

Sutton Coldfield Cordon Report

1998

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Summary of Main Points

Analysis of the 1998 Cordon Survey Has Shown That:

1. Around 12,000 vehicles travel into Sutton Coldfield Town Centre during the morning peak period (07.30-09.30). Around 11,000 vehicles travel outbound during the same time period. (Page 6, Table 1)
2. Off Peak, around 8,500 vehicles travel inbound, 8,000 outbound. (Page 6, Table 2)
3. On an average weekday, 16.2% of inbound vehicles travel into the town centre in the morning peak. Around 80% of an average weekday's traffic cross the cordon line in the main 12 hour day (07.00-19.00). (Page 6, Table 3)
4. By 3 p.m., there is a net increase of some 1,994 vehicles within the cordon area over the overnight levels. (Page 9, Table 5 and Figure 5)
5. The hour ending 9 a.m., shows the highest increase in vehicles to the centre, with an excess of 874 entering the town centre over those leaving the town. The hour ending 6 p.m. shows the greatest loss in vehicles (545). (Page 9, Table 5) A breakdown of the peak periods by quarter hour is given in Figures 1 and 2 on Page 7.
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 17,300 people using private transport to travel into the town centre between 07.30 and 09.30. (Page 14, Figure 9)
8. Using the manual surveys to estimate the inbound mode of transport figure, the main 12 hour day shows approximately 270 cycles, 1,300 buses, 57,000 light vehicles and 1,500 heavy vehicles. (Page 12, Table 8)
9. The estimated mode of transport figures for the outbound directions are 240 cycles, 1,250 buses 56,000 light vehicles and 1,450 heavy vehicles. (Page 13, Table 9)
10. Public transport data collected by Centro has shown that there were 3,306 trips made by bus and 410 trips made by rail into Sutton Coldfield Town Centre during the hours of 07.30-09.30. (Page 15, Table 11)

Purpose of Report

This report is being undertaken as part of the Package 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 automatic traffic surveys and analysis have been undertaken by the West Midlands Joint Data Team.

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. This network is then supplemented by sites on some of the minor roads so as to obtain a close 'closed' cordon. In this way all vehicles entering the town centre are recorded.

The counters used record the vehicles automatically. This method allows a full weeks' data to be collected, enabling 24 hr average weekday data to be presented.

Four sites were also surveyed manually by Birmingham City Council staff. These twelve category passage and occupancy counts are 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 complimentary bus cordon survey is undertaken by CENTRO, which this report feeds into.

Results of the 1998 Sutton Coldfield Cordon Survey are presented on the following pages. Where available, comparisons have been made with 1996 data.

Background

Collection of the data took place in the week beginning Monday 21st November. It is important to avoid school holidays and the Christmas shopping season. In 1996, the surveys took place during the last week in November.

In 1998, site SU12 Wyndley Lane was discontinued as the entrance to Sutton Park was closed at the time the surveys were carried out.

Some of the results in 1998 were found to be inconsistent when compared with 1996 data. Thorough checks were carried out on 1998 data in order to eliminate any errors that may have occurred in the collection of the data.

On checking site SU01, it appeared evident that the outbound machine was over-counting. Calculated adjustments were made to the data to overcome this problem. At site SU04 Coleshill Road, the balance of flows (number of vehicles travelling inbound/outbound) was different to those monitored in 1996. However, after careful examination of the figures no obvious errors in the data were uncovered. When combined together, one or two other small changes in the balance of flows have resulted in a large change in the accumulation of flows (Table5, Figure6) in Sutton town centre during 1998. However, without discovering any glaring errors in the data we have been unable to uncover any one particular reason for this change and no combination of factors is obviously apparent either.

The exact position of the automatic counts can be seen in Appendix 1. It is hoped to continue to monitor these exact same sites in future years so that direct comparisons can be made.

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. This time period can be changed but needs to be consistent year on year.

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

	1996	1998
<u>Inbound</u>		
Total	11841	12164
<u>Outbound</u>		
Total	9951	10977

Table 2 shows the number of vehicles crossing the cordon line in the traditional off-peak morning period (10.00-12.00). It shows a closer difference between vehicles crossing inbound to outbound than the figures in the morning peak period.

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

	1996	1998
<u>Inbound</u>		
Total	8903	8550
<u>Outbound</u>		
Total	8001	8202

The figures in Table 3 show that around 16% 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 16%.

The off-peak time period considered (1000-1200) shows 11% of the daily traffic travelling into and out of the town centre.

Around 80% 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 of 902 is within the expected level of accuracy of automatic counts.

Table 3 Total Vehicles by Time Period on an Average Weekday, 1996/1998

	07.30 - 09.30	10.00 - 12.00	16.00 - 18.00	07.00 - 19.00 (12 hour)	0.00 - 24.00 (24 hour)
1998					
Inbound	12164	8550	11231	60227	74792
% of 24 hr	16.2	11.4	15.0	80.5	100
Outbound	10977	8202	12104	59154	73890
% of 24 hr	14.8	11.1	16.4	80.0	100
NET	1187	348	-873	1073	902
1996					
Inbound	11841	8903	10352	58666	72320
% of 24 hr	16.4	12.3	14.3	81.1	100
Outbound	9951	8001	12060	58047	72639
% of 24 hr	13.7	11.0	16.6	79.9	100
NET	1890	902	-1708	619	-319

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

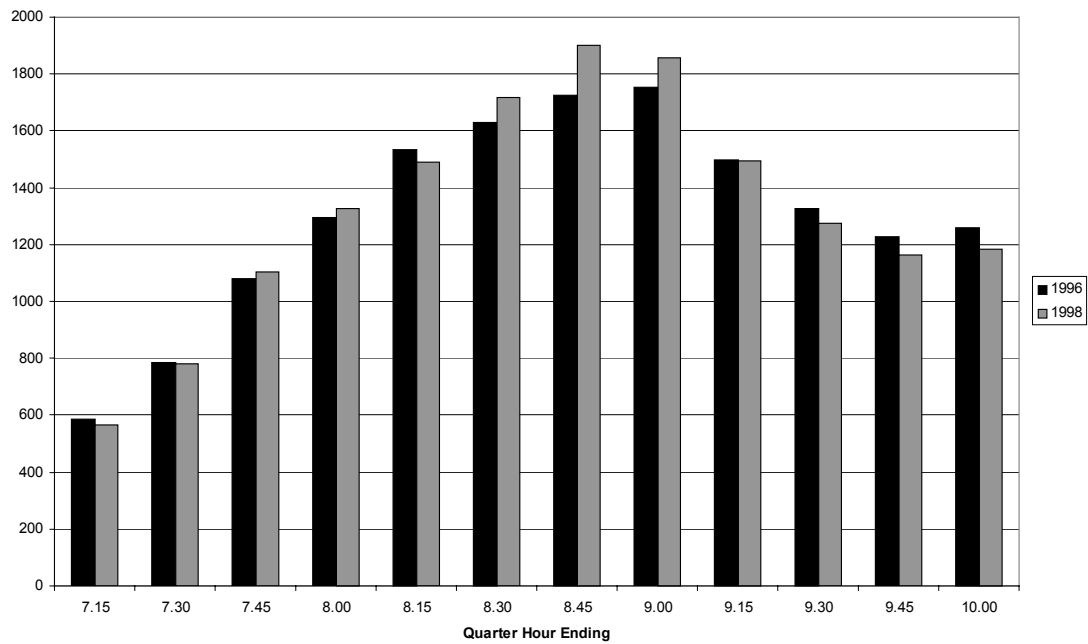


Figure 1 and Figure 2 show the two main peak periods by quarter hour. The morning figures are given from 7a.m. until 10a.m. and the evening from 4p.m. to 7p.m. These time periods are wider than those presented in previous tables in order to assess whether traffic is beginning to increase beyond the traditional peak hours.

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

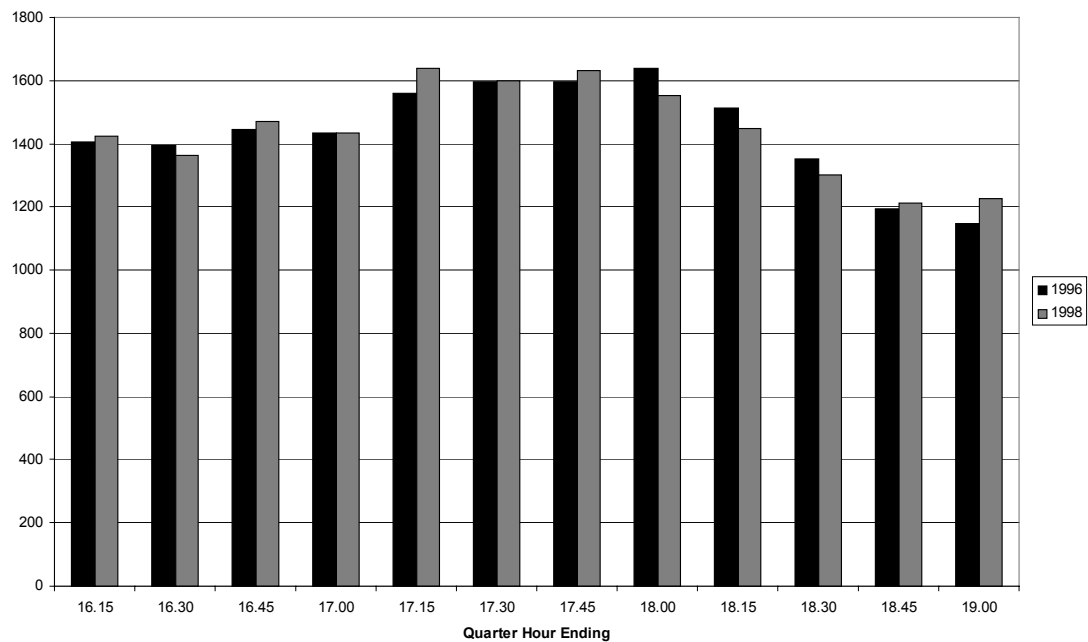


Figure 3 Inbound levels of vehicles, by hour

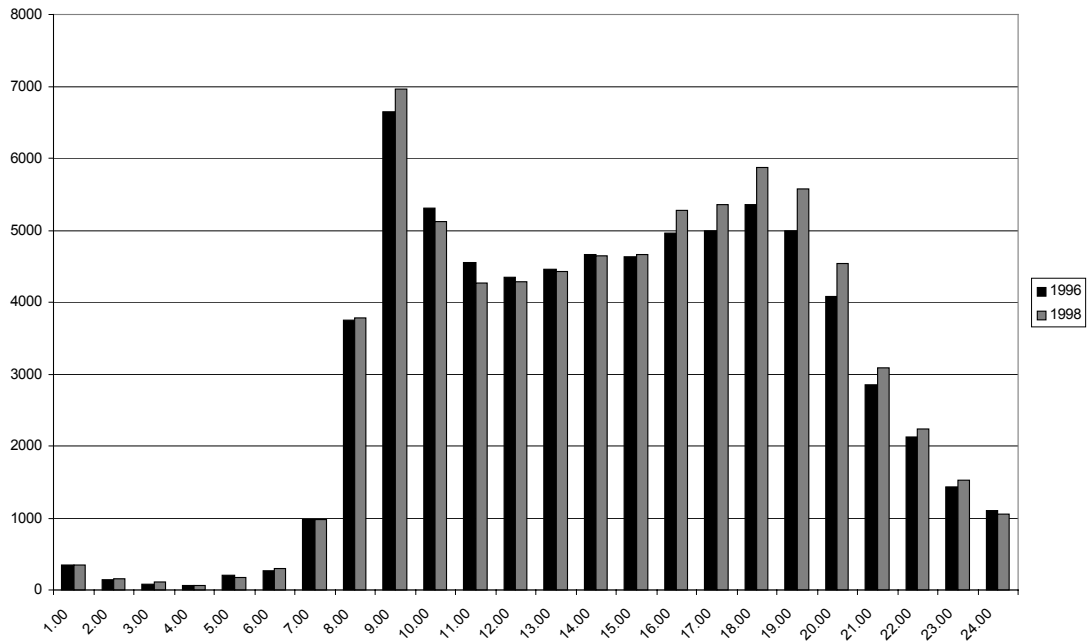
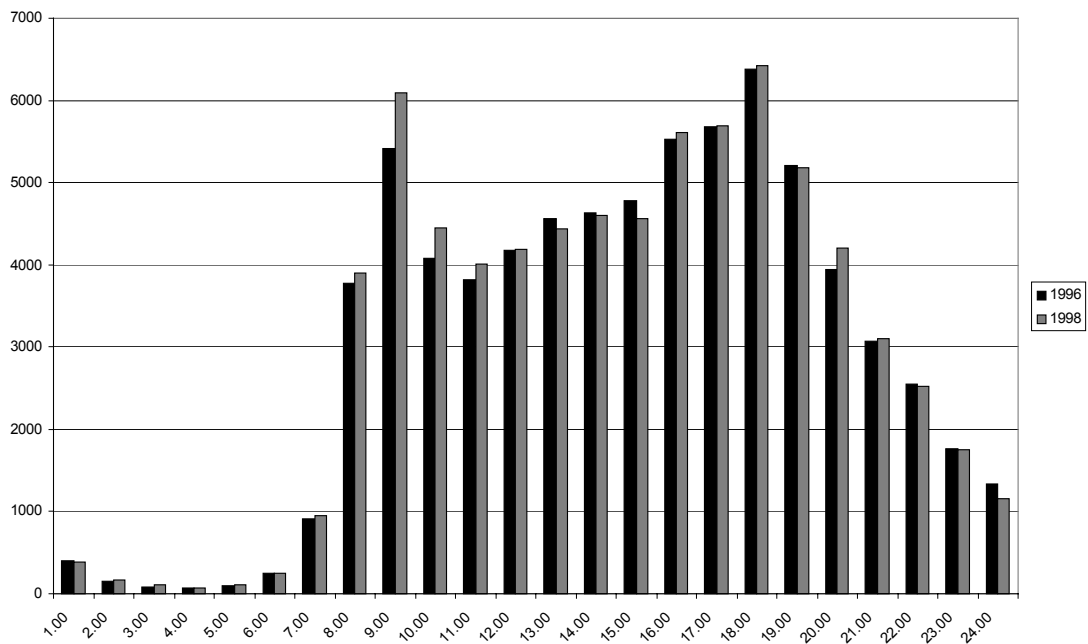


Figure 3 and Figure 4 give the hourly inbound and outbound data.

Figure 4 Outbound levels of vehicles, by hour



Daily and Hourly Variations

The figures in Table 4 give the proportions that each day contributes to an average week day (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 week day. The figures also show which days have the heaviest flows during each time period.

Table 4 Variations in traffic flow, by time of day 1998

	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
Inbound							
07.30 - 09.30	1.008	0.990	1.006	1.005	0.991	0.512	0.200
10.00 - 12.00	0.953	0.984	0.997	1.019	1.047	1.271	0.809
16.00 - 18.00	0.985	0.989	1.009	1.025	0.994	0.818	0.639
07.00 - 19.00	0.982	0.985	1.013	1.010	1.010	0.913	0.619
00.00 - 24.00	0.965	0.979	1.021	1.014	1.023	0.926	0.650
Outbound							
07.30 - 09.30	1.026	0.975	0.997	1.011	0.992	0.475	0.196
10.00 - 12.00	1.003	0.963	0.989	1.008	1.037	1.227	0.816
16.00 - 18.00	0.975	0.995	1.027	0.978	1.026	0.878	0.570
07.00 - 19.00	0.992	0.975	1.012	0.995	1.027	0.922	0.603
00.00 - 24.00	0.972	0.972	1.023	1.004	1.030	0.933	0.640

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

Hour Ending	No. vehicles inbound	No vehicles outbound	Net loss / gain (inbound minus outbound)	Accumulation
1.00	347	383	-36	-36
2.00	150	164	-14	-50
3.00	104	103	1	-49
4.00	70	63	7	-42
5.00	168	105	63	21
6.00	301	247	54	75
7.00	978	947	31	106
8.00	3776	3895	-119	-13
9.00	6966	6092	874	861
10.00	5119	4455	664	1525
11.00	4272	4009	263	1788
12.00	4278	4193	85	1873
13.00	4430	4439	-9	1864
14.00	4638	4609	29	1893
15.00	4660	4559	101	1994
16.00	5280	5609	-329	1665
17.00	5359	5686	-327	1338
18.00	5875	6420	-545	793
19.00	5574	5188	386	1179
20.00	4532	4200	332	1511
21.00	3082	3097	-15	1496
22.00	2244	2524	-280	1216
23.00	1530	1746	-216	1000
24.00	1059	1157	-98	902

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

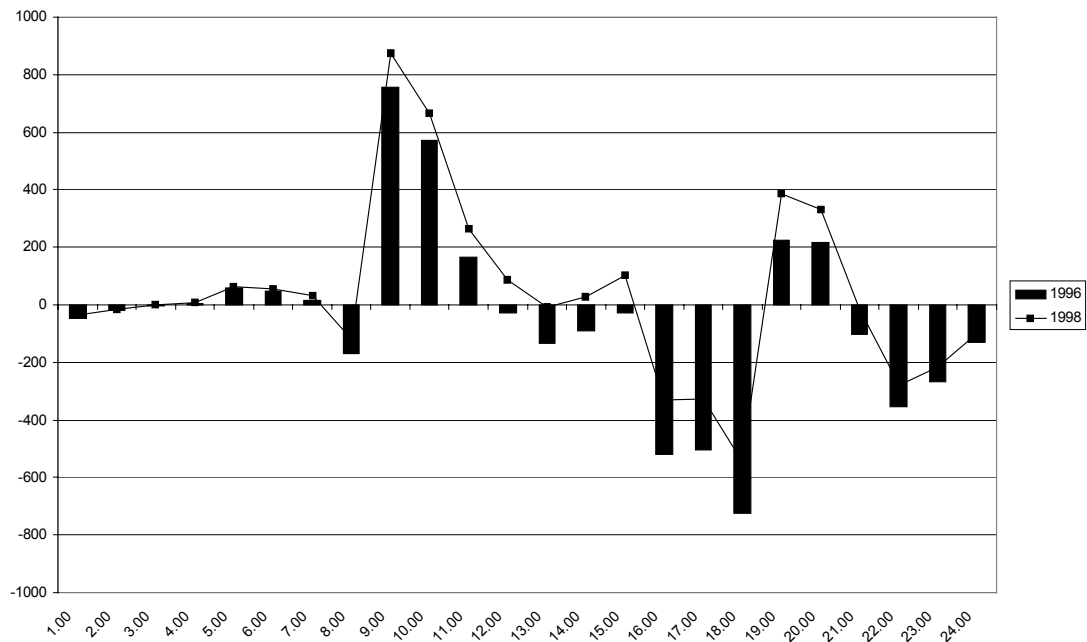
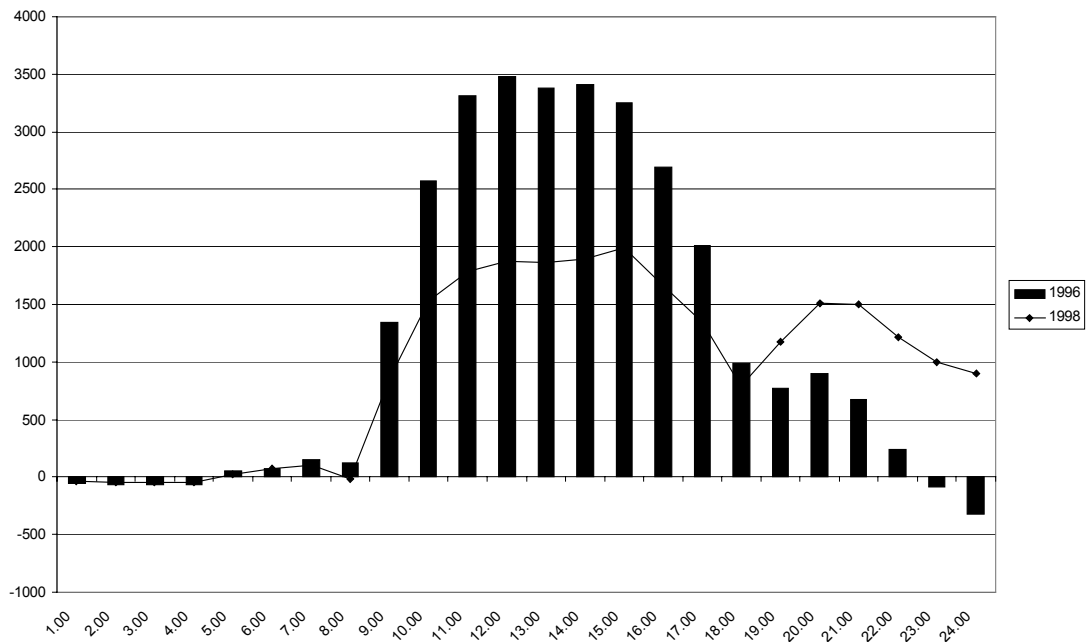


Figure 6 Net accumulation of vehicles, by hour



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 week day. By examining these figures, some patterns of travel may be evident. For example, people may prefer to use a particular road inbound in the morning, but choose a different route for their outward evening journey.

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

Site	Location	Inbound	Outbound	Net loss / gain
SU01	Lichfield Road	14174	14407	-233
SU02	Tamworth Road	7134	6185	949
SU03	Rectory Road	6291	6465	174
SU04	Coleshill Road	7808	7471	337
SU05	East View Road	2422	1971	451
SU06	Maney Hill Road	1002	1470	-468
SU07	Pilkington Avenue	2270	1603	667
SU08	Birmingham Road	10492	10795	-303
SU09	Jockey Road	7406	6973	433
SU10	Braemar Road	589	557	32
SU11	Monmouth Drive	9731	10565	-834
SU13	Tudor Hill	1464	1474	-10
SU14	Goldieslie Road	1452	1297	155

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 Goods Vehicles less than 1.5 tonnes. The 'heavy vehicle' category includes all vehicles greater than 1.5 tonnes.

In Table 7 the percentage each vehicle category contributes to the total vehicles in that hour is given in brackets. 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.

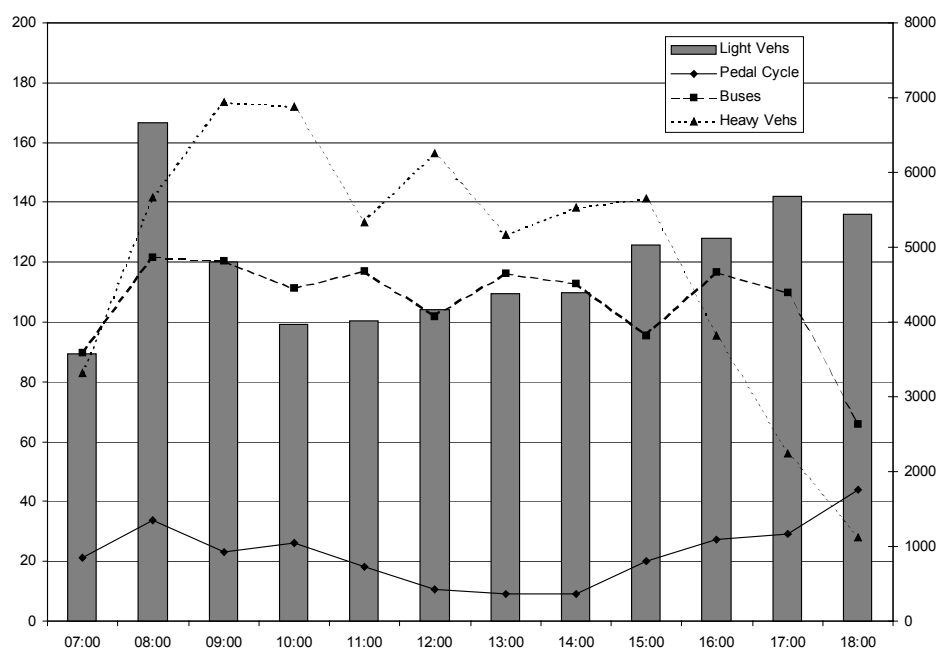
Table 7 Summary of Inbound mode of transport data from manual surveys

Time Starting	Total Vehicles	Pedal Cycles	Bus & Coach	Total Light Vehicles	Total Heavy Vehicles
07:00	2144	12(0.56%)	51(2.38%)	2034(94.87%)	47(2.19%)
08:00	3494	17(0.49%)	61(1.75%)	3345(95.74%)	71(2.03%)
09:00	2893	13(0.45%)	68(2.35%)	2714(93.81%)	98(3.39%)
10:00	2457	15(0.61%)	64(2.60%)	2279(92.76%)	99(4.03%)
11:00	2374	10(0.42%)	65(2.74%)	2225(93.72%)	74(3.12%)
12:00	2519	6(0.24%)	58(2.30%)	2366(93.93%)	89(3.53%)
13:00	2515	5(0.20%)	63(2.50%)	2377(94.51%)	70(2.78%)
14:00	2563	5(0.20%)	62(2.42%)	2420(94.42%)	76(2.97%)
15:00	2652	10(0.38%)	48(1.81%)	2523(95.14%)	71(2.68%)
16:00	2756	14(0.51%)	60(2.18%)	2633(95.54%)	49(1.78%)
17:00	2838	14(0.49%)	53(1.87%)	2744(96.69%)	27(0.95%)
18:00	2794	22(0.79%)	33(1.18%)	2725(97.53%)	14(0.50%)

Table 8 Estimated Inbound mode of transport figures

Time Starting	No. vehs. Counted automatically	estimated pedal cyc	estimated bus and coach	estimated light vehs.	estimated heavy vehs.
07:00	3776	21	90	3582	83
08:00	6966	34	122	6669	142
09:00	5119	23	120	4802	173
10:00	4272	26	111	3963	172
11:00	4278	18	117	4009	133
12:00	4430	11	102	4161	157
13:00	4638	9	116	4384	129
14:00	4660	9	113	4400	138
15:00	5280	20	96	5023	141
16:00	5359	27	117	5120	95
17:00	5875	29	110	5680	56
18:00	5574	44	66	5436	28
Total	60227	269	1291	57189	1477

The figures in Table 7 and Table 8 are represented in Figure 7. As the numbers for Light Vehicles are so much higher than the other categories, the light vehicles (bars) are read from the right hand axis and all the other categories (lines) form 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 figures in Figure 8. The actual manual counts will be included in a separate appendix.

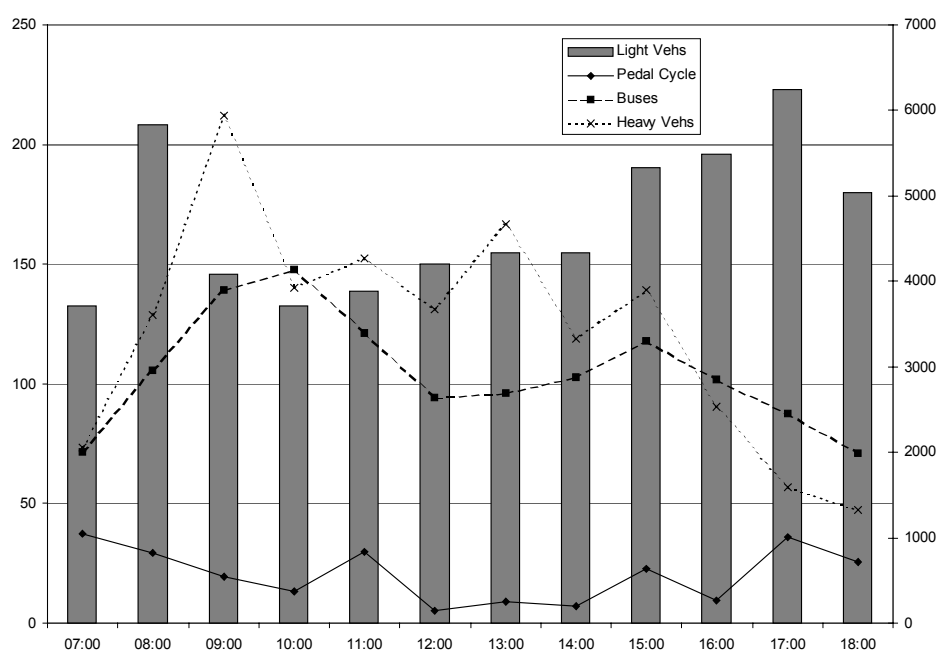
Table 9 Summary of Outbound mode of transport data from manual surveys

Time Starting	Total Vehicles	Pedal Cycles	Bus & Coach	Total Light Vehicles	Total Heavy Vehicles
07:00	2076	20(0.96%)	38(1.83%)	1979(95.33%)	39(1.88%)
08:00	2888	14(0.48%)	50(1.73%)	2763(95.67%)	61(2.11%)
09:00	2270	10(0.44%)	71(3.13%)	2081(91.67%)	108(4.76%)
10:00	2145	7(0.33%)	79(3.68%)	1984(92.49%)	75(3.50%)
11:00	2252	16(0.71%)	65(2.89%)	2089(92.76%)	82(3.64%)
12:00	2540	3(0.12%)	54(2.13%)	2408(94.80%)	75(2.95%)
13:00	2546	5(0.20%)	53(2.08%)	2396(94.11%)	92(3.61%)
14:00	2569	4(0.16%)	58(2.26%)	2440(94.98%)	67(2.61%)
15:00	2946	12(0.41%)	62(2.10%)	2799(95.01%)	73(2.48%)
16:00	2963	5(0.17%)	53(1.79%)	2858(96.46%)	47(1.59%)
17:00	3735	21(0.56%)	51(1.37%)	3630(97.19%)	33(0.88%)
18:00	2851	14(0.49%)	39(1.37%)	2772(97.23%)	26(0.91%)

Table 10 Estimated Outbound mode of transport figures

Time Starting	No. vehs. Counted automatically	estimated pedal cyc	estimated bus	estimated light vehs.	estimated heavy vehs.
07:00	3895	38	71	3713	73
08:00	6092	30	105	5828	129
09:00	4456	20	139	4085	212
10:00	4009	13	148	3708	140
11:00	4193	30	121	3890	153
12:00	4440	5	94	4209	131
13:00	4609	9	96	4337	167
14:00	4559	7	103	4330	119
15:00	5610	23	118	5330	139
16:00	5687	10	102	5485	90
17:00	6421	36	88	6240	57
18:00	5187	25	71	5043	47
Total	59158	244	1253	56213	1448

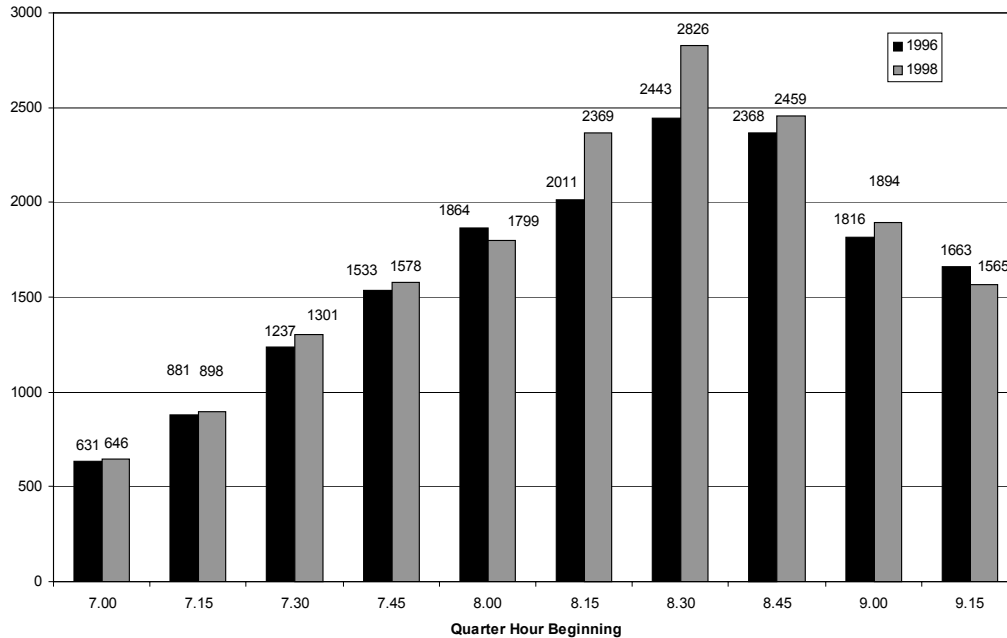
Figure 8 Estimated Outbound mode of transport figures



Occupancy Levels

Figure 9 shows estimates of people travelling by private transport into Sutton town centre during the morning peak period. These numbers have been estimated using the average occupancy figures produced from the four manual surveys and the number of vehicles recorded by automatic machines per time period.

Figure 9 Estimates of numbers of people travelling Inbound Morning Peak Period



As four manuals have been undertaken by quarter hour for the hours 07.30 to 09.30 and 10.00 to 12.00 (inbound) the average occupancy factors from these four counts can be applied to the number of vehicles automatically counted (minus the number of buses given in Appendix 2) to give an estimate of the numbers of people using private transport. Using this method, the estimate of people travelling inbound during the hours 07.30 to 09.30 is 17,335.

Public Transport Data.

Public Transport data was collected by Centro for the time period 07.00 to 12.30. A summary of the analysis is shown below.

Table 11. Inbound and Outbound Trips by Public Transport Into Sutton Coldfield Town Centre.

		Weekday		Weekday		Weekday	
		0730-0930		1000-1200		0700-1230	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Total by Bus	1996	3,285	2,011	2,845	1,861	7,521	4,973
	1998	3,306	1,601	2,496	1,933	7,269	4,784
Total by Rail	1996	374	369	201	152	682	654
	1998	410	439	166	161	679	706
Total by Public Transport	1996	3,659	2,380	3,046	2,013	8,203	5,627
	1998	3,716	2,040	2,662	2,094	7,948	5,490

Source: Centro

Appendix 1

Position of Cordon Sites

Appendix 1 Position of Cordon Sites

Site	Name of Road	Exact Position
SU01	Lichfield Road	Between Wyvern Rd and Mulroy Rd
SU02	Tamworth Road	Under Railway Bridge
SU03	Rectory Road	Between Riland Rd and Cemetery Rd
SU04	Coleshill Road	Between Riland Rd and Broome Close
SU05	East View Road	Between Shooters Hill and Wylde Green
SU06	Maney Hill Road	Between Rowan Rd and Pilkington Ave
SU07	Pilkington Ave	Between Birmingham Rd and Seaton Rd
SU08	Birmingham Road	Between Jockey Rd and Monkseaton Rd
SU09	Jockey Road	Between Mayfield Rd and Sommerville R
SU10	Braemar Road	Between Elwyn Road and Sommerville R
SU11	Monmouth Drive	Between Morven Rd and Sommerville Rd
SU13	Tudor Hill	West of Clifton Rd
SU14	Goldieslie Road	Between Jockey Rd and Highbridge Rd

Appendix 2 Sutton Coldfield Town Centre Car Parks Data 1996

Table A2.1 Anchorage Road

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8.00	0	1	0	1	0	0	0
9.00	7	6	9	12	10	2	0
10.00	25	13	22	24	15	2	10
11.00	6	12	10	5	6	0	33
12.00	8	3	6	10	6	0	36
13.00	7	5	10	11	10	0	23
14.00	10	10	13	18	4	0	27
15.00	10	6	9	7	16	10	27
16.00	1	8	6	4	2	13	8
17.00	4	0	1	1	2	1	0
18.00	0	0	1	3	1	2	1
19.00	22	0	43	0	1	1	0
20.00	8	0	6	5	3	1	1
21.00	3	1	0	1	1	2	0
22.00	0	0	0	1	0	0	0
24.00	0	0	1	0	0	0	0

Table A2.2 Duke Street

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8.00	0	0	1	0	0	0	2
9.00	17	11	18	28	27	7	0
10.00	29	25	24	19	23	29	1
11.00	5	5	10	2	6	19	33
12.00	6	6	8	3	4	29	12
13.00	12	1	9	9	5	22	6
14.00	9	6	6	10	4	29	1
15.00	13	4	7	6	10	20	0
16.00	9	5	11	9	8	20	0
17.00	2	2	5	8	6	7	0
18.00	0	0	1	0	1	0	0
19.00	0	1	0	1	5	1	1
20.00	0	0	0	1	1	2	1
21.00	0	0	0	1	2	0	1
22.00	0	0	0	0	1	0	1
24.00	0	0	0	0	0	0	0

Table A2.3 Manor Hill

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8.00	9	5	6	7	4	8	1
9.00	21	8	19	25	21	36	6
10.00	73	20	51	68	58	99	5
11.00	38	17	46	46	62	62	42
12.00	34	4	36	39	42	67	48
13.00	45	2	37	35	46	54	37
14.00	35	12	37	35	44	72	27
15.00	42	12	31	37	50	65	19
16.00	33	4	13	24	33	58	7
17.00	24	8	7	19	21	37	0
18.00	6	1	4	4	3	11	0
19.00	0	3	1	5	2	1	0
20.00	1	0	2	1	0	0	2
21.00	0	1	1	0	2	5	1
22.00	0	0	0	0	0	2	0
24.00	0	0	0	0	0	0	0

Table A2.4 Mill Street

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8.00	2	2	1	3	4	1	0
9.00	8	2	10	4	8	11	5
10.00	11	15	15	14	16	14	4
11.00	5	6	5	8	5	8	38
12.00	5	2	8	6	6	5	5
13.00	9	6	4	9	10	15	27
14.00	6	7	10	11	6	11	20
15.00	10	3	8	11	7	10	20
16.00	7	9	15	13	10	7	20
17.00	7	4	11	16	11	19	6
18.00	7	8	15	7	6	13	10
19.00	0	4	9	14	5	11	8
20.00	3	4	5	8	9	3	3
21.00	4	1	1	0	3	6	4
22.00	2	0	0	0	2	5	2
24.00	0	0	0	0	0	1	0

Table A2. 5 Reddicroft Lower (1)

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8.00	7	2	6	4	7	7	1
9.00	20	14	26	23	25	24	4
10.00	16	13	9	11	4	33	5
11.00	5	6	4	12	4	21	96
12.00	5	2	8	2	5	24	15
13.00	6	4	5	2	7	20	36
14.00	7	8	5	9	4	28	24
15.00	12	1	4	8	7	31	32
16.00	9	3	6	7	9	32	17
17.00	13	1	7	9	10	19	4
18.00	14	2	8	8	4	13	5
19.00	3	7	13	3	6	1	24
20.00	2	1	9	8	2	2	0
21.00	2	2	2	1	1	1	2
22.00	0	0	1	2	3	3	1
24.00	0	0	0	0	0	0	0

Table A2. 6 Reddicroft Upper (2)

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8.00	4	0	3	3	3	2	0
9.00	18	9	19	15	18	16	0
10.00	32	28	30	27	23	59	3
11.00	7	12	8	13	15	25	30
12.00	15	5	14	7	15	35	53
13.00	13	3	7	10	10	40	21
14.00	14	10	7	16	15	37	5
15.00	11	5	7	12	11	30	8
16.00	9	3	11	12	20	29	2
17.00	11	2	6	11	13	19	1
18.00	1	1	0	5	3	4	0
19.00	0	0	1	0	0	0	0
20.00	0	0	1	0	0	0	1
21.00	0	0	1	1	0	0	0
22.00	1	0	0	0	0	0	0
24.00	0	0	0	0	0	0	0

Table A2.7 Station Street

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8.00	11	4	11	4	10	8	2
9.00	50	15	40	28	41	45	4
10.00	49	30	46	52	49	60	21
11.00	22	15	16	37	21	36	144
12.00	21	6	22	19	27	42	56
13.00	15	10	18	29	23	35	41
14.00	18	10	19	23	32	53	29
15.00	22	6	13	24	27	39	27
16.00	14	5	16	16	21	52	14
17.00	11	3	9	19	18	26	8
18.00	1	3	6	8	5	11	1
19.00	0	1	22	5	1	1	1
20.00	10	2	7	5	2	0	2
21.00	0	12	3	4	5	5	1
22.00	0	0	1	0	1	3	1
24.00	1	0	0	0	0	1	0

Table A2.8 Victoria Road

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
8.00	33	18	20	19	27	20	0
9.00	120	47	121	110	135	153	0
10.00	161	147	157	164	216	234	0
11.00	139	108	173	184	151	223	0
12.00	124	65	174	171	150	232	0
13.00	110	75	143	133	153	194	0
14.00	120	55	138	142	150	224	0
15.00	104	79	126	127	139	200	0
16.00	99	45	75	88	100	225	0
17.00	49	45	55	88	99	96	0
18.00	22	22	21	48	59	32	0
19.00	3	10	16	61	23	3	0
20.00	1	4	5	21	7	1	0
21.00	0	0	0	3	0	0	0
22.00	0	0	0	0	0	0	0
24.00	0	0	0	0	0	0	0

Appendix 3 Calculations for Estimated Mode

Direction: Inbound

TIME	TOTAL STARTING	PEDAL VEH	BUS & CYC	Light COACH Vehs	Heavy Vehs	% pedal	% bus	% light	% heavy	No. auto	veh:s	est.	est.	
											ped	bus	light	heavy
07:00	2144	12	51	2034	47	0.56%	2.38%	94.87%	2.19%	3776	21	90	3582	83
08:00	3494	17	61	3345	71	0.49%	1.75%	95.74%	2.03%	6966	34	122	6669	142
09:00	2893	13	68	2714	98	0.45%	2.35%	93.81%	3.39%	5119	23	120	4802	173
10:00	2457	15	64	2279	99	0.61%	2.60%	92.76%	4.03%	4272	26	111	3963	172
11:00	2374	10	65	2225	74	0.42%	2.74%	93.72%	3.12%	4278	18	117	4009	133
12:00	2519	6	58	2366	89	0.24%	2.30%	93.93%	3.53%	4430	11	102	4161	157
13:00	2515	5	63	2377	70	0.20%	2.50%	94.51%	2.78%	4638	9	116	4384	129
14:00	2563	5	62	2420	76	0.20%	2.42%	94.42%	2.97%	4660	9	113	4400	138
15:00	2652	10	48	2523	71	0.38%	1.81%	95.14%	2.68%	5280	20	96	5023	141
16:00	2756	14	60	2633	49	0.51%	2.18%	95.54%	1.78%	5359	27	117	5120	95
17:00	2838	14	53	2744	27	0.49%	1.87%	96.69%	0.95%	5875	29	110	5680	56
18:00	2794	22	33	2725	14	0.79%	1.18%	97.53%	0.50%	5574	44	66	5436	28
Total	31999	143	686	30385	785	0.45%	2.14%	94.96%	2.45%	60227	269	1291	57189	1477
7.30	631	1	19	599	12	0.16%	3.01%	94.93%	1.90%	1105	2	33	1049	21
7.45	740	2	10	712	16	0.27%	1.35%	96.22%	2.16%	1325	4	18	1275	29
8.00	792	3	16	755	18	0.38%	2.02%	95.33%	2.27%	1491	6	30	1421	34
8.15	909	6	10	875	18	0.66%	1.10%	96.26%	1.98%	1718	11	19	1654	34
8.30	896	5	14	863	14	0.56%	1.56%	96.32%	1.56%	1901	11	30	1831	30
8.45	897	3	21	852	21	0.33%	2.34%	94.98%	2.34%	1856	6	43	1763	43
9.00	757	2	14	724	17	0.26%	1.85%	95.64%	2.25%	1496	4	28	1431	34
9.15	719	2	18	664	35	0.28%	2.50%	92.35%	4.87%	1275	4	32	1177	62
Total	6341	24	122	6044	151	0.38%	1.92%	95.32%	2.38%	12167	46	234	11597	290

Direction: Inbound

TIME	TOTAL STARTINGVEH	PEDAL CYC	BUS & COACH	Light Vehs	Heavy Vehs	% pedal % bus	% light	% heavy	No. auto vehs	ped	cyc	est. bus	est. light	est. heavy
16.30	667	3	9	641	14	0.45%	96.10%	2.10%	1335	6	18	1283	28	
16.45	656	4	15	628	9	0.61%	95.73%	1.37%	1412	9	32	1352	19	
17.00	711	3	9	688	11	0.42%	96.77%	1.55%	1441	6	18	1394	22	
17.15	666	4	15	644	3	0.60%	96.70%	0.45%	1432	9	32	1385	6	
17.30	718	3	16	690	9	0.42%	96.10%	1.25%	1474	6	33	1417	18	
17.45	743	4	13	722	4	0.54%	97.17%	0.54%	1528	8	27	1485	8	
18.00	751	1	6	741	3	0.13%	98.67%	0.40%	1466	2	12	1446	6	
18.15	687	8	10	663	6	1.16%	96.51%	0.87%	1391	16	20	1342	12	
Total	5599	30	93	5417	59	0.54%	96.75%	1.05%	11479	62	191	11106	121	

Direction: Outbound

TIME	TOTAL	PEDAL	BUS &	Light	Heavy	% pedal	% bus	% light	% heavy	auto	ped cyc	estima	estima	estimat
STARTING	VEH	CYC	COACH	Vehs	Vehs	%	%	%	%	vehs	cyc	estima	estima	estimat
												light	heavy	heavy
07:00	2076	20	38	1979	39	0.96%	1.83%	95.33%	1.88%	3895	38	71	3713	73
08:00	2888	14	50	2763	61	0.48%	1.73%	95.67%	2.11%	6092	30	105	5828	129
09:00	2270	10	71	2081	108	0.44%	3.13%	91.67%	4.76%	4456	20	139	4085	212
10:00	2145	7	79	1984	75	0.33%	3.68%	92.49%	3.50%	4009	13	148	3708	140
11:00	2252	16	65	2089	82	0.71%	2.89%	92.76%	3.64%	4193	30	121	3890	153
12:00	2540	3	54	2408	75	0.12%	2.13%	94.80%	2.95%	4440	5	94	4209	131
13:00	2546	5	53	2396	92	0.20%	2.08%	94.11%	3.61%	4609	9	96	4337	167
14:00	2569	4	58	2440	67	0.16%	2.26%	94.98%	2.61%	4559	7	103	4330	119
15:00	2946	12	62	2799	73	0.41%	2.10%	95.01%	2.48%	5610	23	118	5330	139
16:00	2963	5	53	2858	47	0.17%	1.79%	96.46%	1.59%	5687	10	102	5485	90
17:00	3735	21	51	3630	33	0.56%	1.37%	97.19%	0.88%	6421	36	88	6240	57
18:00	2851	14	39	2772	26	0.49%	1.37%	97.23%	0.91%	5187	25	71	5043	47

Direction: Outbound

TIME	TOTAL STARTINGVEH	PEDAL CYC	BUS & COACH	Light Vehs	Heavy Vehs	% pedal	% bus	% light	% heavy	auto vehs	estimate ped cyc	estima bus	estimate light	estimata heavy
Total	31781	131	673	30199	778	0.41%	2.12%	95.02%	2.45%	59158	244	1253	56213	1448
7.30	622	5	9	597	11	0.80%	1.45%	95.98%	1.77%	1150	9	17	1104	20
7.45	708	7	15	672	14	0.99%	2.12%	94.92%	1.98%	1345	13	28	1277	27
8.00	794	8	11	763	12	1.01%	1.39%	96.10%	1.51%	1454	15	20	1397	22
8.15	701	3	15	669	14	0.43%	2.14%	95.44%	2.00%	1484	6	32	1416	30
8.30	723	0	10	692	21	0.00%	1.38%	95.71%	2.90%	1552	0	21	1485	45
8.45	670	3	14	639	14	0.45%	2.09%	95.37%	2.09%	1602	7	33	1528	33
9.00	691	3	15	648	25	0.43%	2.17%	93.78%	3.62%	1317	6	29	1235	48
9.15	520	2	14	483	21	0.38%	2.69%	92.88%	4.04%	1076	4	29	999	43
Total	5429	31	103	5163	132	0.57%	1.90%	95.10%	2.43%	10980	63	208	10442	267
16.30	726	0	15	692	19	0.00%	2.07%	95.32%	2.62%	1469	0	30	1400	38
16.45	718	2	9	702	5	0.28%	1.25%	97.77%	0.70%	1433	4	18	1401	10
17.00	936	4	13	910	9	0.43%	1.39%	97.22%	0.96%	1637	7	23	1592	16
17.15	947	8	15	919	5	0.84%	1.58%	97.04%	0.53%	1599	14	25	1552	8
17.30	920	6	14	890	10	0.65%	1.52%	96.74%	1.09%	1631	11	25	1578	18
17.45	932	3	9	911	9	0.32%	0.97%	97.75%	0.97%	1554	5	15	1519	15
18.00	862	2	11	844	5	0.23%	1.28%	97.91%	0.58%	1447	3	18	1417	8
18.15	690	5	8	671	6	0.72%	1.16%	97.25%	0.87%	1302	9	15	1266	11
Total	6731	30	94	6539	68	0.45%	1.40%	97.15%	1.01%	12072	54	169	11728	122

Appendix 4 Calculations for Estimates of People Inbound

Inbound
1998

TIME	Number of Vehicles With Shown Number of Occupants					TOTAL OCC	TOTAL AVE OCC	Automatically Counted Vehicles	Estimated Number of Buses	Estimated Pedal Cycles	B+C	A-D	E	F	G	
	1	2	3	4	5											VEH
STARTING																
7.00	158	31	2	0	0	191	226	1.18	564	17	9	26	538	637	646	
7.15	211	31	5	0	1	248	293	1.18	782	21	7	28	754	891	898	
7.30	275	58	6	1	0	340	413	1.21	1105	33	2	35	1070	1300	1301	
7.45	467	87	11	3	0	568	686	1.21	1325	18	4	21	1304	1574	1578	
8.00	456	101	14	0	1	572	705	1.23	1491	30	6	36	1455	1794	1799	
8.15	474	136	36	13	4	663	926	1.40	1718	19	11	30	1688	2357	2369	
8.30	485	192	70	15	4	766	1159	1.51	1901	30	11	40	1861	2815	2826	
8.45	559	145	43	11	2	760	1032	1.36	1856	43	6	50	1806	2453	2459	
9.00	513	123	25	7	0	668	862	1.29	1496	28	4	32	1464	1890	1894	
9.15	431	102	15	1	2	551	694	1.26	1275	32	4	35	1240	1561	1565	
7.30-9.30	3660	944	220	51	13	4888	6477	1.33								
9.30	408	110	20	3	0	541	700	1.29								
9.45	391	131	25	3	1	551	745	1.35								
10.00	392	135	10	4	1	542	713	1.32								
10.15	388	137	16	6	0	547	734	1.34								
10.30	361	136	9	2	1	509	673	1.32								
10.45	409	137	22	1	0	569	753	1.32								
11.00	440	151	21	6	1	619	834	1.35								
11.15	436	110	15	8	1	570	738	1.29								
11.30	406	121	15	8	8	558	765	1.37								
11.45	378	118	20	3	0	519	686	1.32								
10-12	3210	1045	128	38	12	4433	5896	1.33								

These values cannot be calculated as
1.34 automatic counts are not carried out by quarter
1.32 hour for these time periods