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Report Title – first line	Pages i and ii	T1		Walsall Cordon 2003
Report Title – second line	Pages i and ii	T2		
Report Title – third line	Pages i and ii	T3		
Report Title or Heading – first line	Left aligned in headers	HL1		Walsall Cordon Report 2003
Report Title or Heading – second line	Left aligned in headers	HL2		
Group Name	Right aligned in headers – first line	HR1		Mott MacDonald Mott MacDonald jdt
Client/Associate (where applicable)	Right aligned in headers – second line	HR2		
Project Number	Footers	PRJNR		205911/CA08
Report Number	Footers	RPTNR		01
Revision Letter	Issue and Revision Record on page ii and footers	REV		A
Date of issue or report	Page i, Issue and Revision Record on page ii and footers	DATE		July2003
Initials of word processor	Footers	INI		DMK

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# Walsall Cordon 2003

**July 2003**

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# Walsall Cordon 2003

## Issue and Revision Record

<b>Rev</b>	<b>Date</b>	<b>Originator</b> (Print) (Signature)	<b>Checker</b> (Print) (Signature)	<b>Approver</b> (Print) (Signature)	<b>Description</b>
		D. King	J. Stokes	B. Storey	
A	July 2003				First Issue

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## Summary

### Analysis of the 2003 Cordon Survey Has Shown That:

1. Around 12,000 vehicles travel into Walsall Town Centre during the morning peak period (07:30 – 09:30). Around 8,000 vehicles travel outbound during the same time period (Page 2, Table 1)
2. Off peak around 8,350 vehicles travel inbound, 7,800 outbound. (Page 2, Table 2)
3. On an average weekday, 18% of inbound vehicles travel into the town centre in the morning peak. Around 81% of an average weekday's traffic cross the cordon line in the main 12 hour day (07:00-19:00). (Page 3, Table 3)
4. By 11 a.m. there is a net increase of some 5,642 vehicles within the cordon area over the overnight levels. (Page 7, Table 5 and Page 8, Figure 6)
5. The hour ending 9 a.m. shows the highest increase in vehicles in to the centre, with an excess of 2,348 entering the town centre over those leaving town. The hour ending 6p.m. shows the greatest loss in vehicles (1,610). (Page 7, Table 5) A breakdown of the peak periods by quarter hour is given in Figures 1 and 2 on Page 4.
6. The surveys have provided detailed data on the variations of traffic levels throughout the day, for inbound and outbound directions at individual sites and for the cordon as a whole.
7. Estimated occupancy figures based on the manual counts show some 15,062 people using private transport to travel into the town centre between 07:30 and 09:30. (Page 12, Figure 9)

## 1 Introduction

This report is being undertaken as part of the Local Transport Plan monitoring process. The purpose of the report is to give an indication of the level of vehicular activity in the town centre, to indicate existing and future levels of transport demand and to monitor the effects of transport policy. The Manual surveys have been undertaken by Walsall MBC while the Automatic surveys and analysis have been undertaken by the **jdt**.

## 2 Methodology

The most effective method of obtaining the necessary data to monitor traffic flows is to monitor traffic crossing a cordon around the town centre. Sites are positioned on all the main roads, with further sites on some of the minor roads so as to obtain a close 'closed' cordon. The idea is to capture all vehicles entering the town centre. The location of the sites is shown in Appendix 1.

Counters are used that record the vehicles automatically (ATC's). In this way, data for a full week is collected, enabling 24 hour average weekday data to be presented.

Four sites are also surveyed manually by Walsall M.B.C. staff. This data is used to estimate the modal split of the automatic data and also to estimate the number of people travelling into the town centre by vehicle.

A complementary bus cordon survey is undertaken by jdt on behalf of Centro, into which this report feeds.

Results of the 2003 Walsall Cordon Survey are presented on the following pages. Where appropriate, comparisons with 2001, 1999 and 1997 data have been made.

## 3 Background and Diary

Collection of the ATC data took place in the week beginning Monday 17<sup>th</sup> March. It is important to avoid school holidays. Future similar exercises should be kept to the same week each time the surveys are repeated.

The exact position of the automatic counts can be seen in Appendix 1. Again, the intention should be to use the same sites for this monitoring purpose each time the cordon survey is carried out.

## 4 Results

In Table 1 the figures for the number of vehicles crossing the cordon line in the morning peak period are presented. Traditionally, the morning peak period has been considered as being 07.30-09.30. The figures show a large decrease in the number of vehicles counted inbound and outbound compared with this time period in 2001. As Table 6 shows, mainly two sites have caused this large decrease, WL02 Lower Rushall Street and WL12 Wednesbury Road. However, when these sites were looked at individually, both sets of figures seemed consistent and did not seem to contain any abnormal flows. A manual count undertaken at WL12 Wednesbury Road also showed a large reduction in traffic compared with 2001 but not by the same margin.

While analysing the modal split, it was noticed that there were a disproportionate number of buses inbound in relation to outbound. On closer examination it appears that this seems to have been caused by one site counted manually at Weston Street. We are unsure whether this count is correct as the



flows rise and fall quite dramatically in the inbound direction during the morning peak and early afternoon. In comparison with 2001, these peaks do not appear to the same degree nor do they appear in the automatic traffic count surveys.

We have therefore decided to use the 2001 data for this direction in the 2003 analysis.

**Table 1 Number of vehicles crossing the cordon in the Morning Peak Period (07.30 - 09.30)**

	1997	1999	2001	2003
Inbound Total	13,865	13,627	13,704	12,044
Outbound Total	9,090	9,244	9,410	7,935

Table 2 shows the number of vehicles crossing the cordon line in the traditional off-peak morning period (10.00-12.00). This time period again shows a large decrease inbound and outbound when compared with the data collected two years ago.

**Table 2 Number of vehicles crossing the cordon in the Morning Off-Peak Period (10.00-12.00)**

	1997	1999	2001	2003
Inbound Total	9,090	9,227	9,400	8,354
Outbound Total	8,815	8,744	8,823	7,831

The figures in Table 3 show that in 2003 around 18% of traffic flowing into the town centre on a typical weekday is crossing the cordon line between the hours of 7.30a.m. and 9.30a.m. This corresponds to the figure outbound in the evening peak period (4p.m. to 6p.m.), which is also 18%. The off-peak time period considered (1000-1200) shows 12.4% of the daily traffic travelling into the town centre. The outbound direction for this time period shows 11.8%. Around 81% of an average day's traffic is crossing the cordon during the main 12hr day.

Whilst the net figure over 24 hours might be expected to be zero, the figures are an average of the flow characteristics over five weekdays and the net figure is within the expected level of accuracy of automatic counts.

**Table 3 Total Vehicles by Time Period on an Average Weekday**

	07.30 - 09.30	10.00 - 12.00	16.00 - 18.00	07.00 – 1900 (12 hour)	00.00 –24.00 (24 hour)
<b>1997</b>					
Inbound	13,865	9,090	9,863	59,938	72,918
% of 24 hr	19.0%	12.5%	13.5%	82.2%	100%
Outbound	9,090	8,815	13,610	60,054	73,706
% of 24 hr	12.3%	12.0%	18.5%	81.5%	100%
<b>NET</b>	4,775	275	-3,747	-116	-788
<b>1999</b>					
Inbound	13,627	9,227	9,940	60,363	73,819
% of 24hr	18.5%	12.5%	13.5%	81.8%	100%
Outbound	9,244	8,744	13,649	60,124	74,137
% of 24hr	12.5%	11.8%	18.4%	81.1%	100%
<b>NET</b>	4,383	483	-3,709	116	-318
<b>2001</b>					
Inbound	13,704	9,400	9,424	59,212	72,190
% of 24hr	19.0	13.0	13.1	82.0	100
Outbound	9,410	8,823	14,383	61,319	75,068
% of 24hr	12.5	11.8	19.2	81.7	100
<b>NET</b>	4,294	577	-4,959	-2,107	-2,878
<b>2003</b>					
Inbound	12,044	8,354	9,265	54,438	67,271
% of 24hr	17.9	12.4	13.8	80.9	100
Outbound	7,935	7,831	12,003	53,404	66,556
% of 24hr	11.9	11.8	18.0	80.2	100
<b>NET</b>	4,109	523	-2,738	1,034	715

**Figure 1 Inbound Morning Peak Period: Vehicle Volumes by Quarter Hour**

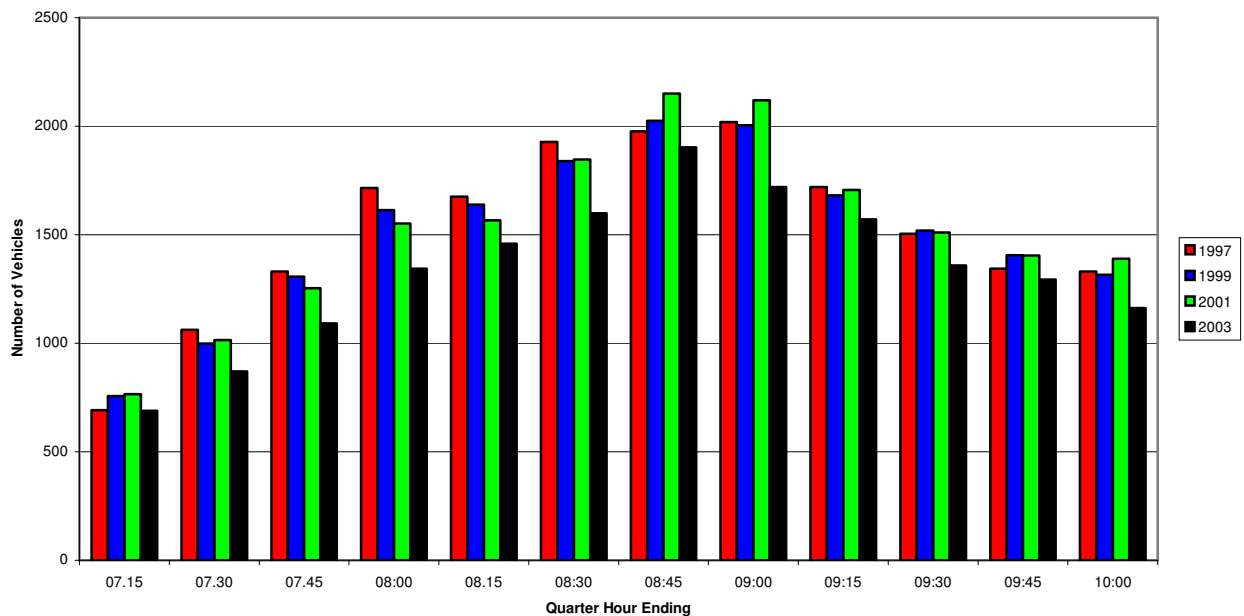
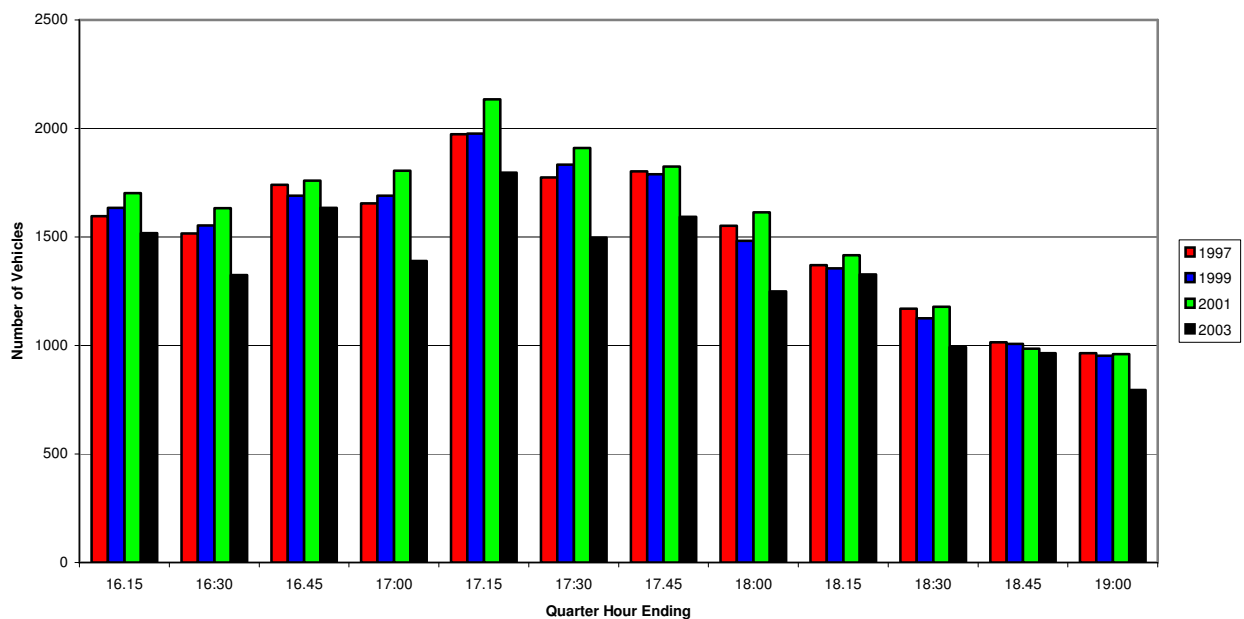
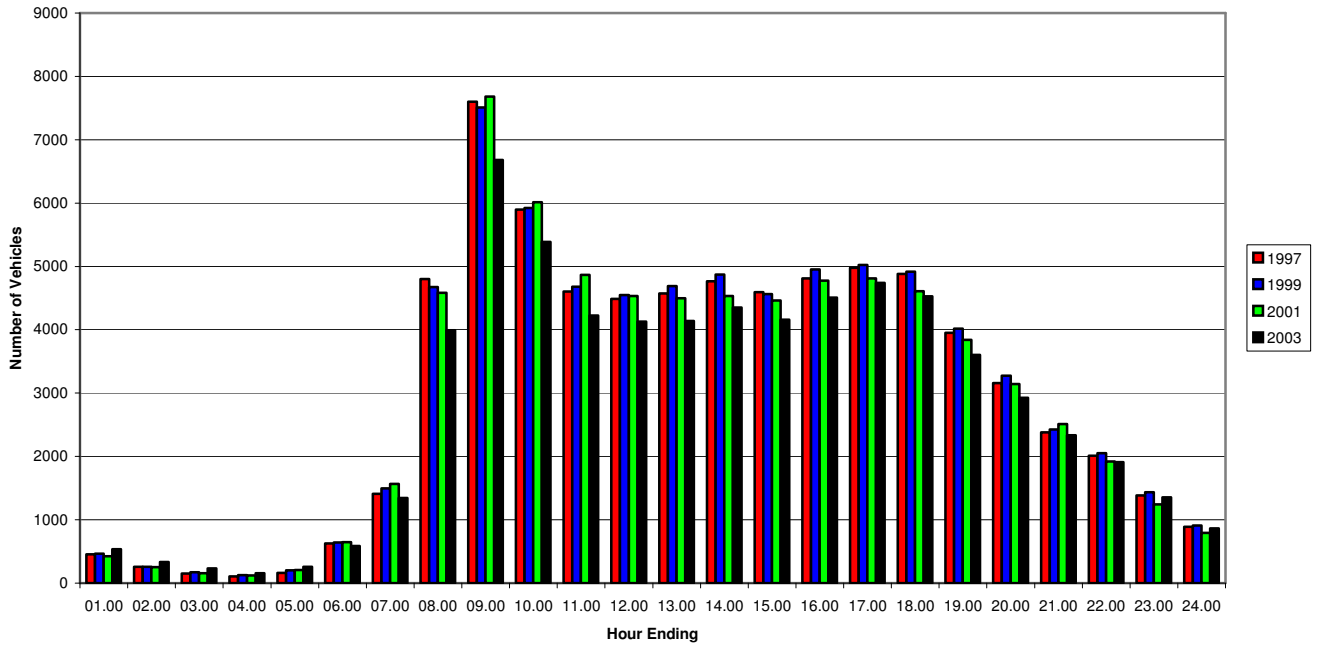


Figure 1 and Figure 2 show the two main peak periods by quarter hour. The morning figures are given from 7a.m. until 10a.m. and the evening from 4p.m. to 7p.m. These time periods are wider than those presented in previous tables. This allows a check on the traditional time periods as peak spreading may be seen on these graphs. Figures 1 and 2 shows fluctuating changes in traffic between 1997 and 2003 although 2003 shows decreases in all time periods

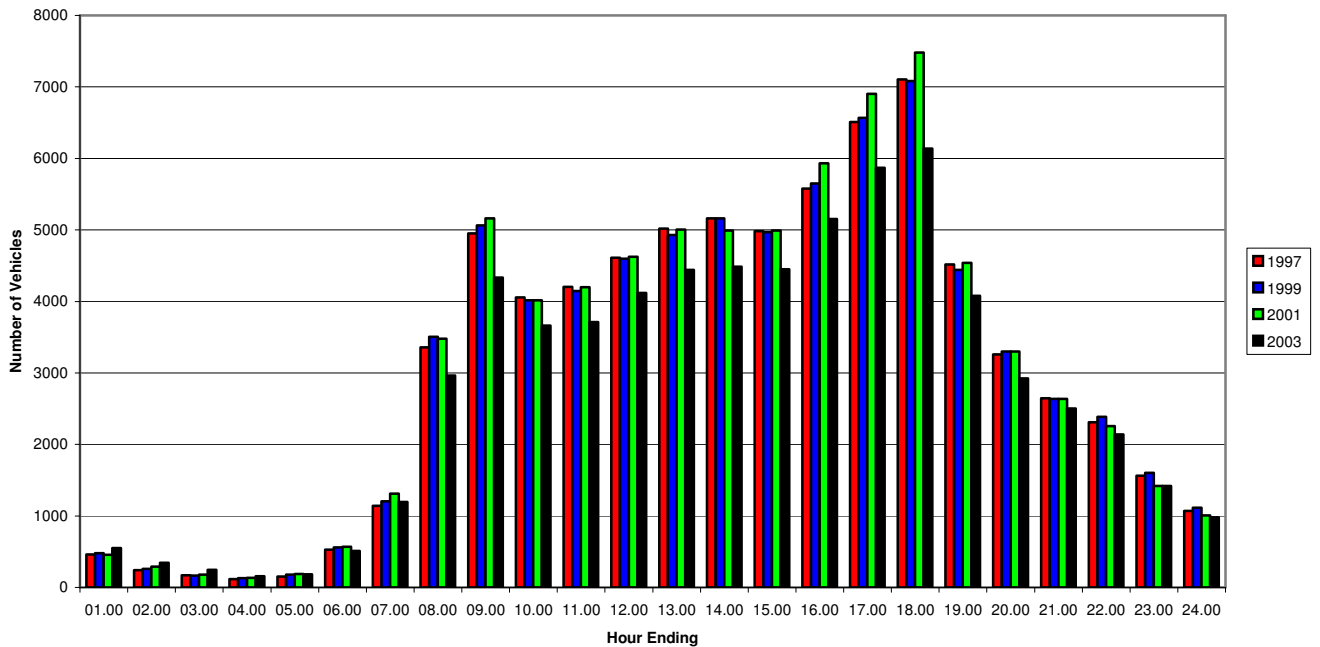
**Figure 2 Outbound Evening Peak Period: Vehicle Volumes by Quarter Hour**



**Figure 3 Inbound levels of vehicles, by hour**



**Figure 4 Outbound levels of vehicles, by hour**



#### 4.1 Daily and Hourly Variations

The figures in Table 4 give the proportions that each day contributes to an average weekday (Mon-Fri) for each of the traditional time periods. These figures can be used to factor a count taken on any particular day to an average weekday. The figures also show which days have the heaviest flows during each time period.

**Table 4 Variations in traffic flow, by time of day 2003**

	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
<u>Inbound</u>							
07.30 - 09.30	0.992	1.008	1.010	1.001	0.989	0.511	0.140
10.00 - 12.00	0.989	1.014	0.968	0.987	1.043	1.155	0.732
16.00 - 18.00	1.020	1.015	0.990	1.013	0.963	0.695	0.528
07.00 - 19.00	0.992	1.004	0.995	0.995	1.014	0.847	0.530
00.00 - 24.00	0.977	0.987	0.990	0.999	1.048	0.912	0.607
<u>Outbound</u>							
07.30 - 09.30	1.004	1.007	1.010	1.017	0.964	0.465	0.193
10.00 - 12.00	0.988	1.017	0.970	0.968	1.057	1.126	0.721
16.00 - 18.00	1.007	1.013	0.976	1.008	0.996	0.754	0.452
07.00 - 19.00	0.990	1.002	0.991	0.992	1.024	0.861	0.552
00.00 - 24.00	0.980	0.989	0.988	0.997	1.046	0.921	0.630

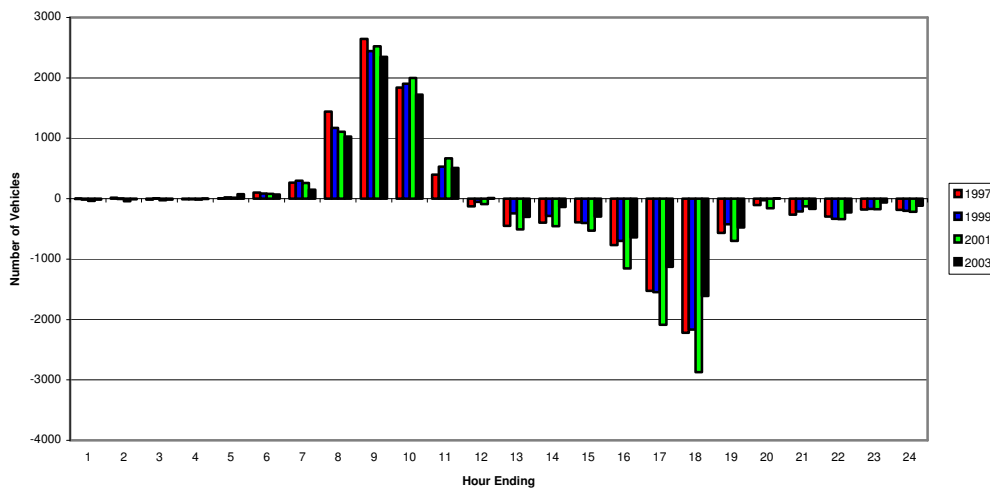
Figure 5 and Figure 6 show the gain in vehicles to the cordon by hour and the total accumulation of vehicles to the cordon. The figures used in these graphs are given in Table 5.

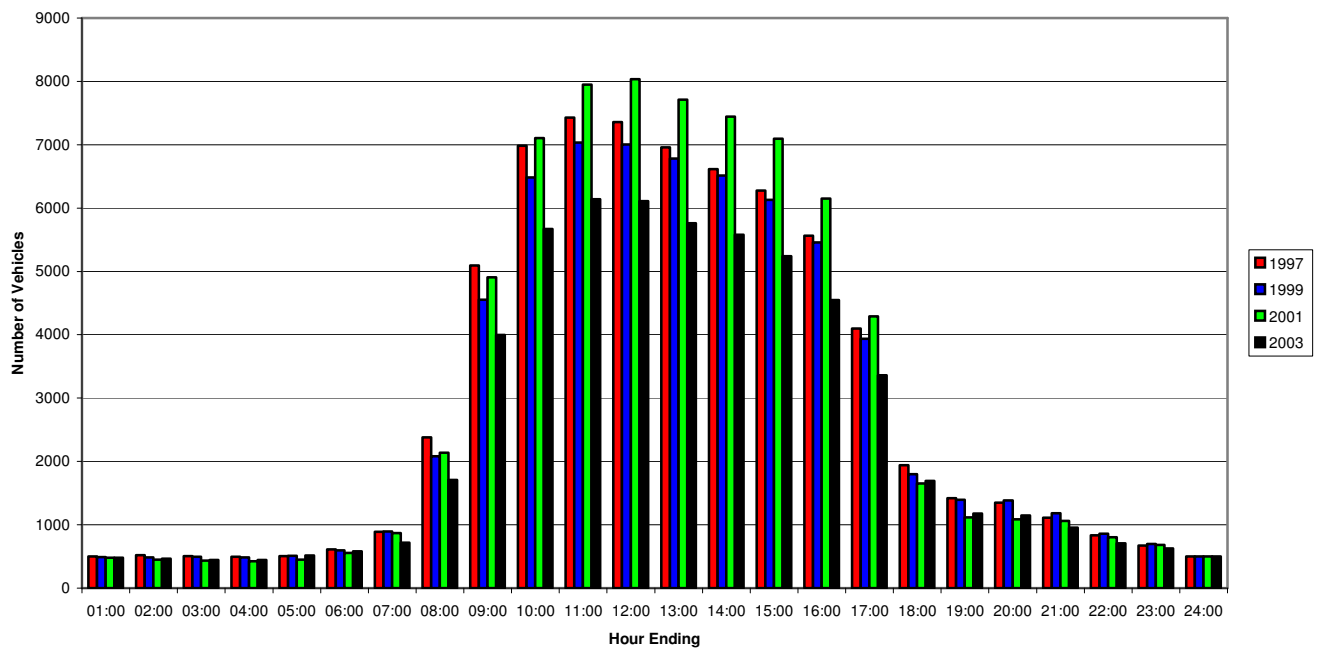
**Table 5 Net loss / gain and accumulation in vehicles crossing the cordon, by hour 2003**

Hour ending	Inbound	Outbound	Net	Accumulation*
01.00	535	551	-16	478
02.00	335	346	-11	464
03.00	230	244	-14	447
04.00	156	158	-2	443
05.00	257	183	74	515
06.00	584	512	72	581
07.00	1346	1195	151	719
08.00	3994	2965	1029	1710
09.00	6680	4332	2348	4000
10.00	5385	3664	1721	5672
11.00	4223	3711	512	6142
12.00	4131	4120	11	6109
13.00	4139	4439	-300	5763
14.00	4352	4487	-135	5581
15.00	4157	4452	-295	5240
16.00	4509	5151	-642	4546
17.00	4739	5867	-1128	3361
18.00	4526	6136	-1610	1694
19.00	3603	4080	-477	1176
20.00	2927	2923	4	1149
21.00	2337	2504	-167	956
22.00	1911	2139	-228	707
23.00	1353	1417	-64	628
24.00	862	980	-118	500

\* N.B. In calculating accumulation of vehicles, the ratio of inbound to outbound vehicles was balanced and a nominal 500 vehicles were added in as an estimate of vehicles remaining inside the cordon overnight.

**Figure 5 Net loss / gain in vehicles crossing the cordon, by hour**



**Figure 6 Net accumulation of vehicles, by hour**

### Patterns of Travel

The figures in Table 6 show the number of vehicles travelling into and out of the town centre by each individual site on an average weekday. Figures presented in this table reflect changes in travel patterns while road works were in progress during 2001 and normal traffic in 2003.

**Table 6 Net loss / gain in vehicles on an average weekday, by site**

Site	Location	Inbound 2001	Outbound 2001	Net loss / gain 2001	Inbound 2003	Outbound 2003	Net loss / gain 2003
WL01	Lichfield Street	2,650	3,539	-889	3369	4195	-826
WL02	Lower Rushall Street	12,695	14,949	-2,254	9969	10204	-235
WL03	Lincoln Road	607	301	306	505	239	266
WL04	The Crescent	1,411	1,436	-25	1337	1417	-80
WL05	Sutton Road	3,538	4,590	-1,052	3742	4659	-917
WL06	Birmingham Road	6,719	6,964	-245	7058	7044	14
WL07	Delves Road	1,902	1,764	138	1885	1882	3
WL08	West Bromwich St.	671	0	671	711	0	711
WL09	Weston Street	5,663	5,987	-324	4944	5966	-1022
WL10	Bescot Crescent	3,939	5,956	-2,017	2798	3502	-704
WL12	Wednesbury Road	8,979	11,016	-2,037	6602	7448	-846
WL13	Rollingmill Street	5,400	5,161	239	4960	6154	-1194
WL14	Bridgeman Street	8,053	6,273	1,780	5648	5400	248
WL15	Wolverhampton St.	0	1,361	-1,361	5491	2779	2712
WL16	Green Lane	4,187	1,551	2,636	2723	1549	1174
WL17	Stafford Street	4,107	2,241	1,866	3946	2500	1446
WL18	Hatherton Street	1,668	1,980	-312	1583	1718	-135

## 4.2 Mode of travel

The four manual surveys give us an indication of mode of travel data.

Table 7 summarises the data recorded at the four manual sites. For the purpose of this table, 'light vehicles' includes motorcycles, cars, taxis and light vans less than 1.5T. The Heavy Goods category includes all vehicles over 1.5T. These are the usual categories for light and heavy vehicles.

In Table 7 the percentage each vehicle category contributes to the total vehicles in that hour is given on the right hand side of the table. In Table 8 these percentages are multiplied by the number of vehicles counted by the automatic counters, giving an estimate of the number of vehicles of that type crossing the cordon line in that hour.

**Table 7 Summary of Inbound mode of transport data from manual surveys**

TIME STARTING	TOTAL VEH	PEDAL CYC	BUS & COACH	Light Vehs	Heavy Vehs	% pedal cycle	% bus	% light	% goods
07:00	2254	16	69	2047	122	0.71%	3.06%	90.82%	5.41%
08:00	2829	11	85	2615	118	0.39%	3.00%	92.44%	4.17%
09:00	2463	3	101	2147	212	0.12%	4.10%	87.17%	8.61%
10:00	2154	1	93	1861	199	0.05%	4.32%	86.40%	9.24%
11:00	2151	1	92	1879	179	0.05%	4.28%	87.35%	8.32%
12:00	2080	1	94	1805	180	0.05%	4.52%	86.78%	8.65%
13:00	2146	4	98	1852	192	0.19%	4.57%	86.30%	8.95%
14:00	1991	8	81	1768	134	0.40%	4.07%	88.80%	6.73%
15:00	2281	7	95	2025	154	0.31%	4.16%	88.78%	6.75%
16:00	2562	13	100	2310	139	0.51%	3.90%	90.16%	5.43%
17:00	2538	8	77	2365	88	0.32%	3.03%	93.18%	3.47%
18:00	2486	0	73	2350	60	0.00%	2.94%	94.64%	2.42%
<b>Total</b>	<b>27932</b>	<b>73</b>	<b>1058</b>	<b>25024</b>	<b>1777</b>	<b>0.26%</b>	<b>3.79%</b>	<b>89.59%</b>	<b>6.36%</b>

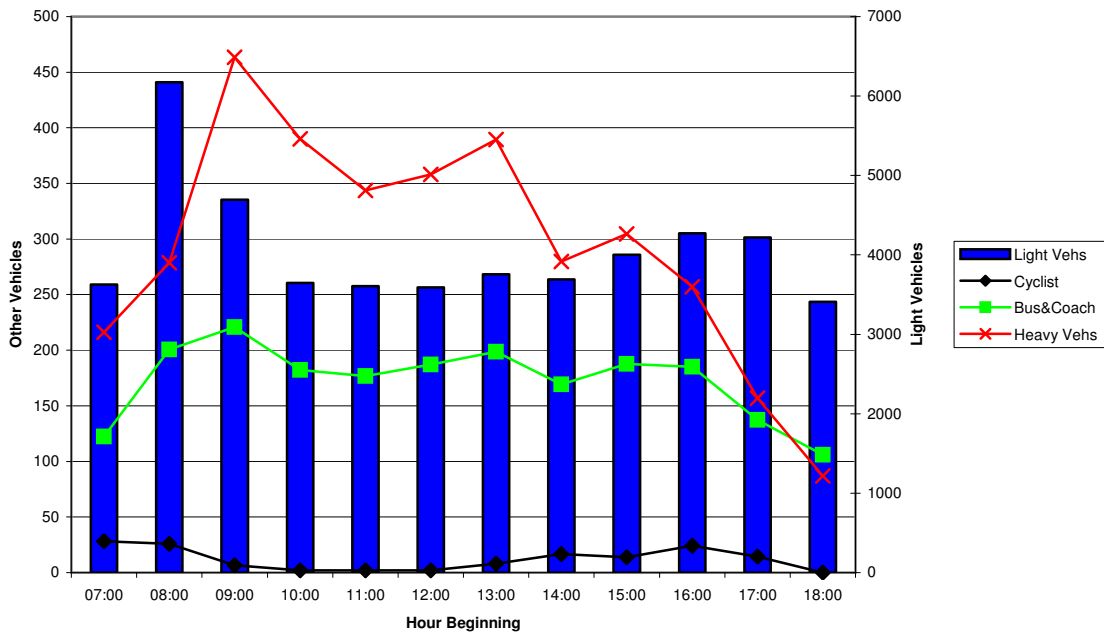
**Table 8 Estimated Inbound mode of transport figures**

TIME STARTING	number of automatic vehs	estimated ped cyc	estimated bus	estimated light	estimated heavy
07:00	3994	28	122	3627	216
08:00	6680	26	201	6175	279
09:00	5385	7	221	4694	464
10:00	4223	2	182	3649	390
11:00	4131	2	177	3609	344
12:00	4139	2	187	3592	358
13:00	4352	8	199	3756	389
14:00	4157	17	169	3691	280
15:00	4509	14	188	4003	304
16:00	4739	24	185	4273	257
17:00	4526	14	137	4217	157
18:00	3603	0	106	3410	87
<b>Total</b>	<b>54438</b>	<b>144</b>	<b>2074</b>	<b>48695</b>	<b>3525</b>



The figures in Table 8 are represented in Figure 7. As the numbers for Light Vehicles are so much higher than the other categories, the light vehicles are read from the right-hand axis and all the other categories from the left-hand axis.

**Figure 7 Estimated Inbound mode of transport figures**



The summary for outbound modes from the manual data can be found in Table 9 with the estimated outbound in Table 10 and the graph representing these estimated figures in Figure 8.

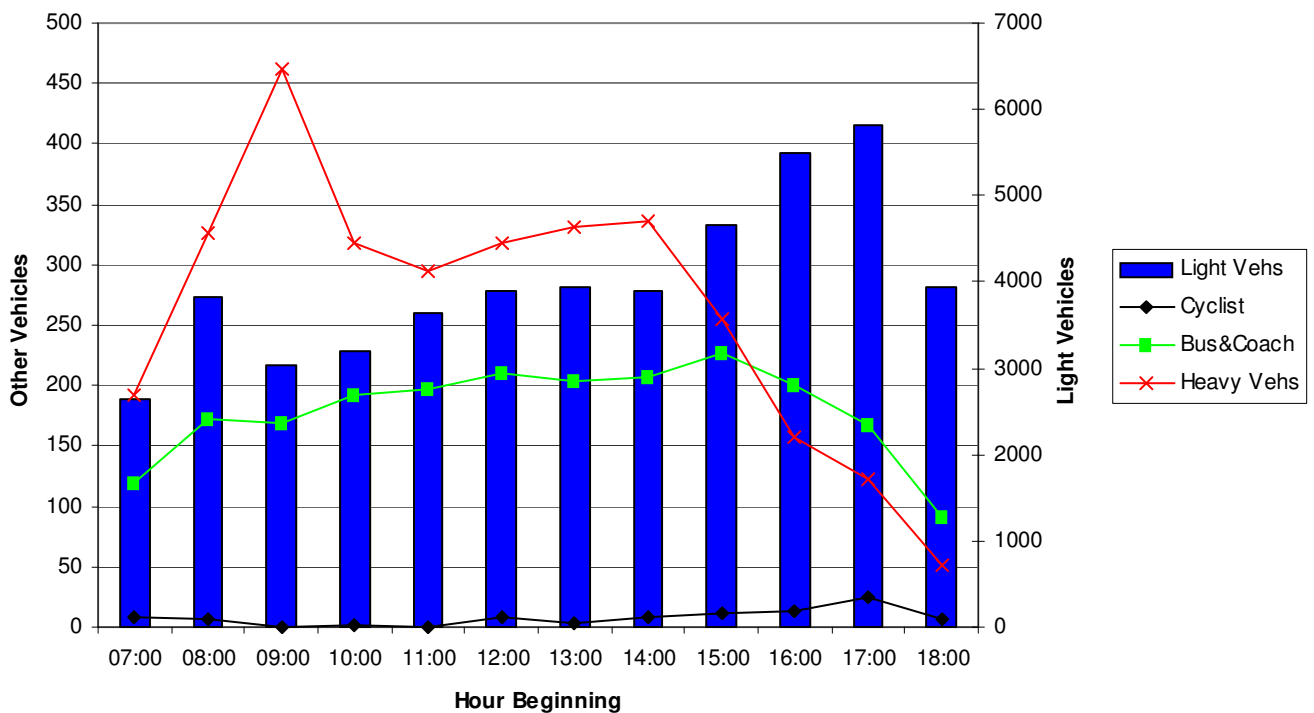
**Table 9 Summary of Outbound mode of transport data from manual surveys**

TIME STARTING	TOTAL VEH	PEDAL CYC	BUS & COACH	Light Vehs	Heavy Vehs	% pedal cycle	% bus	% light	% goods
07:00	2000	6	80	1785	129	0.30%	4.00%	89.25%	6.45%
08:00	2164	3	86	1912	163	0.14%	3.97%	88.35%	7.53%
09:00	1948	0	90	1612	246	0.00%	4.62%	82.75%	12.63%
10:00	1898	1	98	1636	163	0.05%	5.16%	86.20%	8.59%
11:00	2214	0	106	1950	158	0.00%	4.79%	88.08%	7.14%
12:00	2277	4	108	2002	163	0.18%	4.74%	87.92%	7.16%
13:00	2218	2	101	1951	164	0.09%	4.55%	87.96%	7.39%
14:00	2223	4	103	1948	168	0.18%	4.63%	87.63%	7.56%
15:00	2559	6	113	2313	127	0.23%	4.42%	90.39%	4.96%
16:00	3009	7	103	2818	81	0.23%	3.42%	93.65%	2.69%
17:00	2961	12	81	2809	59	0.41%	2.74%	94.87%	1.99%
18:00	2627	4	59	2531	33	0.15%	2.25%	96.35%	1.26%
<b>Total</b>	<b>28098</b>	<b>49</b>	<b>1128</b>	<b>25267</b>	<b>1654</b>	<b>0.17%</b>	<b>4.01%</b>	<b>89.92%</b>	<b>5.89%</b>

**Table 10 Estimated Outbound mode of transport figures**

TIME STARTING	No. auto vehs.	estimated ped cyc	estimated bus	estimated light	estimated goods
07:00	2965	9	119	2646	191
08:00	4332	6	172	3828	326
09:00	3664	0	169	3032	463
10:00	3711	2	192	3199	319
11:00	4120	0	197	3629	294
12:00	4439	8	211	3903	318
13:00	4487	4	204	3947	332
14:00	4452	8	206	3901	336
15:00	5151	12	227	4656	256
16:00	5867	14	201	5495	158
17:00	6136	25	168	5821	122
18:00	4080	6	92	3931	51
<b>Total</b>	<b>53404</b>	<b>94</b>	<b>2158</b>	<b>47987</b>	<b>3166</b>

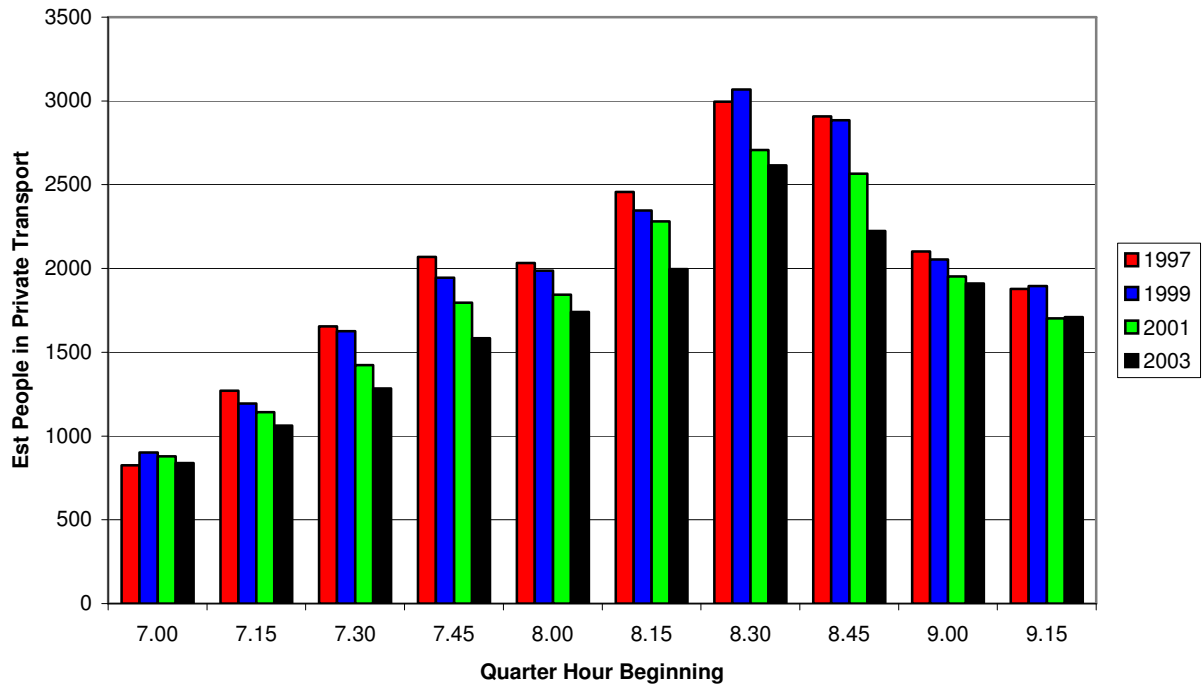
**Figure 8 Estimated Outbound mode of transport figures**



### 4.3 Occupancy Levels

Figure 9 shows the estimated numbers of persons crossing the cordon calculated from the occupancy counts at the four manual sites and the number of vehicles counted automatically per time period

**Figure 9** Estimates of persons Inbound Morning Peak Period



## 5 Appendix 1 Position of Cordon Sites

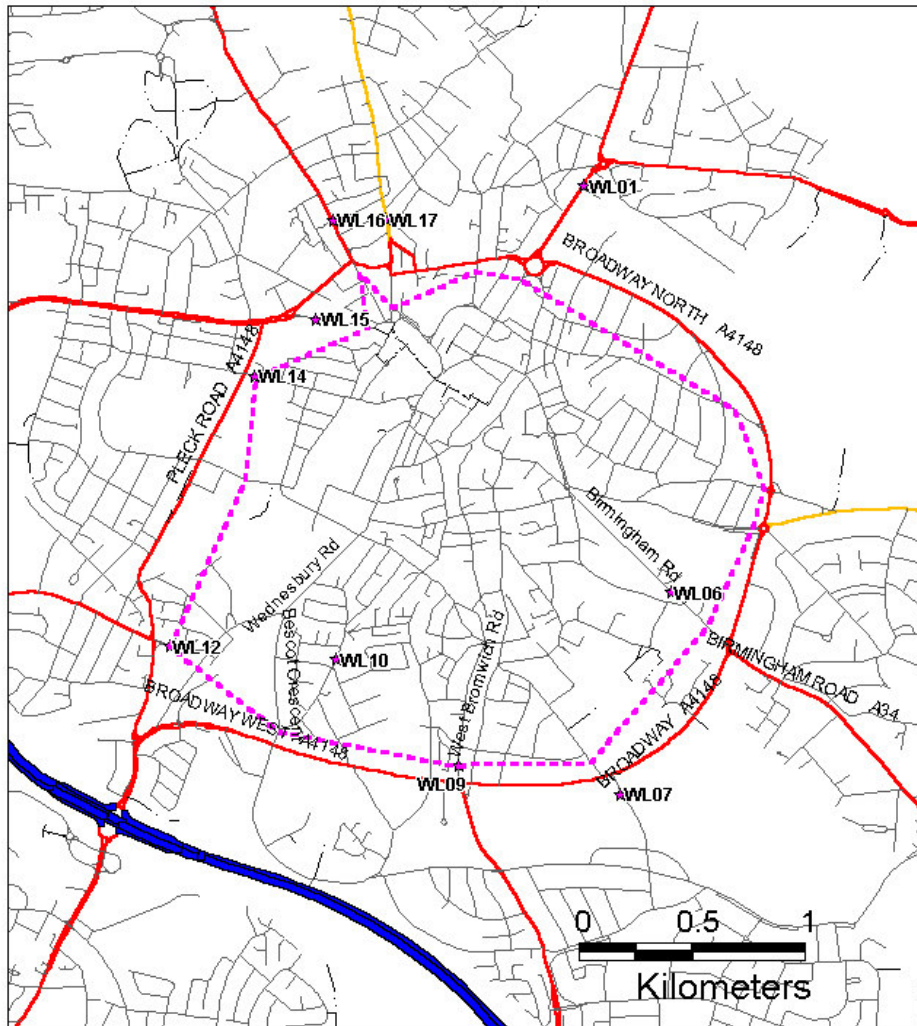
**Table 11 Automatic count sites**

Site	Location	Exact Position
WL01	Lichfield Street	Between Littleton Street and Hatherton St.
WL02	Lower Rushall Street	Between Broadway and Walhouse Road
WL03	Lincoln Road	Between Broadway and Princes Avenue
WL04	The Crescent	Between Broadway and Boscobel Road
WL05	Sutton Road	Between Broadway and Boscobel Road
WL06	Birmingham Road	Between Broadway and Jesson Close
WL07	Delves Road	Between Broadway and Tame Street East
WL08	West Bromwich Road	Between Broadway and Tame Street East
WL09	Weston Street	Between Broadway and Tame Street
WL10	Bescot Crescent	Between Broadway and Milton Street
WL12	Wednesbury Road	Between Bescot Rd and Caledon Street
WL13	Rollingmill Street	Between Brineton Street and Queen Street
WL14	Bridgeman Street	Between Pleck Road and Charles Street
WL15	Wolverhampton Street	Between Blue Lane and Townend
WL16	Green Lane	Between Court Way and Margaret Street
WL17	Stafford Street	Between Littleton Street and Townend
WL18	Hatherton Street	Between Littleton Street and Hatherton Road

**Table 12 Manual Count sites**

WL01(R491)	Lichfield Street	Near Butts Street
WL06(R1884)	Birmingham Road	Near Jesson Close
WL09(R5847)	Weston Street	Near Tame Street
WL12(N2050)	Wednesbury Road	Near Caledon Street

**Figure 10 Location of Walsall ATC Cordon Sites**



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## Appendix 2 Estimates of Vehicle Type from Passage Count Data

### Inbound

Start Time	Tot Vehs	Pedal Cyc	Bus & Coach	Light Vehs	Heavy Vehs	% Pedal Cyc	% Bus & Coach	%Light Vehs	% Heavy Vehs	No. Auto Vehs	Est. Ped Cyc	Est. Bus & Coach	Est. Light Vehs	Est. Heavy Vehs
07:00	2254	16	69	2047	122	0.71%	3.06%	90.82%	5.41%	3994	28	122	3627	216
08:00	2829	11	85	2615	118	0.39%	3.00%	92.44%	4.17%	6680	26	201	6175	279
09:00	2463	3	101	2147	212	0.12%	4.10%	87.17%	8.61%	5385	7	221	4694	464
10:00	2154	1	93	1861	199	0.05%	4.32%	86.40%	9.24%	4223	2	182	3649	390
11:00	2151	1	92	1879	179	0.05%	4.28%	87.35%	8.32%	4131	2	177	3609	344
12:00	2080	1	94	1805	180	0.05%	4.52%	86.78%	8.65%	4139	2	187	3592	358
13:00	2146	4	98	1852	192	0.19%	4.57%	86.30%	8.95%	4352	8	199	3756	389
14:00	1991	8	81	1768	134	0.40%	4.07%	88.80%	6.73%	4157	17	169	3691	280
15:00	2281	7	95	2025	154	0.31%	4.16%	88.78%	6.75%	4509	14	188	4003	304
16:00	2562	13	100	2310	139	0.51%	3.90%	90.16%	5.43%	4739	24	185	4273	257
17:00	2538	8	77	2365	88	0.32%	3.03%	93.18%	3.47%	4526	14	137	4217	157
18:00	2483	0	73	2350	60	0.00%	2.94%	94.64%	2.42%	3603	0	106	3410	87
<b>Total</b>	<b>27932</b>	<b>73</b>	<b>1058</b>	<b>25024</b>	<b>1777</b>	<b>0.26%</b>	<b>3.79%</b>	<b>89.59%</b>	<b>6.36%</b>	<b>54438</b>	<b>144</b>	<b>2074</b>	<b>48695</b>	<b>3525</b>
<b>10-12 Total</b>	<b>4305</b>	<b>2</b>	<b>185</b>	<b>3740</b>	<b>378</b>	<b>0.05%</b>	<b>4.30%</b>	<b>86.88%</b>	<b>8.78%</b>	<b>8354</b>	<b>4</b>	<b>359</b>	<b>7257</b>	<b>734</b>
07:00	479	4	15	433	27	0.84%	3.13%	90.40%	5.64%	689	6	22	623	39
07:15	503	4	16	452	31	0.80%	3.18%	89.86%	6.16%	870	7	28	782	54
07:30	608	5	20	548	35	0.82%	3.29%	90.13%	5.76%	1092	9	36	984	63
07:45	664	3	18	614	29	0.45%	2.71%	92.47%	4.37%	1343	6	36	1242	59
08:00	686	3	17	640	26	0.44%	2.48%	93.29%	3.79%	1458	6	36	1360	55
08:15	702	5	25	644	28	0.71%	3.56%	91.74%	3.99%	1599	11	57	1467	64
08:30	765	0	21	710	34	0.00%	2.75%	92.81%	4.44%	1903	0	52	1766	85
08:45	676	3	22	621	30	0.44%	3.25%	91.86%	4.44%	1720	8	56	1580	76
09:00	695	1	27	613	54	0.14%	3.88%	88.20%	7.77%	1571	2	61	1386	122
09:15	599	1	26	523	49	0.17%	4.34%	87.31%	8.18%	1358	2	59	1186	111
09:30	585	1	17	513	54	0.17%	2.91%	87.69%	9.23%	1294	2	38	1135	119
09:45	584	0	31	498	55	0.00%	5.31%	85.27%	9.42%	1162	0	62	991	109
<b>7.00-10.00</b>	<b>7546</b>	<b>30</b>	<b>255</b>	<b>6809</b>	<b>452</b>	<b>0.40%</b>	<b>3.38%</b>	<b>90.23%</b>	<b>5.99%</b>	<b>16059</b>	<b>60</b>	<b>542</b>	<b>14501</b>	<b>956</b>
<b>7.30-9.30 Total</b>	<b>5395</b>	<b>21</b>	<b>176</b>	<b>4913</b>	<b>285</b>	<b>0.39%</b>	<b>3.26%</b>	<b>91.07%</b>	<b>5.28%</b>	<b>12044</b>	<b>45</b>	<b>394</b>	<b>10971</b>	<b>635</b>
16:00	575	1	33	505	36	0.17%	5.74%	87.83%	6.26%	1268	2	73	1114	79
16:15	645	3	20	573	49	0.47%	3.10%	88.84%	7.60%	1124	5	35	999	85
16:30	650	2	18	598	32	0.31%	2.77%	92.00%	4.92%	1230	4	34	1132	61
16:45	692	7	29	634	22	1.01%	4.19%	91.62%	3.18%	1117	11	47	1023	36
17:00	688	5	18	641	24	0.73%	2.62%	93.17%	3.49%	1178	9	31	1098	41
17:15	577	0	17	541	19	0.00%	2.95%	93.76%	3.29%	1073	0	32	1006	35
17:30	624	2	23	582	17	0.32%	3.69%	93.27%	2.72%	1209	4	45	1128	33
17:45	649	1	19	601	28	0.15%	2.93%	92.60%	4.31%	1066	2	31	987	46
18:00	617	0	22	576	19	0.00%	3.57%	93.35%	3.08%	1048	0	37	978	32
18:15	583	0	17	546	20	0.00%	2.92%	93.65%	3.43%	840	0	24	787	29
18:30	628	0	14	602	12	0.00%	2.23%	95.86%	1.91%	890	0	20	853	17
18:45	655	0	20	626	9	0.00%	3.05%	95.57%	1.37%	825	0	25	788	11
<b>Tot 16.3-18.3</b>	<b>5080</b>	<b>17</b>	<b>163</b>	<b>4719</b>	<b>181</b>	<b>0.33%</b>	<b>3.21%</b>	<b>92.89%</b>	<b>3.56%</b>	<b>8761</b>	<b>29</b>	<b>281</b>	<b>8138</b>	<b>313</b>

<b>Outbound</b>														
Start Time	Tot Vehs	Pedal Cyc	Bus & Coach	Light Vehs	Heavy Vehs	% Pedal Cyc	% Bus & Coach	%Light Vehs	% Heavy Vehs	No. Auto Vehs	Est. Ped Cyc	Est. Bus & Coach	Est. Light Vehs	Est. Heavy Vehs
07:00	2000	6	80	1785	129	0.30%	4.00%	89.25%	6.45%	2965	9	119	2646	191
08:00	2164	3	86	1912	163	0.14%	3.97%	88.35%	7.53%	4332	6	172	3828	326
09:00	1948	0	90	1612	246	0.00%	4.62%	82.75%	12.63%	3664	0	169	3032	463
10:00	1898	1	98	1636	163	0.05%	5.16%	86.20%	8.59%	3711	2	192	3199	319
11:00	2214	0	106	1950	158	0.00%	4.79%	88.08%	7.14%	4120	0	197	3629	294
12:00	2277	4	108	2002	163	0.18%	4.74%	87.92%	7.16%	4439	8	211	3903	318
13:00	2218	2	101	1951	164	0.09%	4.55%	87.96%	7.39%	4487	4	204	3947	332
14:00	2223	4	103	1948	168	0.18%	4.63%	87.63%	7.56%	4452	8	206	3901	336
15:00	2559	6	113	2313	127	0.23%	4.42%	90.39%	4.96%	5151	12	227	4656	256
16:00	3009	7	103	2818	81	0.23%	3.42%	93.65%	2.69%	5867	14	201	5495	158
17:00	2961	12	81	2809	59	0.41%	2.74%	94.87%	1.99%	6136	25	168	5821	122
18:00	2627	4	59	2531	33	0.15%	2.25%	96.35%	1.26%	4080	6	92	3931	51
<b>Total</b>	<b>28098</b>	<b>49</b>	<b>1128</b>	<b>25267</b>	<b>1654</b>	<b>0.17%</b>	<b>4.01%</b>	<b>89.92%</b>	<b>5.89%</b>	<b>53404</b>	<b>94</b>	<b>2158</b>	<b>47987</b>	<b>3166</b>
<b>10-12 Total</b>	<b>4112</b>	<b>1</b>	<b>204</b>	<b>3586</b>	<b>321</b>	<b>0.02%</b>	<b>4.96%</b>	<b>87.21%</b>	<b>7.81%</b>	<b>7831</b>	<b>2</b>	<b>389</b>	<b>6827</b>	<b>613</b>
07:00	436	3	17	384	32	0.69%	3.90%	88.07%	7.34%	608	4	24	535	45
07:15	500	0	20	447	33	0.00%	4.00%	89.40%	6.60%	641	0	26	573	42
07:30	520	2	17	464	37	0.38%	3.27%	89.23%	7.12%	854	3	28	762	61
07:45	544	1	26	490	27	0.18%	4.78%	90.07%	4.96%	862	2	41	776	43
08:00	539	1	18	484	36	0.19%	3.34%	89.80%	6.68%	1029	2	34	924	69
08:15	509	1	27	441	40	0.20%	5.30%	86.64%	7.86%	964	2	51	835	76
08:30	567	1	21	506	39	0.18%	3.70%	89.24%	6.88%	1277	2	47	1140	88
08:45	549	0	20	481	48	0.00%	3.64%	87.61%	8.74%	1062	0	39	930	93
09:00	505	0	21	423	61	0.00%	4.16%	83.76%	12.08%	1045	0	43	875	126
09:15	486	0	22	393	71	0.00%	4.53%	80.86%	14.61%	842	0	38	681	123
09:30	502	0	26	417	59	0.00%	5.18%	83.07%	11.75%	927	0	48	770	109
09:45	455	0	21	379	55	0.00%	4.62%	83.30%	12.09%	850	0	39	708	103
<b>7.00-10.00</b>	<b>6112</b>	<b>9</b>	<b>256</b>	<b>5309</b>	<b>538</b>	<b>0.15%</b>	<b>4.19%</b>	<b>86.86%</b>	<b>8.80%</b>	<b>10961</b>	<b>15</b>	<b>459</b>	<b>9511</b>	<b>977</b>
<b>7.30-9.30 Total</b>	<b>4219</b>	<b>6</b>	<b>172</b>	<b>3682</b>	<b>359</b>	<b>0.14%</b>	<b>4.08%</b>	<b>87.27%</b>	<b>8.51%</b>	<b>7935</b>	<b>11</b>	<b>322</b>	<b>6924</b>	<b>678</b>
16.00	736	2	26	689	19	0.27%	3.53%	93.61%	2.58%	1518	8	342	6932	726
16.15	749	1	24	696	28	0.13%	3.20%	92.92%	3.74%	1325	6	340	6864	786
16:30	786	2	24	736	24	0.25%	3.05%	93.64%	3.05%	1634	4	50	1530	50
16:45	738	2	29	697	10	0.27%	3.93%	94.44%	1.36%	1390	4	55	1313	19
17:00	819	6	17	777	19	0.73%	2.08%	94.87%	2.32%	1797	13	37	1705	42
17:15	818	1	25	775	17	0.12%	3.06%	94.74%	2.08%	1497	2	46	1418	31
17:30	718	2	18	686	12	0.28%	2.51%	95.54%	1.67%	1593	4	40	1522	27
17:45	606	3	21	571	11	0.50%	3.47%	94.22%	1.82%	1249	6	43	1177	23
18:00	717	1	19	687	10	0.14%	2.65%	95.82%	1.39%	1327	2	35	1271	19
18:15	704	2	20	673	9	0.28%	2.84%	95.60%	1.28%	993	3	28	949	13
18.30	613	0	11	593	9	0.00%	1.79%	96.74%	1.47%	965	0	17	934	14
18.45	593	1	9	578	5	0.17%	1.52%	97.47%	0.84%	795	1	12	775	7
<b>Tot 16.3-18.3</b>	<b>5906</b>	<b>19</b>	<b>173</b>	<b>5602</b>	<b>112</b>	<b>0.32%</b>	<b>2.93%</b>	<b>94.85%</b>	<b>1.90%</b>	<b>11480</b>	<b>38</b>	<b>334</b>	<b>10886</b>	<b>222</b>

### Appendix 3 Estimates of Persons from Occupancy Data

Total of Four Surveys  
Inbound

Start Time	Ave Occupancy Lt Vehs	Ave Occupancy Hvy Vehs	Auto	Estimated	Estimated	Est.	Est	Est People	Est People	Est People	<b>2003</b>	<b>2001</b>	<b>1999</b>	<b>1997</b>
			Counted Vehs	Buses	Pedal Cycles	Light Vehs	Heavy Vehs	Lt Vehs	Hvy Vehs	plus p/c				
7.00	1.27	1.14	689	22	6	623	39	789	44	839				
7.15	1.27	1.21	870	28	7	782	54	991	65	1063		1143	1195	1271
7.30	1.21	1.32	1092	36	9	984	63	1191	83	1283		1423	1625	1654
7.45	1.22	1.10	1343	36	6	1242	59	1513	65	1584		1796	1945	2069
8.00	1.22	1.22	1458	36	6	1360	55	1666	67	1740		1843	1988	2032
8.15	1.30	1.11	1599	57	11	1467	64	1913	71	1996		2281	2345	2457
8.30	1.42	1.19	1903	52	0	1766	85	2514	101	2615		2707	3067	2995
8.45	1.35	1.16	1720	56	8	1580	76	2128	88	2224		2566	2885	2907
9.00	1.27	1.24	1571	61	2	1386	122	1756	151	1910		1953	2054	2102
9.15	1.33	1.13	1358	59	2	1186	111	1583	125	1710		1703	1895	1878
0730-0930	1.30	1.18	12044	394	45	10971	635	14265	752	15062		16272	17805	18094
9.30	1.35	1.18	1294	38	2	1135	119	1533	141	1676			1857	1775
9.45	1.32	1.23	1162	62	0	991	109	1311	135	1446			1722	1742
10.00	1.29	1.17												
10.15	1.37	1.18												
10.30	1.34	1.07												
10.45	1.35	1.22												
11.00	1.34	1.06												
11.15	1.41	1.11												
11.30	1.43	1.09												
11.45	1.43	1.09												
1000-1200	1.37	1.12												
12.00	1.38	1.18												
12.15	1.45	1.21												
0700-1230	1.34	1.16												

	Est People plus p/c			
Q.Hour Beg.	<b>2003</b>	<b>2001</b>	<b>1999</b>	<b>1997</b>
7.00	825	878	901	825
7.15	1065	1143	1195	1271
7.30	1282	1423	1625	1654
7.45	1576	1796	1945	2069
8.00	1743	1843	1988	2032
8.15	1983	2281	2345	2457
8.30	2625	2707	3067	2995
8.45	2235	2566	2885	2907
9.00	1903	1953	2054	2102
9.15	1740	1703	1895	1878
	15088	16272	17805	18094



Outbound

Start Time	Ave Occupancy Lt Vehs	Ave Occupancy Hvy Vehs	Automatically	Estimated	Estimated	Est.	Est	Est	Est	Est People	2003
			Counted	Vehicle	Number of Bu	Pedal Cycles	Light Vehs				
								Lt Vehs	Hvy Vehs	Plus P/c	
			608	24	4	535	45	635	52	691	
			641	26	0	573	42	635	49	722	
7.00	1.18	1.16	854	28	3	762	61	673	52	691	
7.15	1.17	1.17	862	41	2	776	43	673	49	722	
7.30	1.19	1.07	1029	34	2	924	69	909	65	978	
7.45	1.19	1.00	964	51	2	835	76	922	43	966	
8.00	1.21	1.09	1277	47	2	1140	88	1114	75	1190	
8.15	1.24	1.05	1062	39	0	930	93	1035	80	1117	
8.30	1.32	1.11	1045	43	0	875	126	1506	98	1606	
8.45	1.22	1.12	842	38	0	681	123	1139	104	1243	
9.00	1.23	1.10						1075	139	1214	
9.15	1.22	1.09	7935	322	11	6924	678	828	134	963	
0730-0930	1.23	1.09	927	48	0	770	109	8529	737	9276	
			850	39	0	708	103				
9.30	1.25	1.09						962	119	1081	
9.45	1.24	1.15						879	118	997	
10.00	1.23	1.09									
10.15	1.28	1.07									
10.30	1.32	1.13									
10.45	1.30	1.13									
11.00	1.27	1.08									
11.15	1.34	1.00									
11.30	1.36	1.16									
11.45	1.34	1.09									
1000-1200	1.31	1.09									
12.00	1.42	1.18									
12.15	1.36	1.12									
0700-1230	1.26	1.10									