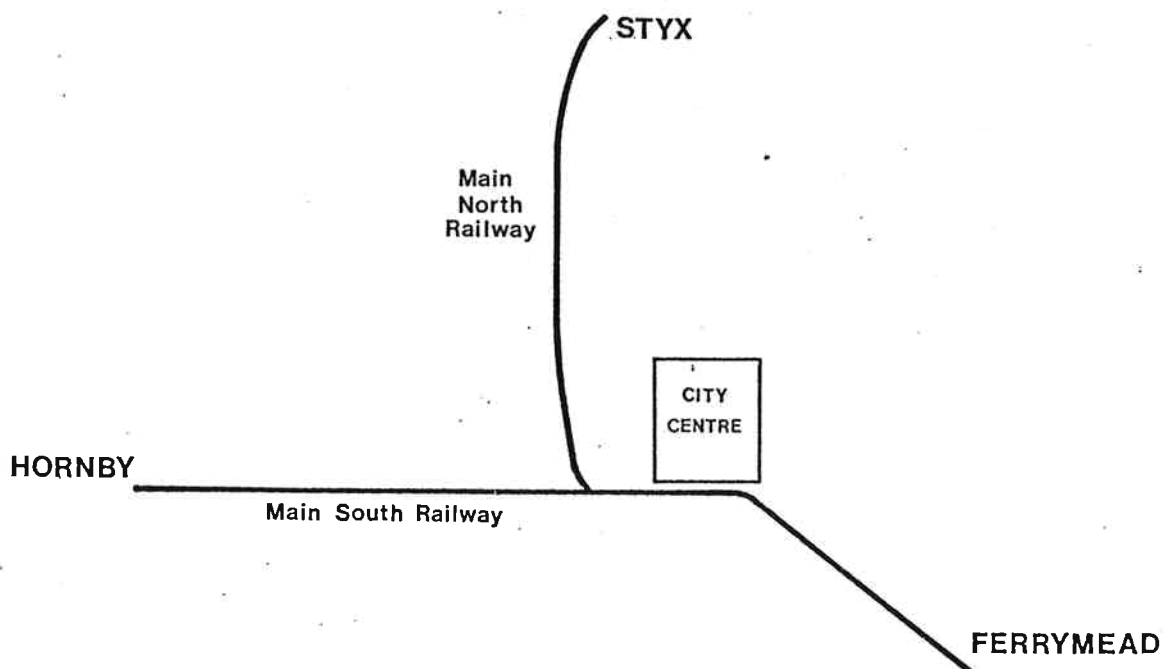


FIGURE 1 - CHRISTCHURCH TRAFFIC SCREENLINE

The Traffic Screenline Survey has been done annually in March since 1986. A similar survey (as part of the National Urban Transportation Survey) was conducted in 1978, although it concentrated on arterial roads. Comparisons can now be made of arterial road traffic changes over the last decade. The 1978 survey was done in August. Since 1986, surveys have been done in March when traffic patterns are less likely to be affected by holidays or bad weather. To permit valid comparisons between the 1978 and the later surveys, a survey was also done in August 1985. Analysis in this report concentrates on the March surveys (1986-1988).

The previous surveys are documented in Canterbury United Council reports as follows:

August 1985	Report 343
March 1986	Report 367
March 1987	Report 398

Each survey has allowed refinements in techniques over previous surveys, although the fundamental method and purpose have remained unchanged. Morning peak hour traffic across a representative sample of Christchurch roads (and pedestrian/cycle paths) was counted on a typical weekday. The survey method, mode definitions and count locations are defined in the Instructions to Surveyors (see Appendix 1).

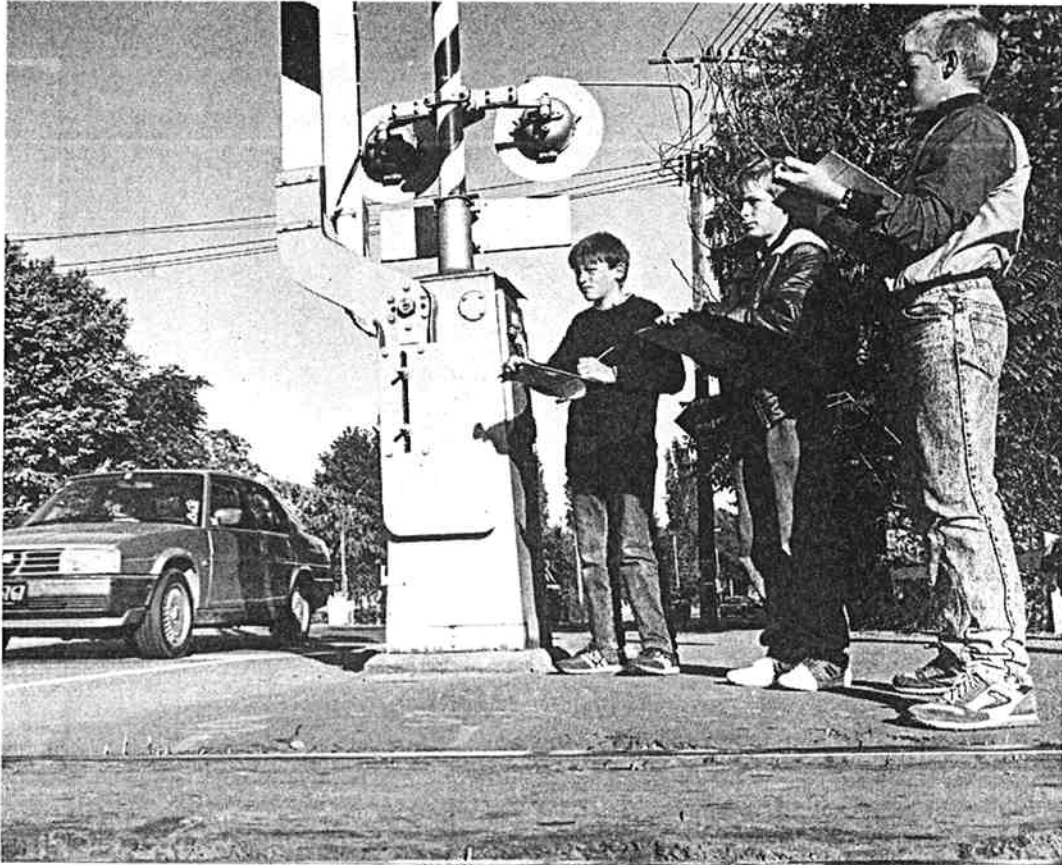
All modes of travel (including pedestrians and cyclists) were counted. The survey began at 7.30 a.m. and traffic flows were recorded for each 15 minute period until 8.45 a.m. This year's survey was held on Tuesday, 22 March. The weather was fine and calm.

The survey was planned, coordinated and analysed by Canterbury United Council staff. About 100 students, working generally in pairs, carried out the survey by standing on the roadside at railway crossings. Figure 2 shows three students surveying traffic at Fendalton Road. The students involved in the survey attend the following schools:

- Linwood High School
- Riccarton High School
- St. Andrews College

The cooperation of the schools and teachers and the diligence and enthusiasm of their students in carrying out the survey are gratefully acknowledged.





St Andrew's College pupils (from left), Tony Gardner, Gordon Barnett and Reon Hulme, all aged 14, survey traffic at the railway level-crossing on Fendalton Road this week. About 100 pupils from the college, Linwood High School and Riccarton High School, helped collect information on vehicles and pedestrians at central-city level-crossings during the morning peak traffic period. The survey results will go to the Canterbury United Council to help with transport planning. During last year's survey, about 40,000 vehicles and pedestrians were recorded.

FIGURE 2 - SURVEYORS AT FENDALTON ROAD

(Photo and caption courtesy of "The Press", 24 March 1988)

This report aims to:

- (i) Record traffic flows for each mode at each survey location.
- (ii) Record other traffic counts which complement the screenline survey.
- (iii) Analyse the data in terms of traffic composition ("modal split"), road type, vehicle occupancy and traffic growth.
- (iv) Consider the implications for regional and district transport planning.

The Traffic Screenline Survey is part of the United Council's ongoing transport monitoring work prescribed in the Canterbury Regional Planning Scheme. This report will be a source document for public bodies and will also be of interest to a wider audience.

3. TRAFFIC COMPOSITION AND ROAD TYPE

**COMPOSITION OF MORNING PEAK HOUR TRAFFIC**  
**ChCh Traffic Screenline Survey 1988**  
 7.45am to 8.45am Tuesday 22 March

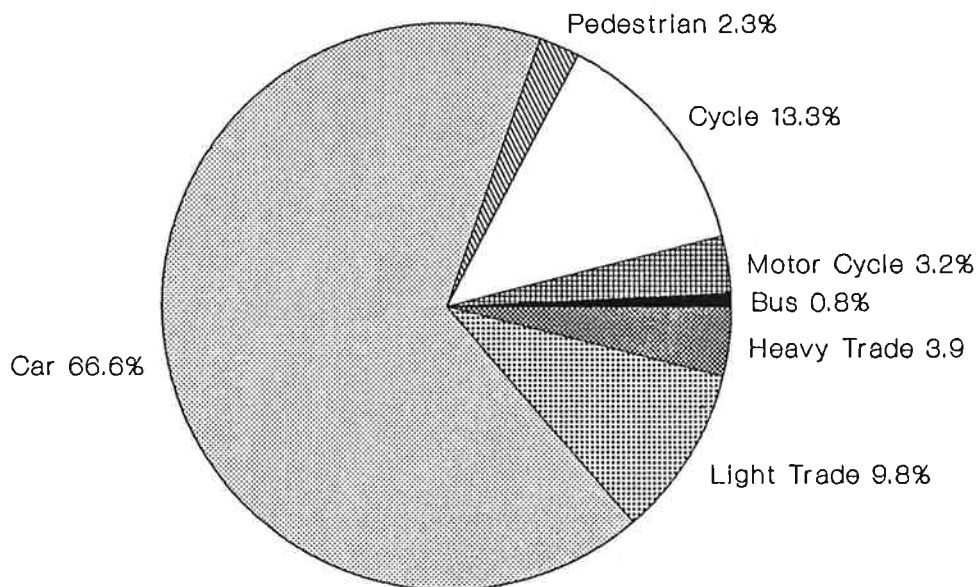


FIGURE 3 - COMPOSITION OF MORNING PEAK HOUR TRAFFIC

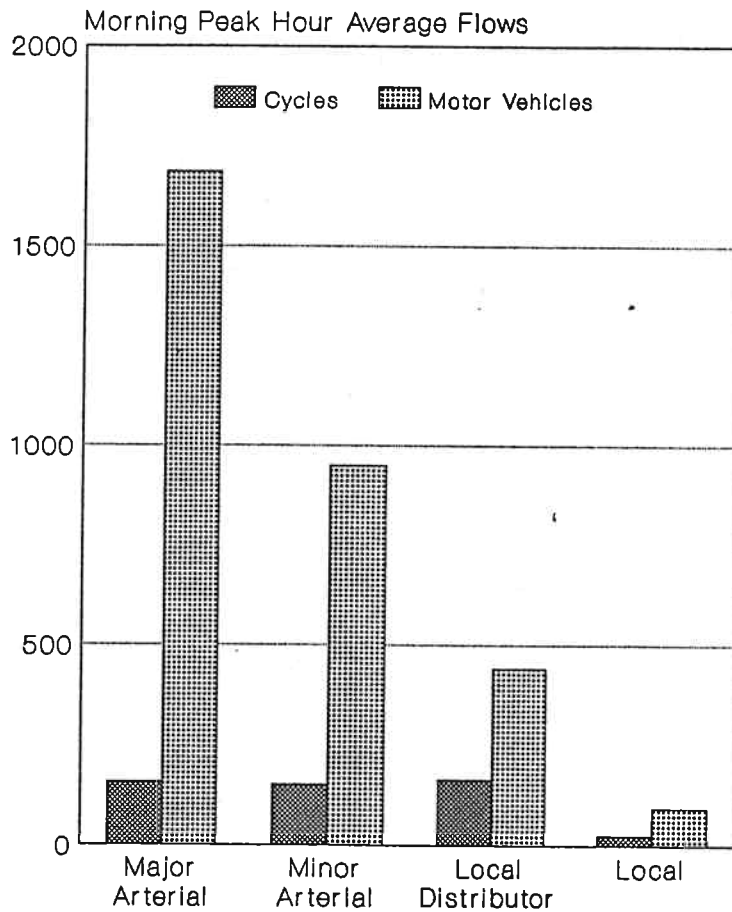
Figure 3 shows the composition of morning peak hour traffic recorded during the survey. Cars and light trade vehicles comprised 76% of traffic, while cycles made up 13% of the total flow. Heavy trade vehicles, buses, motorcycles, and pedestrians accounted for about 10% of traffic in total.

Longer trips are more likely to cross the survey screenline than shorter ones, so that pedestrian and cycle trips are likely to be under-reported by a survey of this type. Put another way, the survey represents vehicle distance rather than vehicle trips. Cycle and pedestrian trips, which are on average shorter than motor vehicle trips, would comprise more than 2.3% and 13.3% respectively of morning peak trips.

Data for this figure are found in Table 2. (Light trade vehicles are distinguished from heavy trade vehicles by having only four wheels. More complete definitions for these and other modes are given in the Instructions to Surveyors, in Appendix 1.)

As in previous years, the morning peak hour was found to occur from 7.45 a.m. to 8.45 a.m. Detailed analysis of temporal traffic variation is provided in Section 5.

### AVERAGE TRAFFIC FLOWS BY ROAD TYPE Cycles and Motor Vehicles ChCh Traffic Screenline Survey 1988



**FIGURE 4 - AVERAGE TRAFFIC FLOWS BY ROAD TYPE**

In Figure 4 the morning peak hour characteristics of the four road types are compared. Major arterial roads (with peak hour motor vehicle flows averaging nearly 1,700) carry almost twice as much traffic as minor arterial roads. Local distributor roads and local roads carry motor vehicle volumes which reflect their role in the road network hierarchy.

The volumes of cycle traffic, however, are similar for the three busiest road types, with flows averaging about 160. The data for this figure are recorded in Table 1.

MORNING PEAK HOUR TRAFFIC FLOWS - SUMMARY  
(By road type for motor vehicles and cycles)

Road Type	Number of Roads	Total Flow		Average Flow	
		Motor Vehicle	Cycle	Motor Vehicle	Cycle
Major Arterial	11	18553	1727	1687	157
Minor Arterial	12	11458	1806	955	151
Local Distributor	11	4869	1812	443	165
Local	7	663	176	95	25
Ped/Cycle Crossing	5		107		21
Total	46	35543	5628		

TABLE 1 - MORNING PEAK HOUR TRAFFIC FLOWS - SUMMARY

Table 1 shows motor vehicle and cycle flows recorded in the peak hour of the Traffic Screenline Survey. Both total flows and average flows for each road type are shown. Motor vehicle flows include all modes except pedestrians and cyclists. The number of crossings of each road type is also shown in the table.

Thus the road hierarchy is functioning as intended with the heaviest volumes of motorised traffic occurring on roads designed for this purpose. By contrast, cycle traffic volumes on arterial roads remain at unacceptably high levels, reflecting a lack of attractive, alternative cycle routes.

Table 2 shows the numbers of vehicles (of each mode) and pedestrians recorded in the peak hour of the survey for each road type. Total numbers and percentages for each mode are also shown. Over 40,000 vehicles were recorded during the peak hour of the survey, an average of over 400 per surveyor.

MORNING PEAK HOUR TRAFFIC FLOWS - DATA  
(By road type for each mode)

Road Type	Car	Light Trade	Heavy Trade	Bus	Motor Cycle	Cycle	Ped	Total
Major Arterial	14758	2039	1005	136	615	1727	171	20451
Minor Arterial	9050	1358	379	151	520	1806	343	13607
Local Distributor	3757	646	224	42	200	1812	367	7048
Local	482	89	57	14	21	176	43	882
Ped/Cycle Crossing						107	66	173
Total	28047	4132	1665	343	1356	5628	990	42161
Percentages	66.5%	9.8%	3.9%	.8%	3.2%	13.3%	2.3%	100.0%

TABLE 2 - MORNING PEAK HOUR TRAFFIC FLOWS - DATA

Table 3 shows the average flow by road type for each mode. The percentage figures are the proportion of a particular road type's traffic which is that mode. For example, heavy trade vehicles comprise 4.9% of major arterial road traffic while they comprise 6.5% of local road traffic. This apparently high figure for trucks on local roads is explained by Chapmans Road, in an industrial area, where two thirds of all trucks on local roads were recorded. Trucks comprise only 2.4% of traffic on the other local roads.

AVERAGE MORNING PEAK HOUR TRAFFIC FLOWS  
(By road type for each mode)

Road Type	Car	Light Trade	Heavy Trade	Bus	Motor Cycle	Cycle	Ped	Motor Vehicle
Major Art'l	1342 72%	185 10.0%	91 4.9%	12 .7%	56 3.0%	157 8.4%	16 .8%	1687 91%
Minor Art'l	754 67%	113 10.0%	32 2.8%	13 1.1%	43 3.8%	151 13.3%	29 2.5%	955 84%
Local Dist.	342 53%	59 9.2%	20 3.2%	4 .6%	18 2.8%	165 25.7%	33 5.2%	443 69%
Local	69 55%	13 10.1%	8 6.5%	2 1.6%	3 2.4%	25 20.0%	6 4.9%	95 75%
Ped/Cycle						21 62%	13 38%	

TABLE 3 - AVERAGE MORNING PEAK HOUR TRAFFIC FLOWS

#### 4. NETWORK PLANNING IMPLICATIONS

In Table 4 the 46 survey locations are grouped according to road type and arranged in decreasing order of motor vehicle traffic. This allows a review of individual roads in terms of their role within the road and cycle route networks.

Amongst major arterial roads, the matters of most concern are some large cycle flows. Fendalton Road carried 416 cycles in the morning peak hour and three other roads carried more than two hundred. Alternative cycle routes are needed to entice cyclists away from these roads.

Tunnel Road (with only 338 motor vehicles in the peak hour) seems out of place as a major arterial but this status is warranted to preserve its capacity as the strategic link between Christchurch and Lyttelton.

Five minor arterial roads carried more than 200 cycles in the peak hour, while motor vehicle volumes on these same roads exceeded 1000. Relief for cyclists by parallel cycle routes is required for these roads too.

Curries Road, with only 93 motor vehicles should be considered for reclassification as a local road now that plans to bridge the Heathcote River and Christchurch-Lyttelton railway line have been abandoned.

Of the local distributor roads, Kilmarnock Street stands out as by far the busiest with 1,144 motor vehicles and 456 cycles. Only three minor arterial roads of the 12 surveyed carried more total traffic. It should not be reclassified as a minor arterial road and motorised traffic needs to be discouraged from using it so that it more properly functions as a local distributor road. Improvements planned for Fendalton Road and the construction of the Matai Street cycle underpass will reduce both motor vehicle and cycle volumes on Kilmarnock Street.

MOTOR VEHICLE AND CYCLE FLOWS  
(By road type, in order of motor vehicle traffic volume)

Road Type	Road Number#	Road Name	Motor Vehicle	Cycle
Major Arterial	3	Main South	2618	140
"	4	Curletts	2613	26
"	16	Waltham	2374	229
"	27	Blenheim	2062	64
"	26	Ferrymead Bridge	1878	88
"	19	Ensors	1768	149
"	31	Fendalton	1713	416
"	43	Main North	1291	80
"	2	Carmen	1001	242
"	40	Northcote	897	291
"	25	Tunnel	338	2
Minor Arterial	14	Colombo	1515	261
"	28	Riccarton	1482	231
"	34	Wairakei	1419	325
"	8	Lincoln	1352	138
"	33	Glandovey	1116	302
"	7	Clarence	1004	208
"	13	Durham	967	23
"	37	Harewood	922	143
"	35	Blighs	657	111
"	12	Montreal	513	31
"	23	Garlands	418	25
"		Curries *	93	8
Local Distributor	29	Kilmarnock	1144	456
"	11	Antigua	712	228
"	10	Selwyn	545	98
"	18	Wilsons	525	71
"	6	Matipo	518	71
"	5	Annex	460	217
"	38	Langdons	278	216
"	1	Parker	224	159
"	39	Sawyers Arms	197	117
"	42	Sturrocks	138	75
"	41	Tuckers	128	104
Local	9	Grove	216	35
"	32	Wroxton	107	67
"	24	Chapmans	105	3
"	22	Clarendon	94	29
"		Halswell Jnctn *	84	23
"	21	Richardson	48	15
"		Barnes *	9	4
Ped/Cycle Crossing	15	Mádras	0	16
"	17	Falsgrave	0	15
"	20	Judge	0	39
"	30	Matai	0	8
"	36	Bellvue	0	29

# See maps in Appendix 1. \* Estimated from previous surveys.

TABLE 4 - MOTOR VEHICLE AND CYCLE FLOWS



Amongst local roads, Chapmans Road seems to be acting as a local distributor and could be considered for reclassification.

Kilmarnock Street, and to a lesser extent, Antigua Street, are officially designated as cycle routes, but high current motor vehicle volumes undermine their potential for providing safe alternative routes to the arterial road network.

The only other formal cycle route surveyed was Annex Road. With 217 cycles and 460 motor vehicles it is providing a well-used cycling facility without too much interference from motor vehicles. Langdons Road, Parker Street, Sawyers Arms Road and Tuckers Road could be considered for cycle route status, as each has significant cycle traffic and modest motor vehicle flows.

The Traffic Screenline Survey provides useful information on the roads it includes, and samples enough roads to allow generalisations about road types. Decisions on the status of individual roads must be based on consideration of land use and traffic level of service as well as traffic volumes.



5. TEMPORAL TRAFFIC VARIATIONS

### MOTOR VEHICLE FLOWS BY QUARTER HOUR ChCh Traffic Screenline Survey 1988

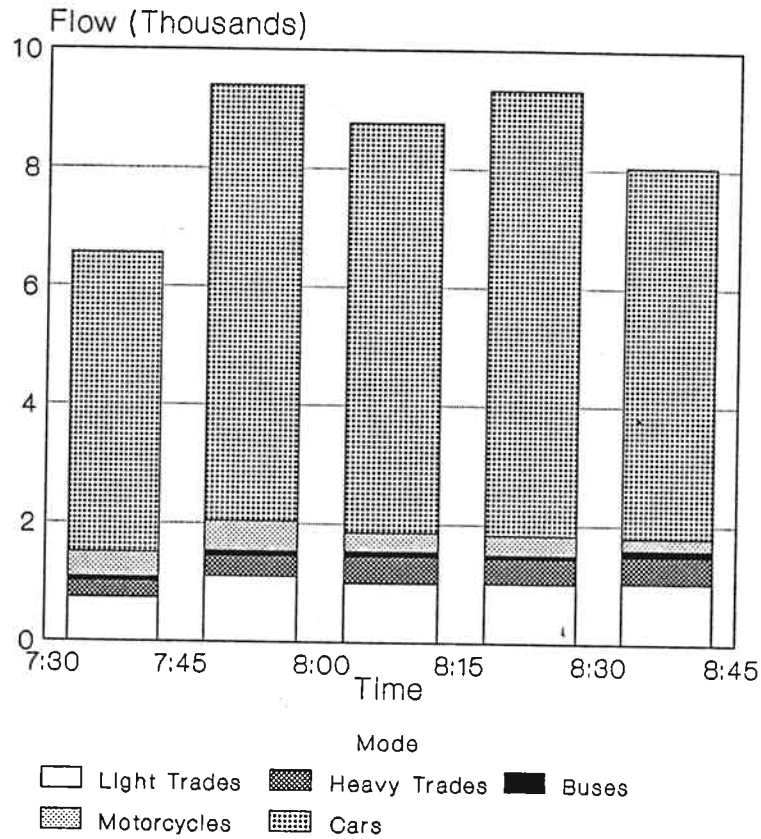


FIGURE 5 - MOTOR VEHICLE FLOWS BY QUARTER HOUR

Figure 5 shows peak hour volumes for the five motorised traffic modes recorded during the survey. Car traffic was busiest in the fourth survey period (between 8.15 a.m. and 8.30 a.m.) although the second period was almost as busy. Heavy trade vehicles and buses peaked in the fifth period and the third period was also busy.

Motorcycles, by contrast, were most numerous in the second period. Period one was twice as busy as period five, so that the peak hour for motorcycles was from 7.30 a.m. to 8.30 a.m. For all other modes the peak hour began at 7.45 a.m

Data for Figure 5 are found in Table 5.

## TRAFFIC FLOWS BY MODE BY QUARTER HOUR

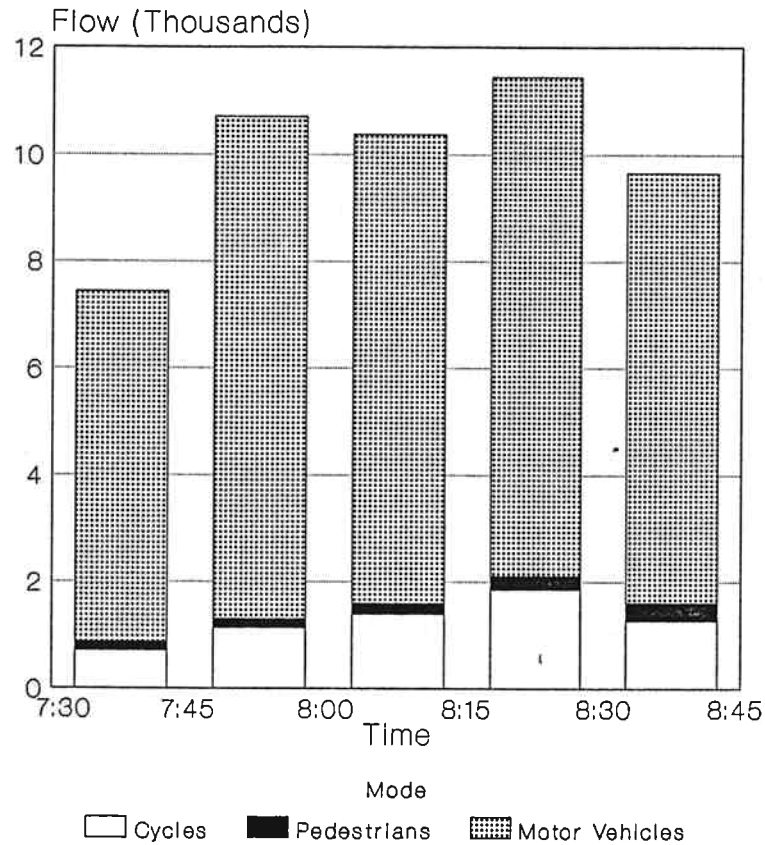
Mode	Quarter Hour					Peak Hour
	7:30- 7:45	7:45- 8:00	8:00- 8:15	8:15- 8:30	8:30- 8:45	
Car	5073	7360	6914	7514	6259	28047
Light Trade	733	1103	993	1011	1025	4132
Heavy Trade	270	346	450	411	458	1665
Bus	77	80	95	65	103	343
Motor Cycle	415	509	319	327	201	1356
Cycle	705	1128	1386	1846	1268	5628
Pedestrian	169	173	210	266	341	990
Motor Vehicle	6568	9398	8771	9328	8046	35543
Total	7442	10699	10367	11440	9655	42161

TABLE 5 - TRAFFIC FLOWS BY MODE BY QUARTER HOUR

Figure 6 compares the volumes of motor vehicle traffic with that of pedestrians and cyclists over the five survey periods.

The first survey period was significantly less busy than the others. The second and fourth periods were slightly busier than the others for motor vehicles. The fourth period was easily the busiest for cycle traffic with 33% of the peak hour flow. However, the last period was busiest for pedestrians. This probably reflects the high proportion of walking trips done by primary school pupils, who tend to make their trips later than other students and workers. Data for Figure 6 are recorded in Table 5.

### TRAFFIC FLOWS BY QUARTER HOUR ChCh Traffic Screenline Survey 1988

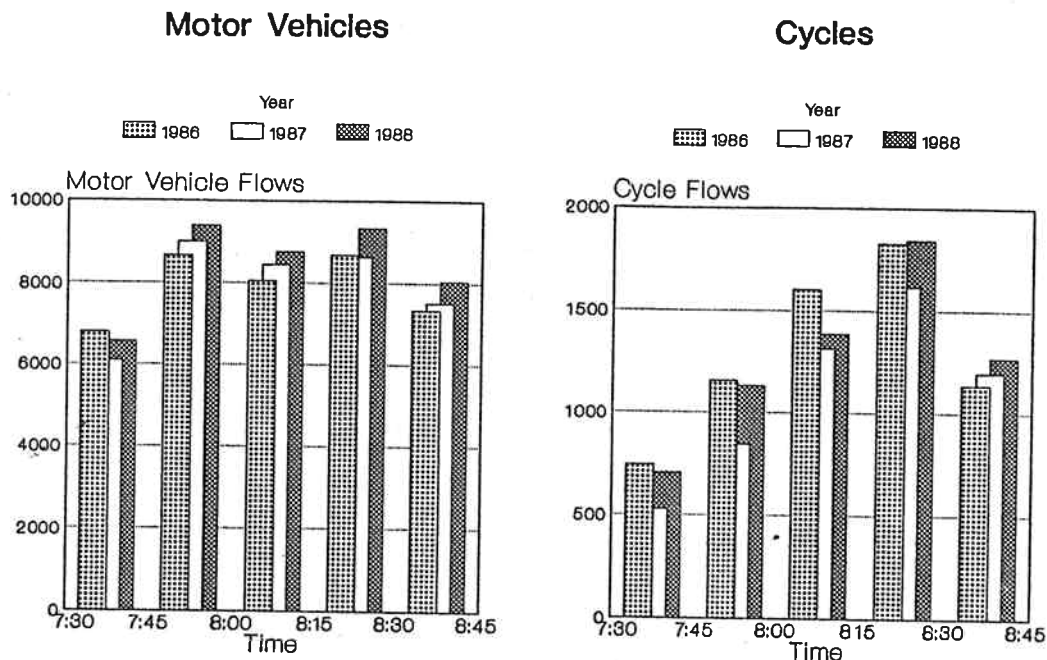


**FIGURE 6 - TRAFFIC FLOWS BY QUARTER HOUR**

Figure 7 illustrates the difference in timing between cycle and motor vehicle traffic over the last three surveys (1986, 1987 and 1988). Data for this figure are found in Table 6.

Motor vehicle traffic distribution over the duration of the survey has varied little over the years. The busiest quarters are always the second and the fourth, corresponding with the common starting times of 8.00 a.m. and 8.30 a.m. for workers. Cyclists have shown a little more variability.

# TRAFFIC FLOWS BY QUARTER HOUR AND BY YEAR



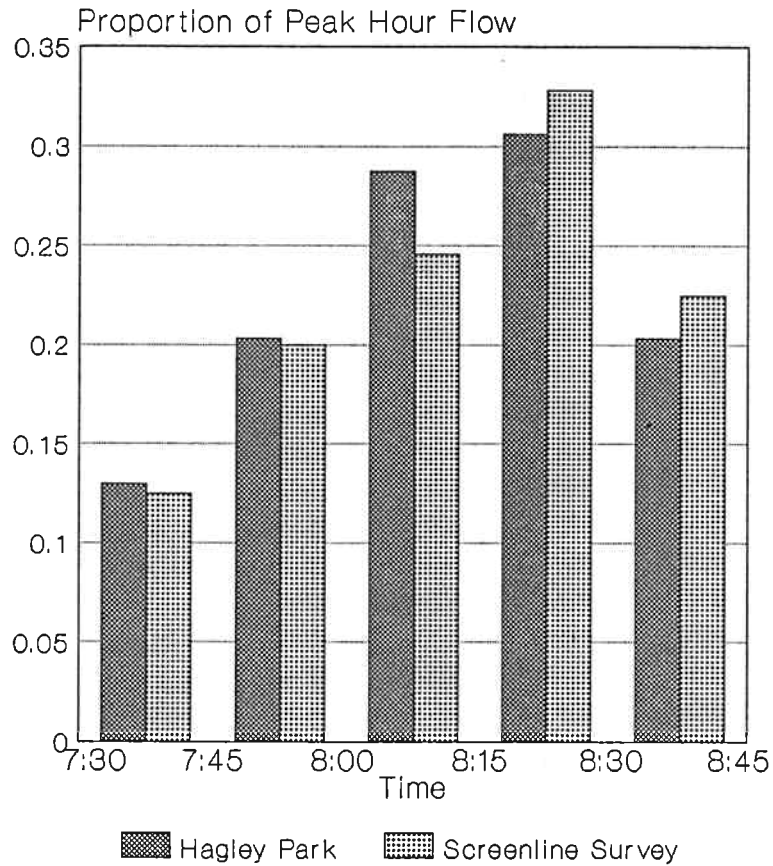
**FIGURE 7 - TRAFFIC FLOWS BY QUARTER HOUR AND BY YEAR**

## TRAFFIC FLOWS BY QUARTER HOUR AND BY YEAR

Mode	Year	Quarter Hour				
		7:30-7:45	7:45-8:00	8:00-8:15	8:15-8:30	8:30-8:45
Motor Vehicle	1986	6779	8663	8045	8693	7335
	1987	6089	9008	8453	8634	7515
	1988	6568	9398	8771	9328	8046
Cycle	1986	742	1154	1605	1830	1137
	1987	528	845	1312	1617	1195
	1988	705	1128	1386	1846	1268

**TABLE 6 - TRAFFIC FLOWS BY QUARTER HOUR AND BY YEAR**

### CYCLE FLOWS BY QUARTER HOUR Hagley Park and Screenline Surveys



**FIGURE 8 - CYCLE FLOWS BY QUARTER HOUR**

The distribution of cycle traffic over the survey duration is comparable with that recorded by automatic traffic counter at the Armagh Street entrance to Hagley Park. This survey will be reported more fully in the 1988 Annual Monitoring Report. Figure 8 shows the distribution of cycle traffic through the survey by quarter hour averaged for weekdays over three weeks (14 March to 31 March 1988). It also shows cycle traffic as recorded in the Traffic Screenline survey. Counts for each quarter hour have been expressed in terms of the peak hour flow to facilitate comparison between the surveys.





6. VEHICLE OCCUPANCY

### CAR OCCUPANCY BY QUARTER HOUR ChCh Traffic Screenline Survey 1988

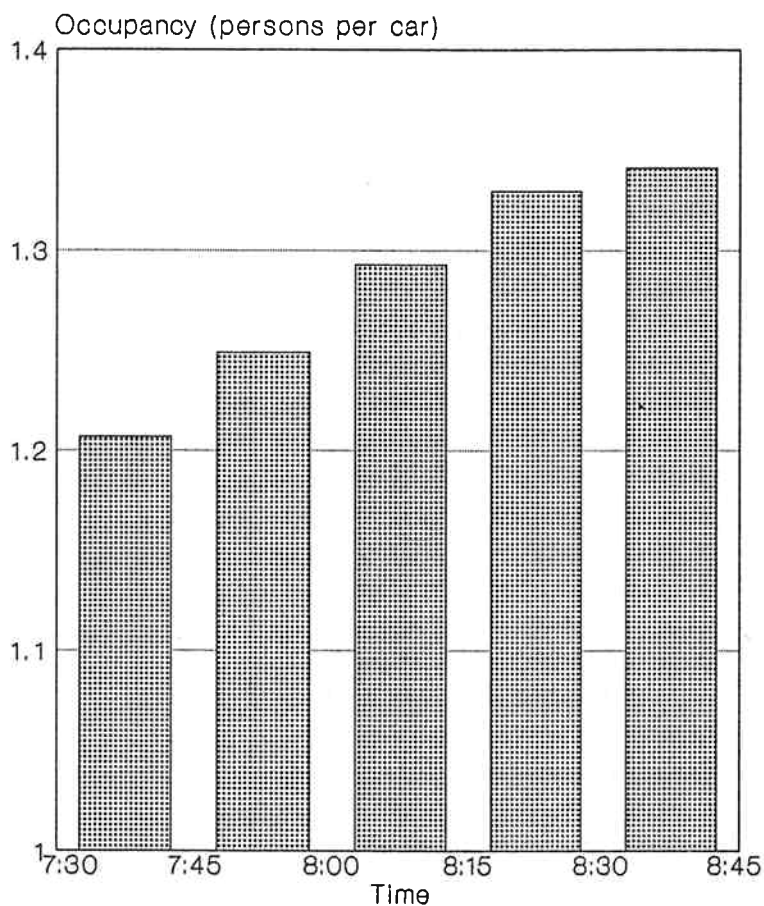


FIGURE 9 - CAR OCCUPANCY BY QUARTER HOUR

The number of occupants in each of the first ten cars in each quarter hour was recorded at each station for each direction of travel. About 800 cars were surveyed for occupancy in each quarter hour. Car occupancy was found to increase through each period of the survey, rising steadily from 1.20 to 1.34 (see Figure 9). This may be explained by school students being delivered to schools by parents in time for school at around 8.30 a.m. or 8.45 a.m.

For analysing occupancy it has been found helpful to divide the survey stations into six geographic sectors. Figure 10 shows how the sectors have been defined.

## SURVEY SECTORS

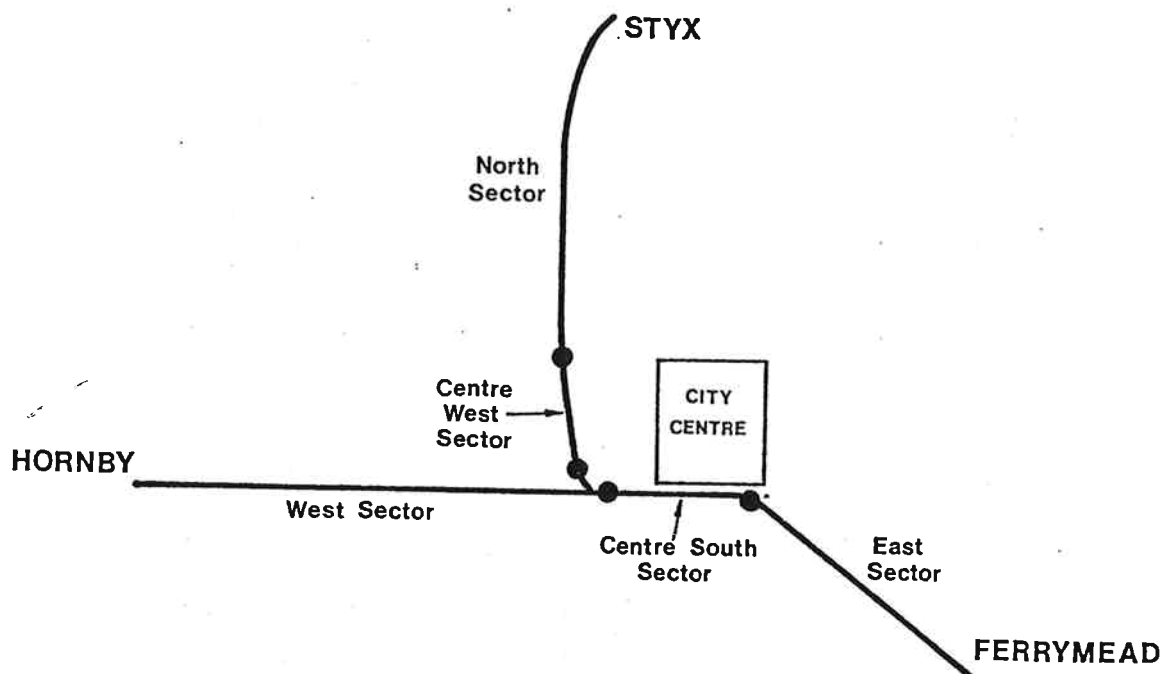


FIGURE 10 - SURVEY SECTORS

Two inner sectors (Centre South and Centre West) comprise radial roads leading to the city centre. The Centre South Sector includes railway crossings from Lincoln Road to Waltham Road, while the Centre West Sector runs from Blenheim Road to Fendalton Road inclusive.

Three more distant sectors (East, West and North) have a variety of road types and purposes. Three remote stations with pronounced tidal flows (Main North Road, Ferrymead Bridge and Tunnel Road) are grouped into one sector (Outer Radials).

By multiplying the car occupancies found for each time period of the peak hour by the number of cars recorded in each period, the total number of people crossing the screenline in cars were estimated.

With a few assumptions about the occupancy of other vehicles, estimates were also made of the total number of people crossing the screenline, and their mode of travel.

Light trade vehicles were assumed to carry an average of 1.15 persons each during the morning peak hour. Heavy trade vehicles and motor cycles were assumed to carry 1.05 persons on average. Pedestrians

are by definition one person, and cycles were assumed to carry one person.

Bus loadings are regularly surveyed by the Christchurch Transport Board, the major bus operator in Christchurch. Analysis of 60 buses in March and April this year on Hagley Avenue, Riccarton Avenue, Carlton Mill Road and Moorhouse Avenue (at Waltham Road) revealed that inbound buses at these fairly central locations carried an average of 32 passengers (33 people including the driver) between 7.45 a.m. and 8.45 a.m. Inbound buses would be more lightly loaded further from the city centre. It is estimated that inbound buses overall would carry 25 people, if measured at the railway screenline.

Bus loadings were also surveyed as part of the North of the Waimakariri River Public Transport Study. Inbound buses in the morning peak were found to carry 38 people at Bealey Avenue and 16 at the Waimakariri River, generally supporting the estimate of 25 at the screenline.

Outbound buses averaged six people at Bealey Avenue and three at the Waimakariri River. It is estimated that the outbound bus occupancy, if measured at the railway screenline, would average five. There were 179 inbound buses and 164 outbound buses recorded in the screenline survey.

### TRAVEL MODES OF PEOPLE ChCh Traffic Screenline Survey 1988

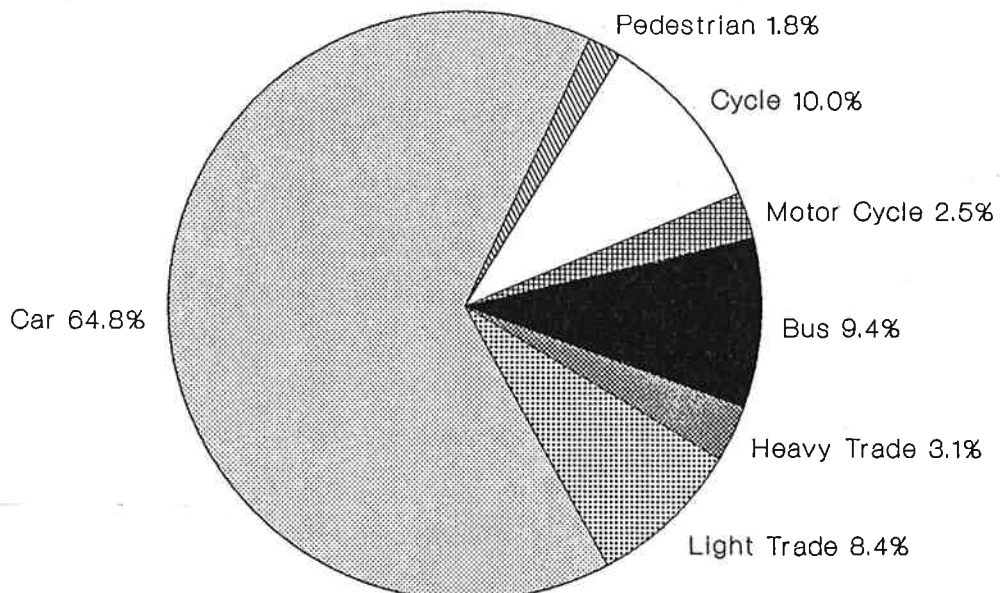


FIGURE 11 - TRAVEL MODES OF PEOPLE

Figure 11 represents the distance people travel by each mode during the morning peak hour. This pie chart varies from Figure 3 which represents the distance vehicles travel; not people. The main difference is for buses, which make up less than 1% of vehicle distance but carry people about 9% of their travel distance at this time. Data for Figure 11 are shown in Table 7 .

#### TRAVEL MODES OF PEOPLE

Mode		Number of Vehicles	Occu-pancy	Number of People	Proportion of People
Car	First Quarter	7360	1.249	9193	64.8%
	Second Quarter	6914	1.293	8940	
	Third Quarter	7514	1.329	9986	
	Fourth Quarter	6259	1.341	8393	
	Total				
Light Trade		4132	1.15	4752	8.4%
Heavy Trade		1665	1.05	1748	3.1%
Bus	Inbound	179	25	4475	9.4%
	Outbound	164	5	820	
	Total				
Motor Cycle		1356	1.05	1424	2.5%
Cycle		5628	1	5628	10.0%
Pedestrian		990	1	990	1.8%
Total		42161		56349	

TABLE 7 - TRAVEL MODES OF PEOPLE

Table 8 records the car occupancy in the peak hour for each sector of the survey over the last three years.. While the overall number of occupants in cars averaged about 1.30 each year, some sectors and directions varied considerably from this. The most obvious example is the Centre South sector, from Lincoln Road to Waltham Road. Northbound cars (into town) carry on average 1.38 people, while southbound cars averaged only 1.24. The three outer radials also exhibit a tidal nature, with occupancy averaging 1.45 persons per car for inbound traffic and 1.34 for outbound.

**CAR OCCUPANCY BY SECTOR  
(1986 to 1988)**

Sector	No. of Stations	Dir	1986	1987	1988	Average	1988 Motor Vehicles
West	8	N	1.33	1.25	1.30	1.29	4241
		S	1.28	1.29	1.19	1.25	4281
Centre South	8	N	1.38	1.33	1.43	1.38	4906
		S	1.21	1.24	1.26	1.24	3288
East	7	N	1.23	1.21	1.19	1.21	1518
		S	1.35	1.24	1.29	1.29	1533
Centre West	4	E	1.25	1.33	1.28	1.29	4116
		W	1.20	1.37	1.26	1.27	2285
North	11	E	1.33	1.32	1.40	1.35	3124
		W	1.33	1.29	1.32	1.31	2744
Outer Radials	3	In	1.53	1.43	1.39	1.45	2543
		Out	1.38	1.40	1.23	1.34	964
Sum Average	41 *	All	1.30	1.29	1.30	1.30	35543

\* Only 41 of the 46 survey locations carry car traffic.

TABLE 8 - CAR OCCUPANCY BY SECTOR



7. COMPARISONS WITH PREVIOUS YEARS

The Traffic Screenline Survey records traffic at 46 locations throughout Christchurch, but only one hour of one day is used. Because of this short sampling time, the survey is too crude a yardstick to measure annual changes in traffic with any confidence.

RICCARTON ROAD SCREENLINE SURVEYS  
(For week beginning 21 March 1988)

Day	Eastbound Traffic		Westbound Traffic	
	Cycle	Motor Vehicle	Cycle	Motor Vehicle
Monday	113	804	106	650
Tuesday	118	844	113	638
Wednesday	113	803	115	654
Thursday	123	847	114	584
Friday	89	795	84	663
Average	111	819	106	638
Standard Devn.	13	25	13	31

TABLE 9 - RICCARTON ROAD SCREENLINE SURVEYS

An indication of the daily variability of traffic is seen in Table 9. Morning peak hour traffic on Riccarton Road was surveyed on all five weekdays of the week in which the main survey was held. Motor vehicle traffic in one direction varied from 795 to 847, and from 584 to 654 in the other. Average flows for the two directions were 819 and 638 with standard deviations (a measure of spread) of 25 and 31. (One would be 95% confident that the "true" flows would be within two standard deviations of the average, so that the average flow would probably be between 769 and 869 for eastbound traffic and between 576 and 700 westbound.) Traffic flows are inherently variable. Even when weather conditions are constant, traffic flows vary from day-to-day with no obvious pattern.

An analysis of forty automatic traffic counts at a variety of Christchurch locations, each extending over a week, has been analysed and will be reported in full in the 1988 Annual Monitoring Report.

It shows that morning peak hour motor vehicle volumes vary from day to day and station to station but that there is insufficient evidence to conclude that any one weekday is significantly different from any other.

The same analysis shows that total daily traffic volumes are significantly higher on Fridays than other weekdays, even though Friday morning peak hour traffic is the same as for other weekdays.

Given the high variability of counts in the screenline survey (as demonstrated at Riccarton Road), it is not appropriate to use this survey as a measure of traffic growth from one year to the next. Traffic may vary more from day to day on a random basis than real annual growth. The screenline survey may be used for modal comparison over much longer time intervals, for example, five or ten years.

However, a more convenient tool for measuring traffic growth exists. This is the standard traffic counting programme, where traffic is counted at about 450 locations every three years.

Recent analysis of these data (to be reported fully in the Annual Monitoring Report) reveals that motor vehicle traffic has increased as shown in Table 10. While the data allow differentiation of road type, the rates of change of different modes are not obtainable from this source because automatic traffic counters do not generally distinguish vehicle type.

MOTOR VEHICLE TRAFFIC GROWTH 1984 TO 1987  
(Based on analysis of Flow Map figures for 377 locations)

Road Type	Number in Sample	Average Daily Total (1987)	Total Growth (3 Years)	Annual Growth Rate
Major Arterial	96	14500	11.1%	3.6%
Minor Arterial	147	7900	9.7%	3.1%
Local Distributor	96	5400	7.9%	2.6%
Local	38	3300	3.6%	1.2%

TABLE 10 - MOTOR VEHICLE TRAFFIC GROWTH 1984 TO 1987



The 1978 NUTS survey is of some assistance in monitoring growth for different modes. However, only eight of the eleven major arterial roads in the current survey and eight of twelve minor arterial roads were surveyed. Traffic in March 1979 was estimated from the August 1978 data, using the ratio of March to August flows found in 1985 and 1986. A comparison of traffic was then made for three modes for the interval March 1979 to March 1988. This is summarised in Table 11.

ARTERIAL ROAD TRAFFIC GROWTH 1979 TO 1988  
(Based on analysis of 16 arterial roads)

Road Type	Annual Growth Rate 1979 to 1988			Average Flow March 1988		
	Heavy Trade	Cycle Vehicle	Motor Vehicle	Heavy Trade	Cycle Vehicle	Motor Vehicle
Major Arterial	2.9%	.4%	3.0%	106	149	2040
Minor Arterial	-.4%	-.4%	1.1%	37	170	1147
TOTAL	2.0%	.0%	2.3%	71	160	1593

TABLE 11 - ARTERIAL ROAD TRAFFIC GROWTH 1979 TO 1988

Cycle traffic has not altered on arterial roads over the last decade. Heavy trade vehicles have increased at 2.0% per annum. Motor vehicle traffic has increased 3.0% per annum on major arterials and 1.1% on minor arterials.



8. CONCLUSIONS

(i) The composition and timing of morning peak hour traffic in Christchurch has not changed much over the last two years. Traffic volumes are still increasing each year. Most traffic continues to be cars and light trade vehicles but cycles are a significant minority. The survey recorded over 40,000 vehicles and pedestrians as follows:

Cars	67%
Cycles	13%
Light Trade Vehicles	10%
Other	10%

- (ii) The road hierarchy is generally performing as planned. Major arterial roads carry on average nearly twice as many motor vehicles (1,700 in the peak hour) as minor arterials (950). Minor arterials carry over twice as many motor vehicles as local distributors (450), while local roads carry on average 100 motor vehicles in the morning peak hour. This pattern supports the findings of a more comprehensive analysis of conventional traffic counts carried out as part of the regular traffic monitoring process.
- (iii) Cycle traffic, however, is not so well distributed. Higher flows than desirable occur on arterial roads. Cycle flows of about 160 per road in the morning peak hour are found on major and minor arterial roads and local distributor roads.
- (iv) Existing policies and proposals in the Canterbury Urban Transport Operational Plan to improve the efficiency of the road and cycle route networks are supported by the survey. Arterial roads can be enhanced as efficient corridors for motor vehicle travel by reducing cycle traffic on them. This can be done by improving the continuity and complexity of the cycle route network.
- (v) Encouraging cycling, bus use and ride sharing can also increase the efficiency of the arterial road network. These measures, too, are included in the Operational Plan and are supported by the survey.

- (vi) The Traffic Screenline Survey is now well established. Change appears to be gradual. The survey provides useful data and should be done every five years to coincide with the National Census.

Andrew G Macbeth

URBAN TRANSPORT PLANNER

APPENDIX 1

INSTRUCTIONS TO SURVEYORS, MAPS AND TALLY SHEET

Our ref. TRAN/4/1

Your ref.

9 March 1988

P O Box 1997  
 Christchurch,  
 New Zealand  
 4th Floor  
 Civic Offices  
 163 Tuam Street  
 Tel (03) 62359

1988 RAILWAY SCREENLINE TRAFFIC SURVEY  
INSTRUCTIONS TO SURVEYORS

1. Introduction

**Constituent  
 Councils:**

Akaroa County

Amuri County

Christchurch City

Cheviot County

Ellesmere County

Eyre County

Heathcote County

Hurunui County

Kaiapoi Borough

Lyttelton Borough

Melvern County

Mt Herbert County

Oxford County

Paparua County

Rangiora District

Riccarton Borough

Waimairi District

Wairua County

and special purpose  
 authorities and  
 Government  
 Departments.

This survey is a vital part of the information needed to plan for traffic in Christchurch. Thank you for agreeing to assist us with this.

The count is different from the normal traffic counts obtained from automatic machines connected to a hose laid across the road. It is special because:

- (i) All types (or "modes") of traffic will be counted, not just motor vehicles.
- (ii) All types of roads are included, from pedestrian ways and subways to arterial roads.

All counts will be carried out simultaneously along the "screenline" defined by the Christchurch main railway lines. In this way a total picture will be obtained along a representative slice of Christchurch.

This survey is a repeat of ones done in March last year and the year before. By comparing data from the surveys, we will be able to analyse traffic changes. The surveys will be repeated in future years to build up a long-term picture of traffic composition and growth patterns.

Students of St. Andrews College are surveying the northern section (from Riccarton to the Styx Overbridge on the Main North Road). Linwood High School students are surveying the eastern section (from the city to Ferrymead). The western section, from the city to Islington, is being surveyed by students from Riccarton High School. Staff of the Canterbury United Council will visit all surveyors during the course of the survey.



2.

2. Things You Will Need

- (a) These instructions.
- (b) Clipboard and tally sheet.
- (c) Pencil (and a spare).
- (d) Watch or clock set to the correct time.
- (e) Clickers - if supplied to you.
- (f) Warm clothing.
- (g) A little common sense.

3. Time, Date and Postponement Procedure

The survey is planned for Tuesday, 22 March from 7.30a.m. to 8.45a.m. Postponement of the survey because of bad weather will be announced on Radio 3ZB (1098 AM on your radio dial). Listen for announcements immediately after the news bulletins at 6.30a.m., 7.00a.m. or 7.30a.m. If you are in any doubt, phone somebody else in your class. If you do not hear a cancellation notice, please assume that the count is on, even if the weather looks doubtful.

4. Location

Every crossing of the railway is to be counted, including some available only to pedestrians and cyclists. Locate your site on the attached map and think about how you will get there. At least two people will be at every site. It is recommended that you arrive about five minutes early so you can familiarise yourself with the area, meet up with your partner(s) and decide together on a convenient place from which to observe traffic. Most roads in Christchurch are "tidal" and carry more traffic into town in the mornings, out of town in the afternoons. The easiest place to see traffic at a railway crossing will probably be close to where vehicles will stop if waiting for a train. Choose the side of the road which seems to carry more traffic. It is recommended that surveyors stand (or sit) together so that you can help each other if traffic gets busy, or keep each other company if things are quiet. Pick a single track or the painted white stop line (or even an imaginary line between you and a power pole across the road) as your screenline and stick to that throughout the survey.

5. Classifications

All vehicles and pedestrians crossing the railway lines should be recorded. Classifications are as follows:

- Cars - Includes station wagons
- Light Trade - Trade vehicles with only four wheels including utilities ("utes"), vans and small trucks.
- Heavy Trade - Trade vehicles with more than four wheels such as vans with double rear wheels on each side, most trucks and odd vehicles like tractors and forklift trucks.


- Buses - Includes mini-buses
- Motorcycles - Includes mopeds
- Cycles - Includes cyclists walking their cycles, adult tricyclists.
- Pedestrians - Includes joggers, children on tricycles, skateboarders, people on horses.

Note: Trailers should be ignored. Simply record the vehicle towing them in the appropriate classification.

#### 6. Car Occupancy

Please also record the number of people in each of the first ten cars in each time period. There is a space on the survey form for recording car occupancy. You need only record a car once - either by recording its occupancy or by tallying it as a car. Don't record it in both places on the tally sheet. If you can't record occupancy of the first ten cars because you are too busy, just make sure you record each car with a tally mark (or your clicker, if you have one) and then record occupancy of any car you get time to do, until you've done ten.

#### 7. Counting Method

Each surveyor counts traffic in only one direction. Your tally sheet is designed with columns for each vehicle type. Fill in the details at the top of the page before you start, checking with your partner that you both know which direction you are supposed to be counting. Record each vehicle or pedestrian as it crosses your chosen screenline by marking with a tally stroke. After four strokes, use a diagonal stroke across all four to indicate the fifth, to ease totalling at the end. Thus, seven cars would be marked as  11. On busy roads you will have to do small, neat marks.

Keep an eye on your watch so that you can begin each quarter hour in a new row and confirm the time you change to each new time period with your partner. If you forget to change rows in time, record the actual time you begin counting the interval in the "time period" column. Better still, don't forget!

On the busiest roads, it can be difficult to keep up with the traffic. You may need to write down a single number, (inside a circle, for clarity), e.g. (17) if a whole stream of cars passes you quickly. At a few sites, clickers will be available for the person counting the busiest flow. Use it only for cars, and use tally marks for any other vehicle classes. If you are using a clicker, don't forget to record car occupancy for ten cars too, remembering not to record them on your clicker as well.

Your survey form for the first period may look like this:



CANTERBURY UNITED COUNCIL

RAILWAY SCREENLINE TRAFFIC SURVEY

Location: Rhabarb Street

Direction: Northbound

Surveyor: Go Banana

TIME PERIOD	CARS	LIGHT TRADE	HEAVY TRADE	BUSES	MOTOR CYCLES	CYCLES	PEDESTRIANS
Occupants	3         2						1
30-7.45	(13)         (8)						

7. Collection of Completed Survey Forms

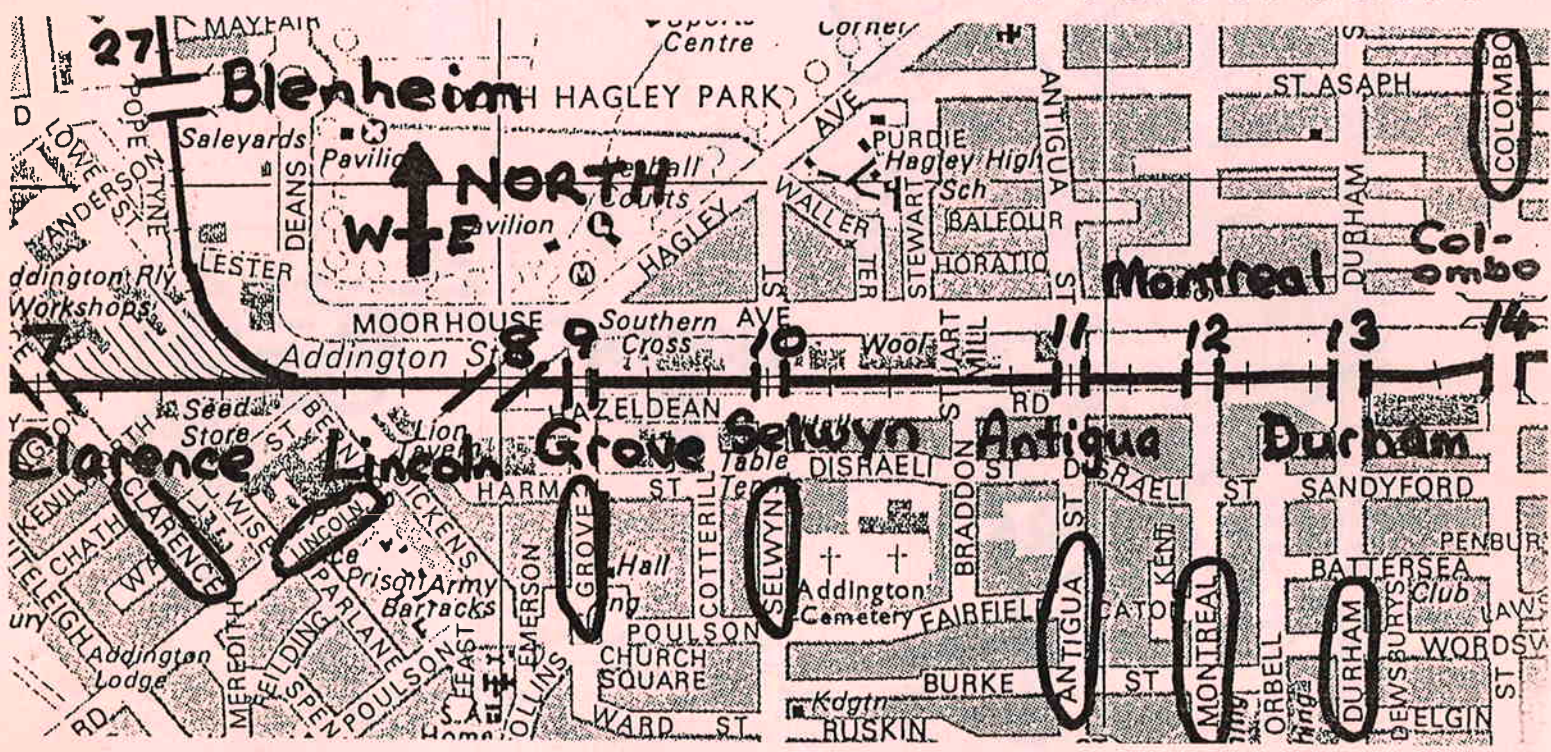
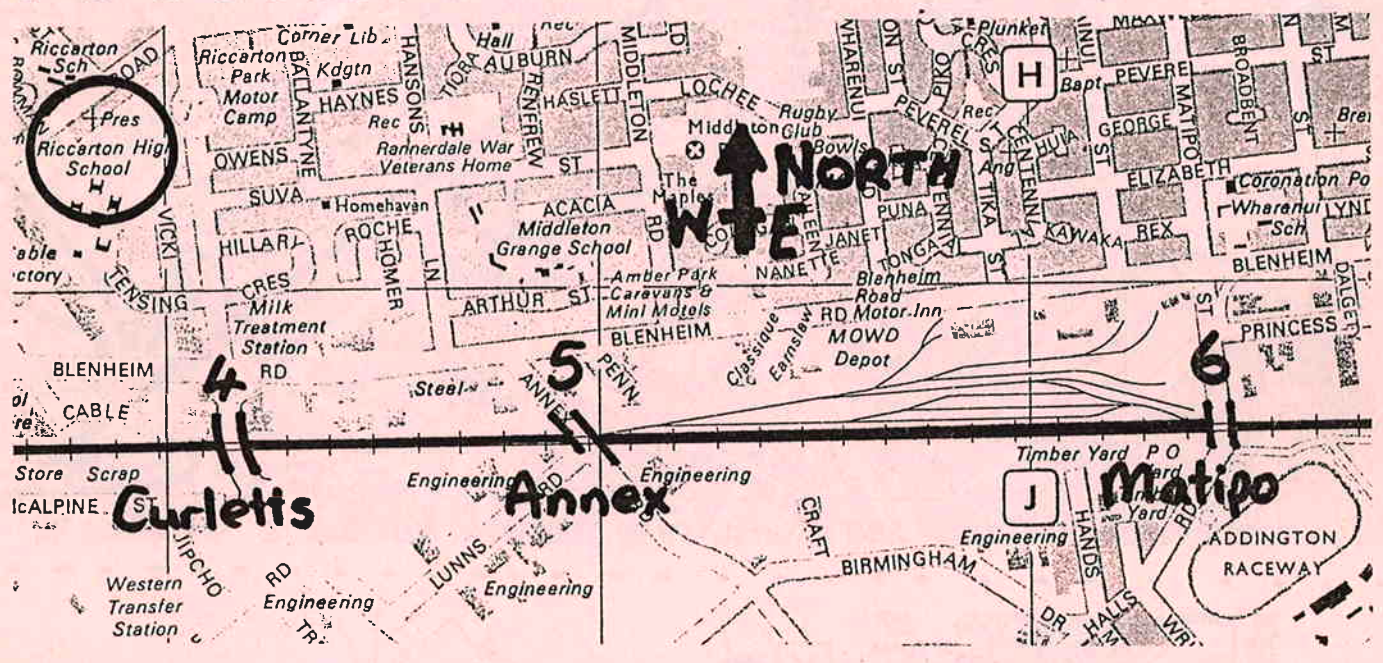
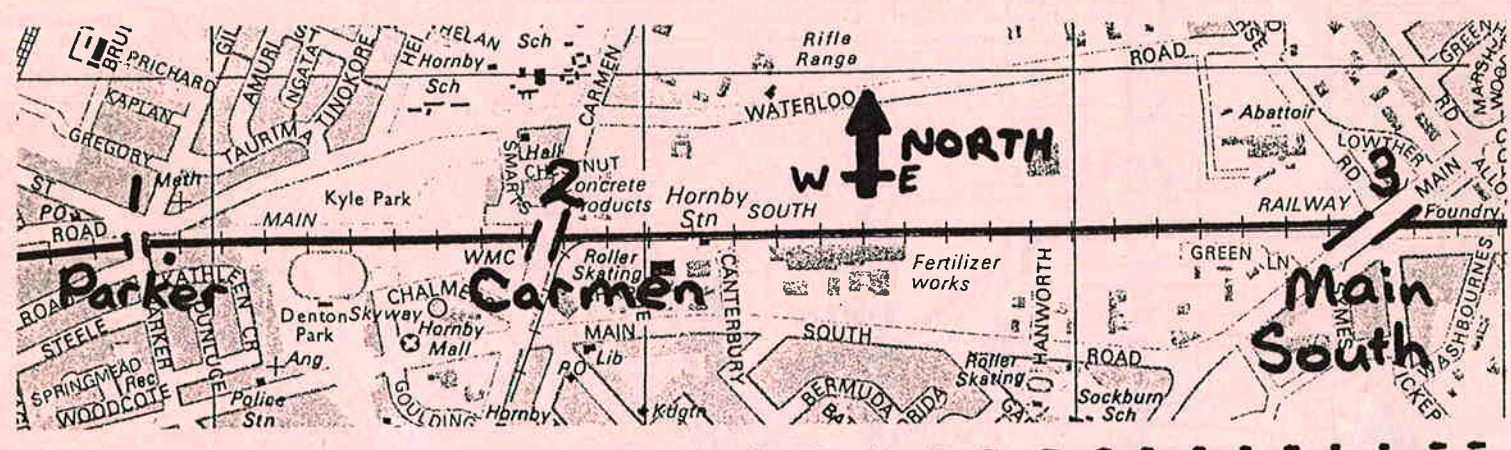
Please return to school with your survey form, clipboard and clicker (if you have been supplied with one), and hand them in to the United Council staff member. He will want to check your survey form then to see that it has been filled in properly, and you can explain anything unusual on your sheet to him if necessary.

Andrew Macbeth  
URBAN TRANSPORT PLANNER



# CANTERBURY UNITED COUNCIL<sup>38</sup>

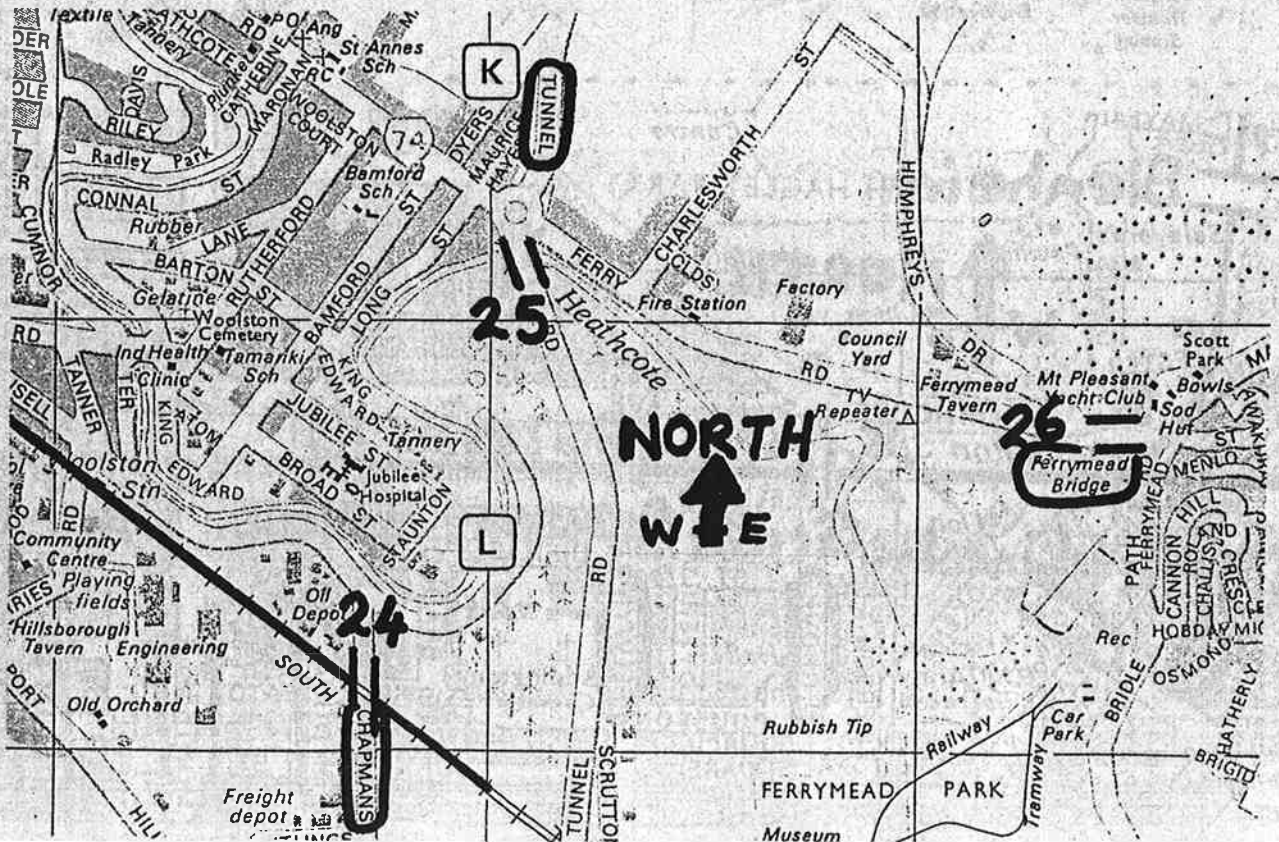
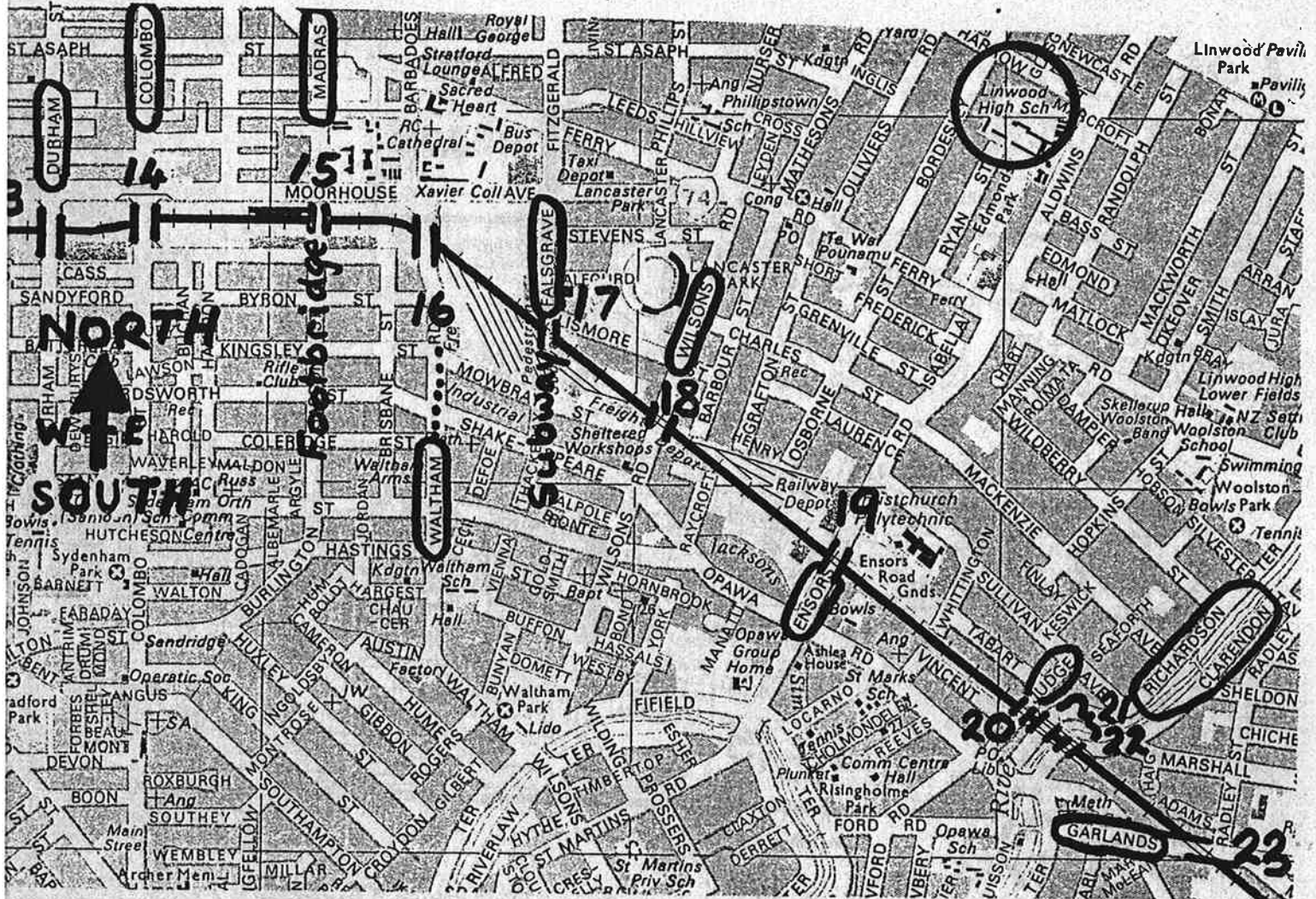
## Railway Screenline Traffic Survey - Western Section





# CANTERBURY UNITED COUNCIL <sup>39</sup>

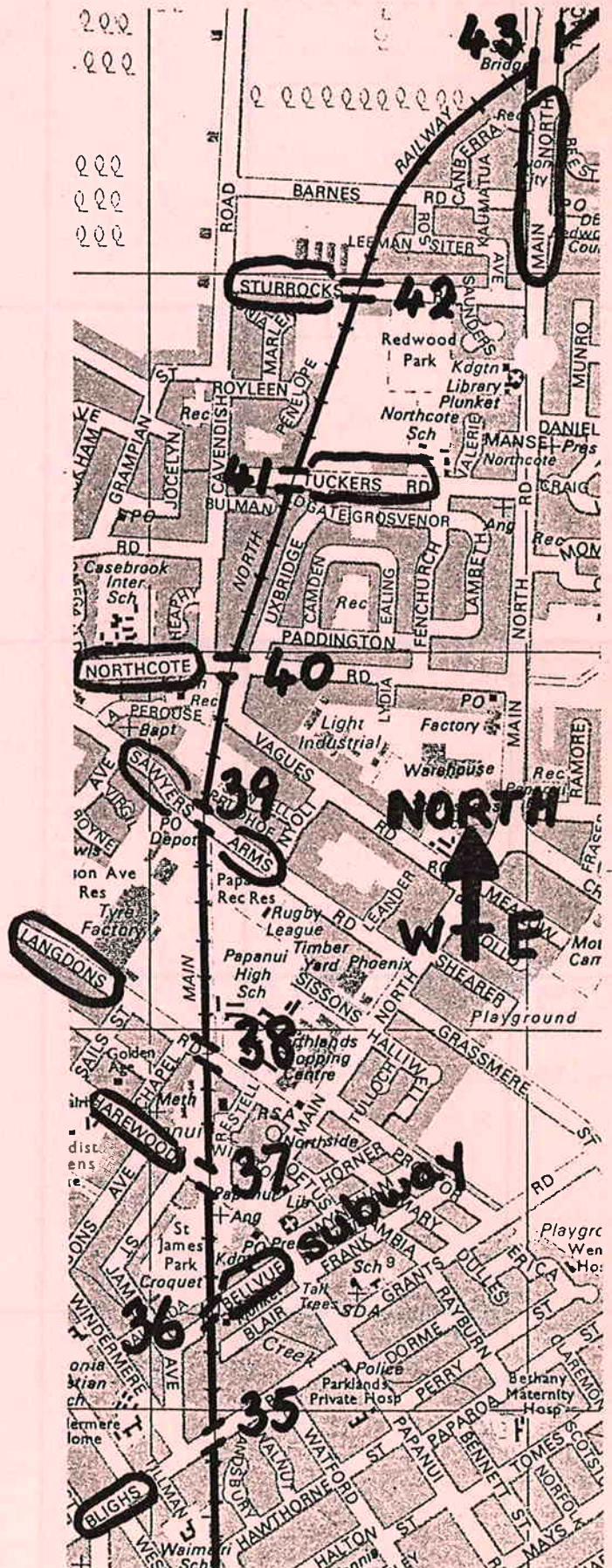
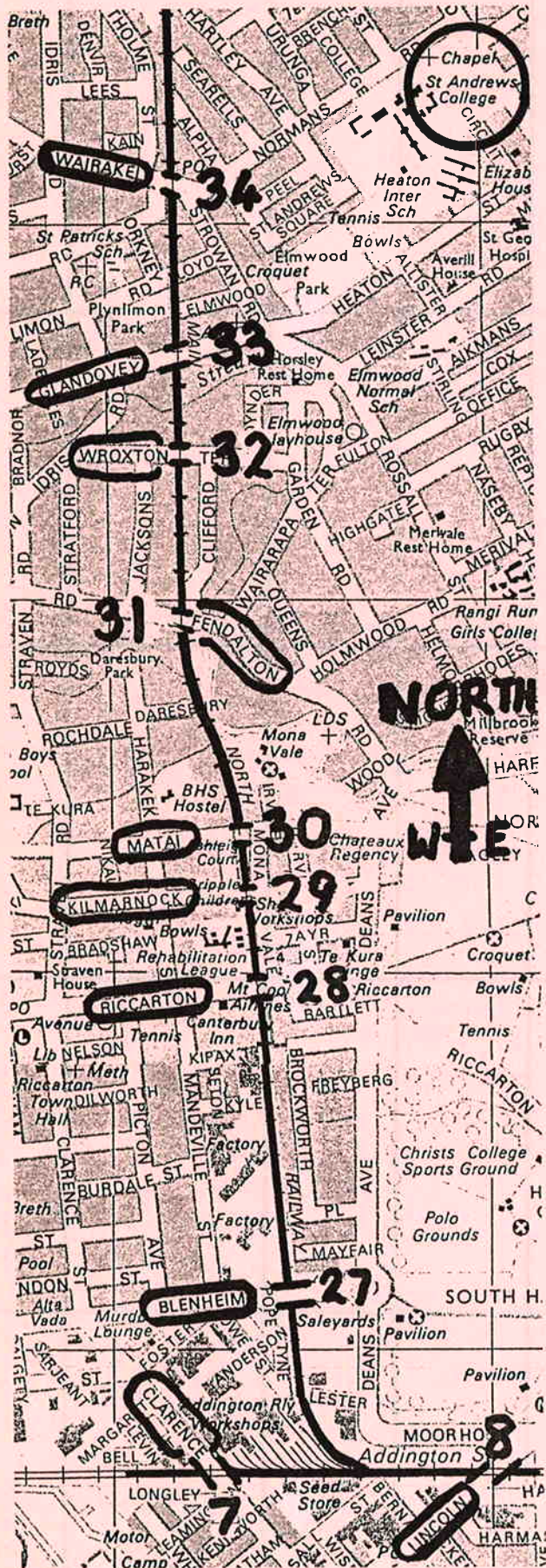
## Railway Screenline Traffic Survey - Eastern Section





# CANTERBURY UNITED COUNCIL

## Railway Screenline Traffic Survey - Northern Section





CANTERBURY UNITED COUNCIL

RAILWAY SCREENLINE TRAFFIC SURVEY

oad: \_\_\_\_\_ Direction: \_\_\_\_\_ Surveyor: \_\_\_\_\_

PERIOD	CARS	LIGHT TRADE	HEAVY TRADE	BUSES	MOTOR CYCLES	CYCLES	PEDES-TRIANS
Supants 30-7.45							
Supants 15-8.00							
Supants 00-8.15							
Supants 5-8.30							
Supants 30-8.45							



APPENDIX 2

SURVEY CONTROL SHEETS



## CANTERBURY UNITED COUNCIL

## RAILWAY SCREENLINE TRAFFIC SURVEY - WESTERN SECTION

<u>STATION NAME AND NUMBER</u>	<u>DIRECTION</u>	<u>FLOWS</u> (* = Clicker)	<u>SURVEYOR</u>
1 Parker	Northbound	All	
	Southbound	All	
2 Carmen	Northbound	All *	
	Southbound	All	
3 Main South	Northbound (to City)	Cars, light trade	
	" " "	All other flows	
	Southbound (to Hornby)	Cars, light trade	
	" " "	All other flows	
4 Curletts	Northbound (to Riccarton)	Cars, light trade	
	" " "	All other flows	
	Southbound (from Ricc.)	Cars, light trade	
	" " "	All other flows	
5 Annex	Northbound	All	
	Southbound	All	
6 Matipo	Northbound	All	
	Southbound	All	
7 Clarence	Northbound	All	
	Southbound	All	
8 Lincoln	Northbound	All*	
	Southbound	All	
9 Grove	Northbound	All	
	Southbound	All	
10 Selwyn	Northbound	All	
11 Antigua	Southbound	All	
	Northbound	All	
12 Montreal	Southbound	All	
	Northbound	All	
27 Blenheim	Eastbound	Cars, light trade	
	Westbound	All other flows	
		All*	

3 Clickers

(31 Surveyors)



CANTERBURY UNITED COUNCILRAILWAY SCREENLINE TRAFFIC SURVEY - EASTERN SECTION

<u>STATION NAME AND NUMBER</u>	<u>DIRECTION</u>	<u>FLOWS</u> (* = Clicker)	<u>SURVEYOR</u>
26 Ferrymead Br.	Eastbound (to Sumner) Westbound (to City) " " "	All Cars, light trade* All other flows	
25 Tunnel	Northbound (to City) Southbound (to tunnel)	All All	
24 Chapmans	Northbound Southbound	All All	
23 Garlands	Eastbound Westbound	All All	
22 Clarendon	North and Southbound	All	
21 Richardson	North and Southbound	All	
20 Judge	Northbound Southbound	Cycles, peds. Cycles, peds.	
19 Ensors	Northbound Southbound	All All*	
18 Wilsons	Northbound Southbound	All All	
17 Falsgrave	Northbound Southbound	Cycles, peds. Cycles, peds.	
16 Waltham	Northbound Southbound	Cars, light trade* All other flows Cars, light trade All other flows	
15 Madras	Northbound Southbound	Cycles, peds. Cycles, peds.	
14 Colombo	Northbound Southbound	Cars, light trade All other flows All	
13 Durham	Northbound Southbound	All All	

(3 Clickers)

(30 Surveyors)

CANTERBURY UNITED COUNCILRAILWAY SCREENLINE TRAFFIC SURVEY - NORTHERN SECTION

<u>STATION NAME AND NUMBER</u>	<u>DIRECTION</u>	<u>FLOWS</u> <u>(* = Clicker)</u>	<u>SURVEYOR</u>
43 Main North	Northbound (from City)	All	
	Southbound (to City)	All *	
42 Sturrocks	Eastbound	All	
	Westbound	All	
41 Tuckers	Eastbound	All	
	Westbound	All	
40 Northcote	Eastbound	All *	
	Westbound	All	
39 Sawyers Arms	Eastbound	All	
	Westbound	All	
38 Langdons	East bound	All	
	Westbound	All	
37 Harewood	Eastbound	All *	
	Westbound	All	
36 Bellvue	Eastbound	Cycles, peds.	
	Westbound	Cycles, peds.	
35 Blighs	Eastbound	All	
	Westbound	All	
34 Wairakei	Eastbound	Cars, light trade	
	"	All other flows	
33 Glandovey	Westbound	All	
	Eastbound	All *	
32 Wroxton	Eastbound	All	
	Westbound	All	
31 Fendalton	Eastbound	Cars, light trade*	
	"	All other flows	
30 Matai	Westbound	All	
	Eastbound	Cycles, pads	
29 Kilmarnock	Westbound	Cycles, pads	
	Eastbound	All*	
		All	6 clickers

(32 Surveyors)

APPENDIX 3

PEAK HOUR DATA RECORD



## PEAK HOUR DATA RECORD - MAJOR ARTERIAL ROADS

Road Name	Dir	Car Occu- pancy	Car	Light Trade	Heavy Trade	Bus	Motor Cycle	Cycle	Ped	Motor Vehicle	All Traffic
Carmen	N	1.18	299	54	49	5	13	191	41	420	652
Carmen	S	1.15	458	65	43	6	9	51	4	581	636
Main South	N	1.35	1062	90	109	10	53	98	3	1324	1425
Main South	S	1.33	962	176	87	19	50	42	8	1294	1344
Curletts	N	1.33	1101	127	103	9	41	19	1	1381	1401
Curletts	S	1.10	971	125	103	5	28	7	3	1232	1242
Waltham	N	1.23	1073	161	42	9	54	178	19	1339	1536
Waltham	S	1.43	799	167	46	0	23	51	9	1035	1095
Ensors	N	1.30	642	72	48	3	35	111	12	800	923
Ensors	S	1.30	771	109	55	1	32	38	11	968	1017
Tunnel	N	1.35	114	17	15	0	10	0	0	156	156
Tunnel	S	1.23	127	27	16	2	10	2	0	182	184
Ferrymead Br	E	1.23	240	79	28	5	10	7	0	362	369
Ferrymead Br	W	1.26	1316	136	10	13	41	81	0	1516	1597
Blenheim	E	1.20	989	166	67	2	50	48	3	1274	1325
Blenheim	W	1.33	577	138	43	5	25	16	1	788	805
Fendalton	E	1.20	1127	52	10	11	26	311	6	1226	1543
Fendalton	W	1.35	413	32	10	7	25	105	2	487	594
Northcote	E	1.25	437	36	16	3	34	224	22	526	772
Northcote	W	1.30	285	48	19	4	15	67	18	371	456
Main North	N	1.23	290	77	37	8	8	9	3	420	432
Main North	S	1.58	705	85	49	9	23	71	5	871	947
<b>TOTAL</b>			<b>14758</b>	<b>2039</b>	<b>1005</b>	<b>136</b>	<b>615</b>	<b>1727</b>	<b>171</b>	<b>18553</b>	<b>20451</b>
<b>AVERAGE (11)</b>		<b>1.28</b>	<b>1341</b>	<b>185</b>	<b>91</b>	<b>12</b>	<b>55</b>	<b>157</b>	<b>15</b>	<b>1687</b>	<b>1859</b>

## PEAK HOUR DATA SUMMARY - MINOR ARTERIAL ROADS

Road Name	Dir	Car Occu- pancy	Car	Light Trade	Heavy Trade	Bus	Motor Cycle	Cycle	Ped	Motor Vehicle	All Traffic
Clarence	N	1.30	402	55	13	0	34	175	14	504	693
Clarence	S	1.15	410	65	19	0	6	33	3	500	536
Lincoln	N	1.30	722	119	25	8	48	116	27	922	1065
Lincoln	S	1.20	314	78	14	8	16	22	8	430	460
Montreal	N	1.30	330	57	13	0	17	20	2	417	439
Montreal	S	1.16	63	19	9	2	3	11	12	96	119
Durham	N	1.58	172	25	10	1	7	5	2	215	222
Durham	S	1.60	575	120	30	4	23	18	5	752	775
Colombo	N	1.85	783	160	31	14	57	217	77	1045	1339
Colombo	S	1.18	323	86	23	24	14	44	37	470	551
Garlands	E	1.14	177	49	19	1	6	14	8	252	274
Garlands	W	1.33	108	35	20	0	3	11	12	166	189
Curries *	N	1.28	35	19	4	0	2	6	0	60	66
Curries *	S	1.21	21	5	5	0	2	2	2	33	37
Riccarton	E	1.45	705	42	28	23	46	118	6	844	968
Riccarton	W	1.10	496	67	28	16	31	113	40	638	791
Glandovey	E	1.63	420	31	8	4	14	93	7	477	577
Glandovey	W	1.28	534	59	3	3	40	209	0	639	848
Wairakei	E	1.25	729	68	11	14	46	242	11	868	1121
Wairakei	W	1.38	455	53	11	6	26	83	11	551	645
Blighs	E	1.15	251	15	8	1	8	53	1	283	337
Blighs	W	1.23	305	38	17	3	11	58	2	374	434
Harewood	E	1.40	482	41	18	8	42	115	50	591	756
Harewood	W	1.13	238	52	12	11	18	28	6	331	365
TOTAL			9050	1358	379	151	520	1806	343	11458	13607
AVERAGE (12)		1.31	754	113	32	13	43	151	29	955	1134

\* Surveyed Tuesday 12 April 1988

## PEAK HOUR DATA RECORD - LOCAL DISTRIBUTOR ROADS

Road Name	Dir	Car Occu-pancy	Car	Light Trade	Heavy Trade	Bus	Motor Cycle	Cycle	Ped	Motor Vehicle	All Traffic
Parker	N	1.45	84	14	8	3	6	117	32	115	264
Parker	S	1.33	81	10	11	1	6	42	5	109	156
Annex	N	1.20	94	44	23	2	7	185	2	170	357
Annex	S	1.13	212	57	12	0	9	32	2	290	324
Matipo	N	1.30	215	45	12	2	10	58	3	284	345
Matipo	S	1.08	159	51	13	1	10	13	2	234	249
Selwyn	N	1.55	280	30	15	1	20	76	24	346	446
Selwyn	S	1.08	145	41	8	2	3	22	8	199	229
Antigua	N	1.30	359	75	14	4	25	191	11	477	679
Antigua	S	1.30	157	48	13	4	13	37	11	235	283
Wilsons	N	1.15	222	49	28	0	9	40	10	308	358
Wilsons	S	1.23	151	37	22	1	6	31	10	217	258
Kilmarnock	E	1.28	699	36	5	7	25	293	23	772	1088
Kilmarnock	W	1.25	320	19	5	8	20	163	87	372	622
Langdons	E	1.35	107	19	7	0	11	199	35	144	378
Langdons	W	1.25	115	7	8	2	2	17	4	134	155
Sawyers Arms	E	1.41	50	14	6	3	6	90	34	79	203
Sawyers Arms	W	1.53	90	19	5	1	3	27	16	118	161
Tuckers	E	1.68	46	2	2	0	4	33	34	54	121
Tuckers	W	1.45	63	5	3	0	3	71	5	74	150
Sturrocks	E	1.37	37	11	3	0	0	10	4	51	65
Sturrocks	W	1.35	71	13	1	0	2	65	5	87	157
TOTAL			3757	646	224	42	200	1812	367	4869	7048
AVERAGE (11)		1.32	342	59	20	4	18	165	33	443	641



## PEAK HOUR DATA RECORD - LOCAL ROADS AND PEDESTRIAN/CYCLE CROSSINGS

## LOCAL ROADS

Road Name	Dir	Car Occu-pancy	Car Trade	Light Trade	Heavy Trade	Bus	Motor Cycle	Cycle	Ped	Motor Vehicle	All Traffic
Halswell Jtn *	N	1.30	28	6	5	3	1	16	6	43	65
Halswell Jtn *	S	1.30	31	5	2	2	1	7	1	41	49
Grove	N	1.35	108	21	5	6	5	29	7	145	181
Grove	S	1.18	53	10	4	3	1	6	1	71	78
Richardson	N	1.18	18	0	0	0	1	8	3	19	30
Richardson	S	1.48	26	0	1	0	2	7	7	29	43
Clarendon	N	1.14	31	6	0	0	1	8	3	38	49
Clarendon	S	1.42	46	7	0	0	3	21	7	56	84
Chapmans	N	1.13	13	8	20	0	0	0	0	41	41
Chapmans	S	1.08	35	9	19	0	1	3	0	64	67
Wroxton	E	1.64	36	10	0	0	1	24	4	47	75
Wroxton	W	1.38	52	5	0	0	3	43	4	60	107
Barnes *	E	1.30	2	1	1	0	0	3	0	4	7
Barnes *	W	1.30	3	1	0	0	1	1	0	5	6
TOTAL AVERAGE (7)		1.30	482	89	57	14	21	176	43	663	882
			69	13	8	2	3	25	6	95	126

\* Estimated

## PEDESTRIAN AND CYCLE CROSSINGS

Crossing Name	Dir	Car Occu-pancy	Car Trade	Light Trade	Heavy Trade	Bus	Motor Cycle	Cycle	Ped	Motor Vehicle	All Traffic
Madras	N							10	12		22
Madras	S							6	4		10
Falsgrave	N							12	2		14
Falsgrave	S							3	4		7
Judge	N							11	3		14
Judge	S							28	22		50
Matai	E							2	3		5
Matai	W							6	1		7
Bellvue	E							20	9		29
Bellvue	W							9	6		15
TOTAL AVERAGE (5)								107	66		173
								21	13		35