
Dudley M B C
Mary Stevens Park
STOURBRIDGE
DY8 2AA

Dudley Cordon 2000

January 2001

Mott MacDonald
Canterbury House
85 Newhall Street
Birmingham B3 1LZ
Tel 0121 237 4002
Fax 0121 237 4003

Dudley Cordon Survey 2000

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Summary

The following is a summary of the information contained in this report. Estimates of people have only been calculated for the inbound and outbound morning peak periods. The estimates are calculated using manual surveys. The extent of these surveys defines the extent of information available. For details on methodology and a breakdown of the time periods, see the main report.

0730-0930 inbound

total vehicles	24,795
estimated pedal cycles	79
estimated bus	324
estimated light vehicles	23,279
estimated goods vehicles	1,103
estimated people (light vehs)	27,783
estimated people (goods vehs)	1,190

0730-0930 outbound

total vehicles	19,496
estimated pedal cycles	64
estimated bus	278
estimated light vehicles	18,190
estimated goods vehicles	965
estimated people (light vehs)	21,161
estimated people (goods vehs)	1,053

1000-1200 inbound

total vehicles	16,760
estimated pedal cycles	30
estimated bus	298
estimated light vehicles	15,134
estimated goods vehicles	1,314

1000-1200 outbound

total vehicles	16,582
estimated pedal cycles	10
estimated bus	291
estimated light vehicles	14,846
estimated goods vehicles	1,435

1630-1830 inbound

total vehicles	21,018
estimated pedal cycles	77
estimated bus	185
estimated light vehicles	20,338
estimated goods vehicles	417

1630-1830 outbound

total vehicles	23,194
estimated pedal cycles	66
estimated bus	317
estimated light vehicles	22,378
estimated goods vehicles	433

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 surveys and analysis have been undertaken by the **jdt** and Dudley M.B.C..

2 Methodology

Counts of vehicles crossing a cordon around Dudley Town Centre are undertaken at two year intervals using Automatic Traffic Counters (ATC's) installed on all major and most minor roads crossing the cordon. The counts record vehicles continuously, by direction, for a seven day period. The location of the sites is shown in figure 11.

Four sites are also surveyed manually by Dudley 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 complimentary bus cordon survey is undertaken by **jdt**, into which this report feeds.

3 Background

The 2000 Dudley Cordon ATC survey was undertaken in the week beginning 20th November. Care was taken to avoid school holidays and the Christmas shopping seasons. In future, every effort will be made to keep the cordon survey to the same week in October.

The exact position of the automatic counts are listed in Appendix 1.

4 Diary and Quality of Data Collection

Unfortunately the data from the manual surveys, which were carried out at the same time as the ATC's, was only split down into 6 categories of vehicles instead of the normal 12 categories. This does not affect the report in that all HGV's are grouped together anyway, however only having 1 category of HGV's does not allow for any axle factoring to be done on the data at a later date.

Flows seem to follow The Department of Transport's Traffic Appraisal Manual (TAM) which quotes +/- 5% as being the error margin for a 95% confidence interval of the true flows for an automatic count taken over a period of more than 12 hours (TAM 1981 6.2.5). The corresponding error margin for a manual count taken over a short period of time is +/- 10% (TAM 1981 6.3.5).

5 Results

In the table below the figures for the number of vehicles crossing the cordon line in both directions during the morning peak period are presented. The period considered to be the morning peak has been taken as 0730 - 0930, in order to provide consistency with previous years, and allowing trends in vehicles entering and leaving Dudley Town Centre to be analysed.

Table 1 No. of Vehicles Crossing the Cordon Line in the Morning Peak Period (0730 - 0930)

	1996	1998	2000
Inbound Total	24,705	23,301	24,785
Outbound Total	18,462	18,649	19,496

From these figures, the total number of vehicles crossing the cordon towards the town centre during this time period shows a rise from previous years, especially outbound.

The figures for the 1000-1200 time period are given in Table 2. Again, this time period has been considered as it is the off-peak time period that has been surveyed in previous years.

Table 2 No. of Vehicles Crossing the Cordon Line in the Off-Peak Period (1000 – 1200).

	1996	1998	2000
Inbound Total	18,217	15,530	16,760
Outbound Total	15,130	15,216	16,582

From these figures, the off-peak vehicles increased by approximately 8% in the inbound direction, over 1998 although still not upto the 1996 levels. The outbound direction increased by approximately 9% over 1998 and is also increased over the 1996 levels.

Table 3 Total Vehicles by Time Period on an Average Weekday, 1998 and 2000

	0730 - 0930	1000- 1200	1600- 1800	0700- 1900 (12 hr)	24 hour
1998					
Inbound 1998	23,299	15,530	19,563	108,544	135,194
% of 24hr	17.2	13.8	14.5	80.3	100
Outbound 1998	18,645	15,216	23,726	110,654	140,135
% of 24hr	13.3	10.9	16.9	79.0	100
NET 1998(Inbound minus Outbound)	4,654	314	-4,163	-2,110	-4,941
2000					
Inbound 2000	24,785	16,760	21,555	117,627	147,029
% of 24 hr	16.9	11.4	14.7	80.0	100
Outbound 2000	19,496	16,582	23,516	115,086	145,312
% of 24 hr	13.4	11.4	16.2	79.2	100
Net 2000(Inbound minus Outbound)	5,289	178	-1,961	2541	1717

The figures in Table 3 show that 16.9% of traffic flowing into the town centre on a typical day is crossing the cordon line between the hours of 7.30am and 9.30am. This corresponds with the figures for the outbound traffic between 4pm and 6pm which account for 16.2% of a daily outbound flow.

The off-peak time period considered (1000-1200) shows 11.4% of the daily traffic travelling into the town centre with the same percentage (11.4%) travelling out of the centre .

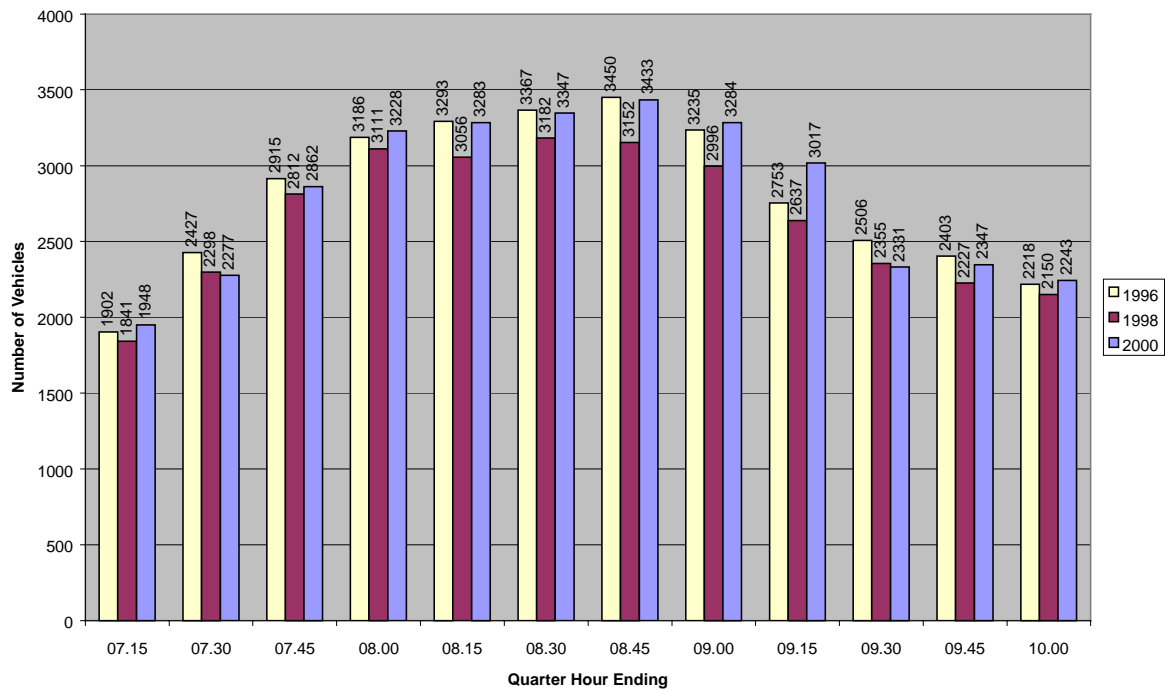
Around 80% of an average day's traffic is crossing the cordon during the main 12-hr day.

The net figure of 5,289 for the morning peak period gives some idea of the amount of the journey to work traffic to the town centre. Full figures for the net vehicles in the town centre are given in Table 5 by hour and Table 6 by station.

The time periods considered have been kept consistent with the time periods surveyed in previous years but, in future, any time period could be considered.

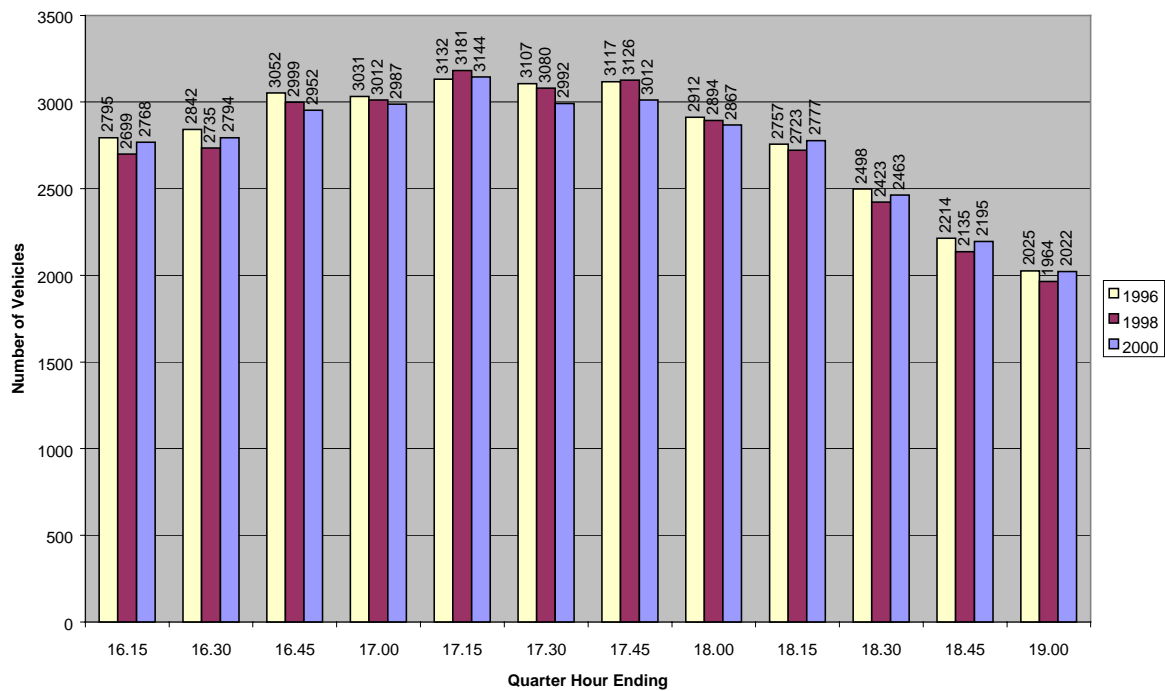
Figure 1 and 2 give a pictorial view of traffic flow in the two peak time periods, by quarter-hour periods.

Figure 1 Inbound Morning Peak: Vehicle Volumes by Quarter Hour



As expected, the graph shows the number of vehicles entering the town centre gradually increasing from 7am, with the peak number between 8.30 – 8.45am.

Figure 2 Outbound Evening Peak: Vehicle Volumes by Quarter Hour



The evening peak hour for vehicles leaving the town centre is from 16.30 – 17.30 with the highest quarter hour period being 17.00-17.15.

The following Figure 3 and Figure 4 present the 24 hour variations in Total Traffic for the inbound and outbound data.

Figure 3 Inbound 24 Hour Variations in Total Traffic

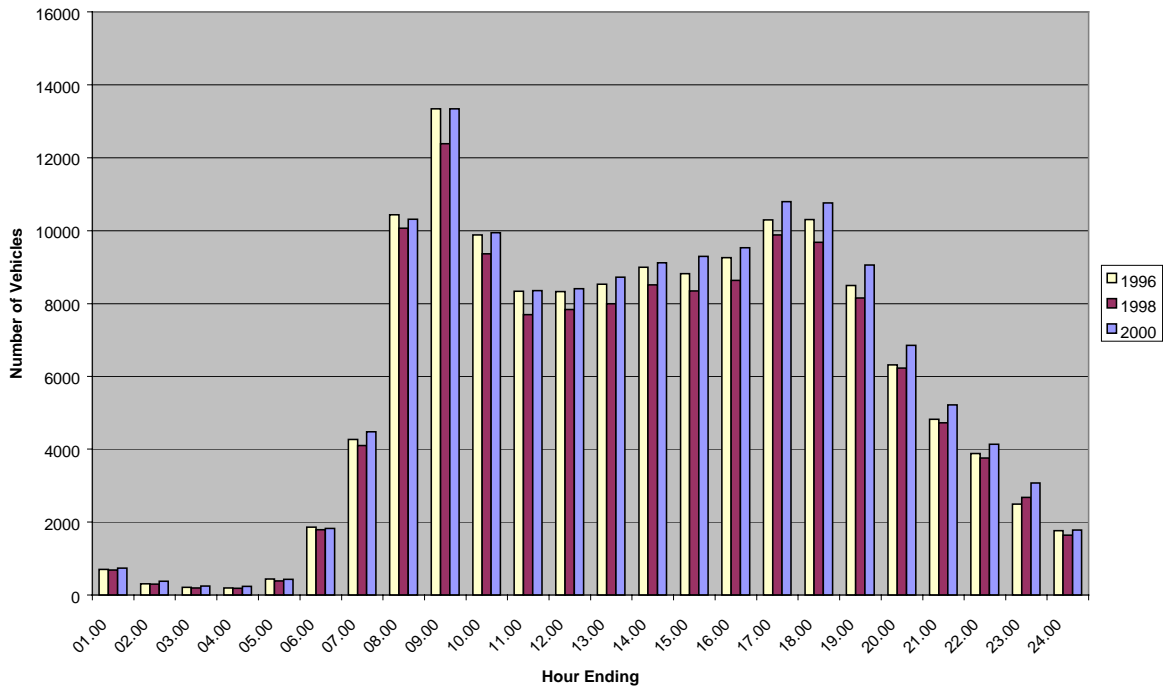
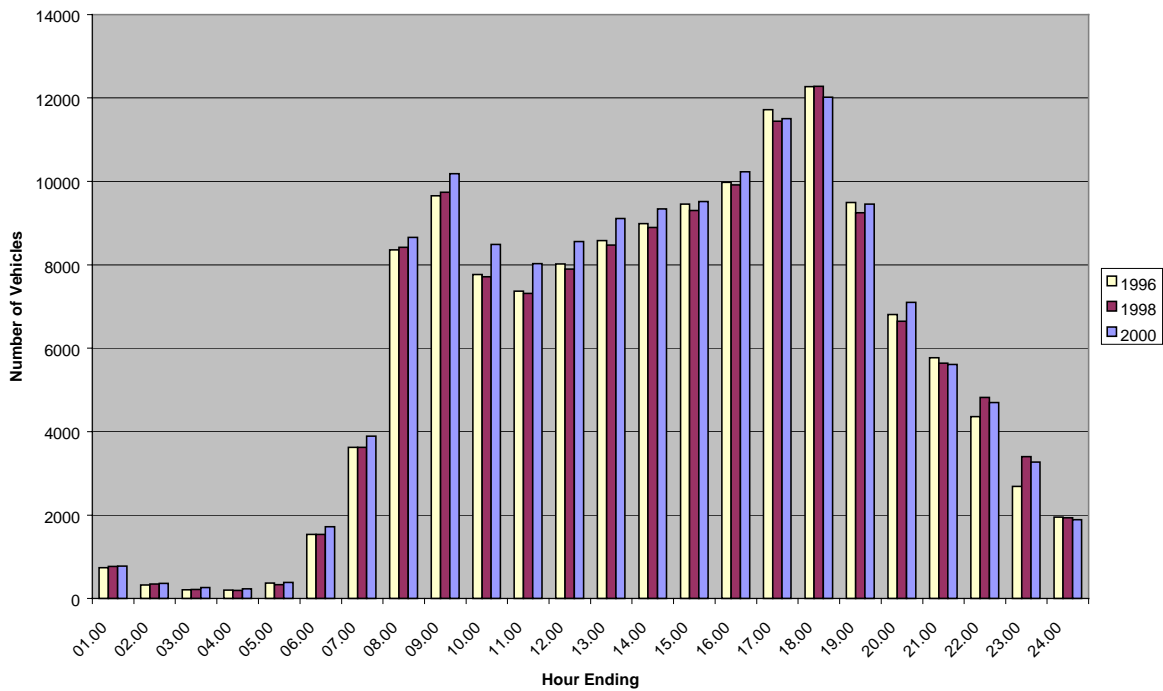
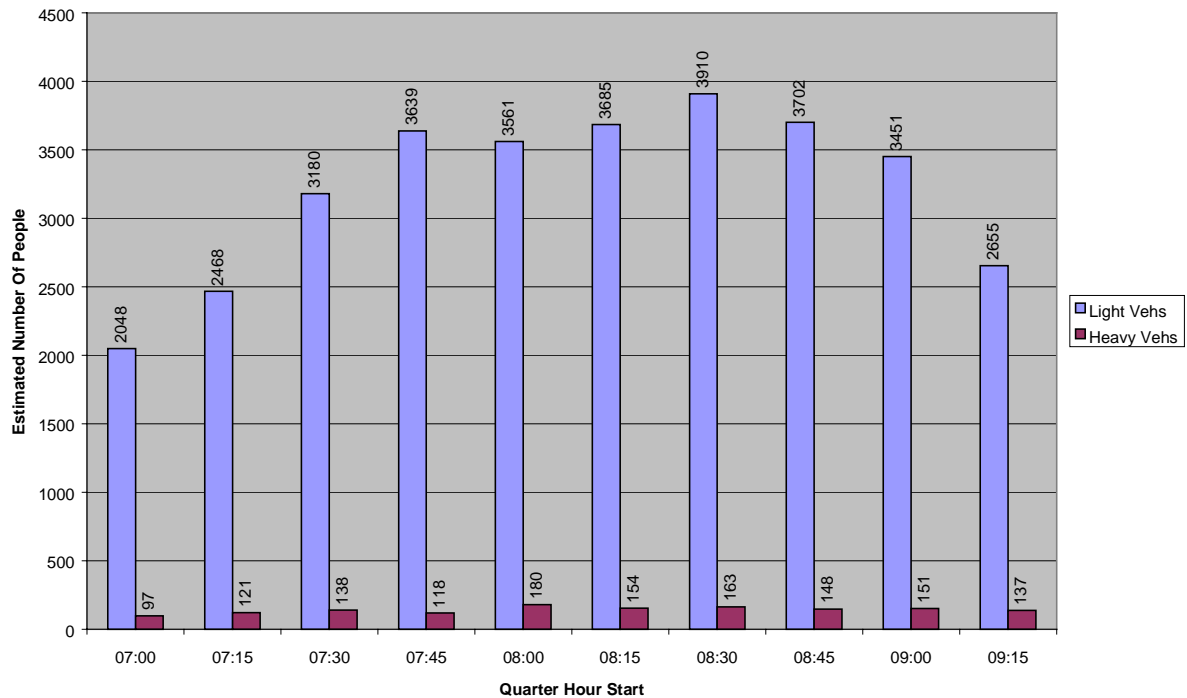


Figure 4 Outbound 24 Hour Variations in Total Traffic



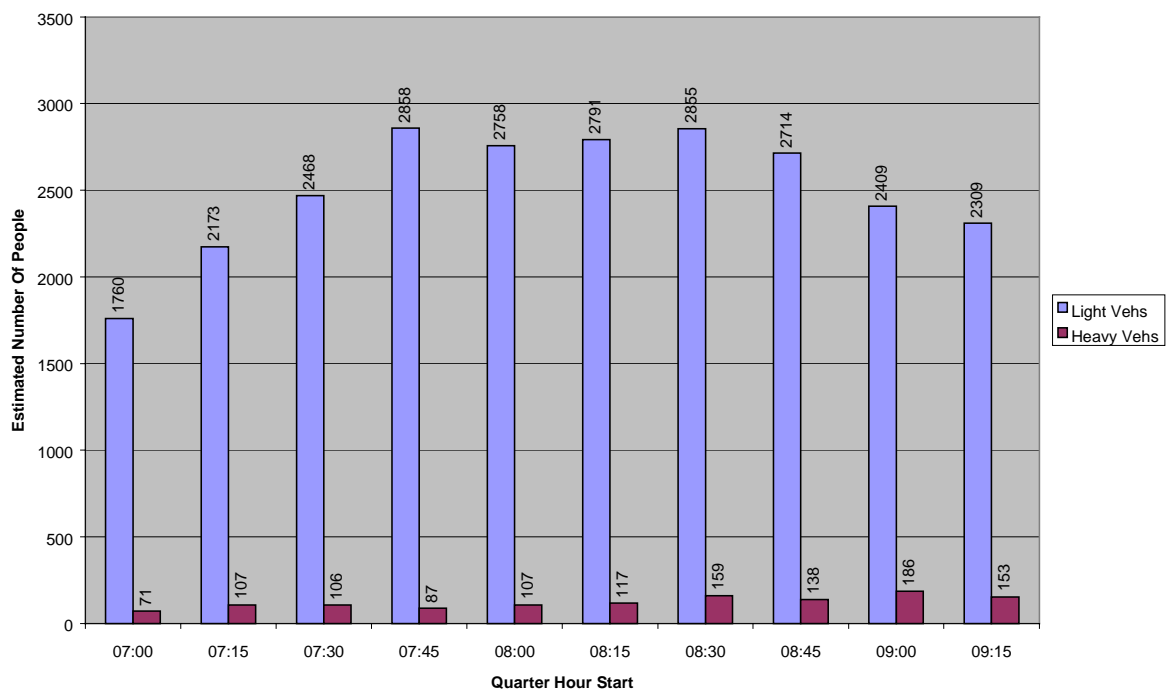
5.1 Occupancy Levels

Figure 5 Estimate of Numbers of Persons Travelling Inbound - Morning Peak



Figures 5 and 6 show 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 6 Estimate of Numbers of Persons Travelling Outbound - Morning Peak



5.2 Daily and Hourly Variations

Table 4 Variations in Traffic Flow by Time of Day, 2000

	MON	TUE	WED	THUR	FRI	SAT	SUN
Inbound							
0730-0930	1.018	1.014	0.990	0.990	0.989	0.445	0.159
1000-1200	1.000	0.991	0.989	0.986	1.035	1.076	0.841
1600-1800	1.009	1.002	1.030	0.991	0.970	0.725	0.596
0700-1900	1.000	0.994	0.997	0.992	1.017	0.792	0.595
0000-2400	0.985	0.986	0.995	1.006	1.029	0.813	0.610
Outbound							
0730-0930	1.003	0.983	0.999	1.003	1.012	0.477	0.179
1000-1200	1.002	0.988	0.990	0.979	1.041	1.028	0.818
1600-1800	1.009	1.012	1.009	0.995	0.976	0.716	0.550
0700-1900	0.999	0.995	0.993	0.991	1.022	0.794	0.599
0000-2400	0.985	0.988	0.991	1.008	1.028	0.812	0.616

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

Figure 7 Net Loss/gain in Vehicles Inside the Cordon, by Hour.

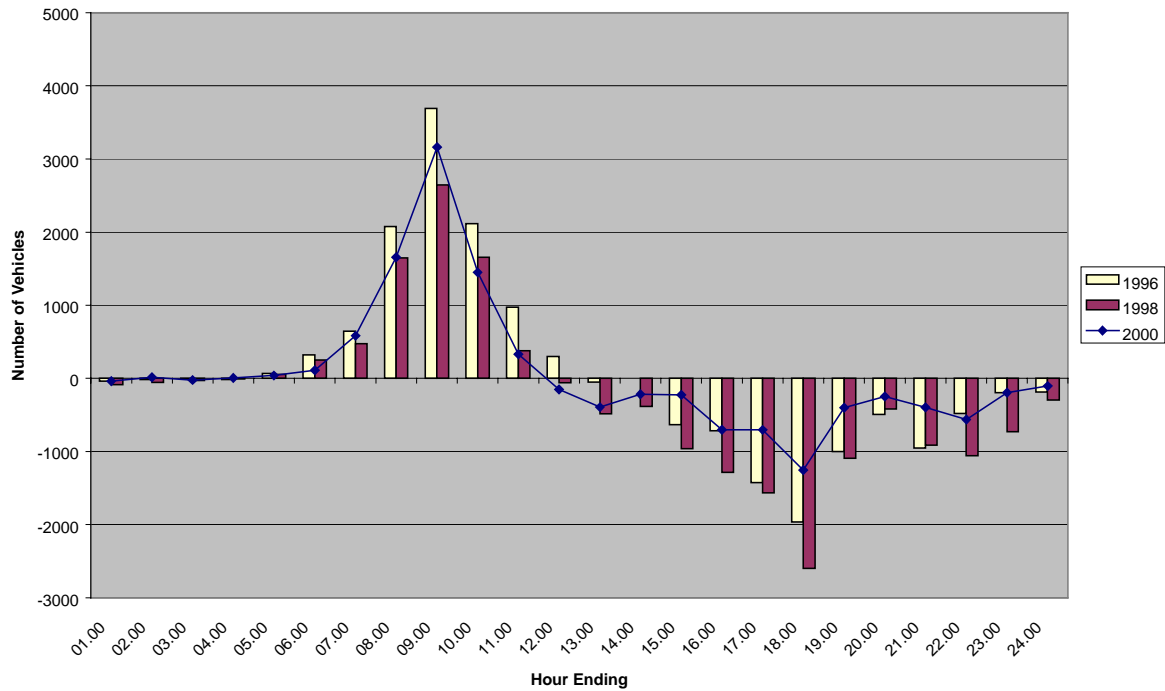


Figure 8 Net Accumulation of Vehicles Inside Cordon Area, by Hour.

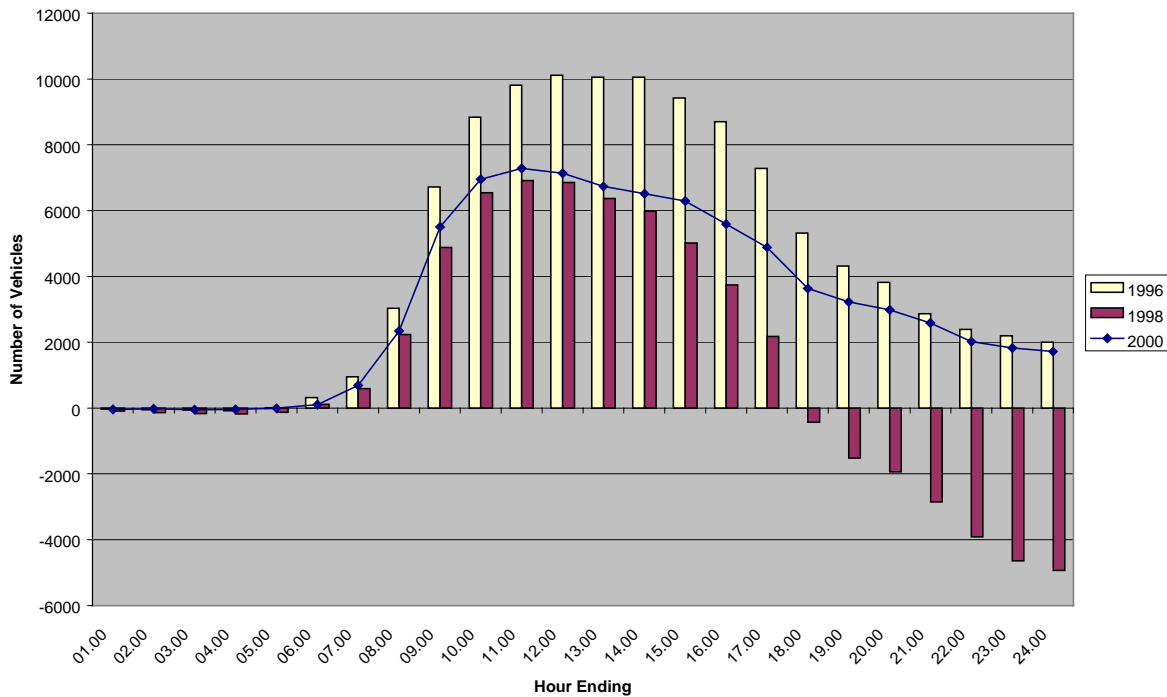


Figure 7 shows the net loss or gain to the town centre of vehicles throughout an average weekday. Stationary vehicles are not taken into account, only the movement of vehicles across the cordon line. Figure 8 shows the net accumulation of vehicles inside the cordon area by hour. The figures used for Figure 7 and Figure 8 are given in Table 5.

Table 5 Net Loss/Gain and Accumulation in Vehicles, by Hour 2000.

Hour Ending	Inbound	Outbound	Net Loss/Gain	Accumulation
1.00	739	778	-39	-39
2.00	381	366	15	-24
3.00	244	268	-24	-48
4.00	240	234	6	-42
5.00	426	388	38	-4
6.00	1830	1718	112	108
7.00	4476	3895	581	689
8.00	10315	8659	1656	2345
9.00	13347	10186	3161	5506
10.00	9938	8489	1449	6955
11.00	8357	8028	329	7284
12.00	8403	8554	-151	7133
13.00	8717	9113	-396	6737
14.00	9119	9337	-218	6519
15.00	9291	9517	-226	6293
16.00	9528	10230	-702	5591
17.00	10797	11501	-704	4887
18.00	10758	12015	-1257	3630
19.00	9057	9457	-400	3230
20.00	6855	7102	-247	2983
21.00	5214	5611	-397	2586
22.00	4136	4700	-564	2022
23.00	3076	3274	-198	1824
24.00	1785	1892	-107	1717

5.3 Patterns of Travel

The figures in Table 6 show the number of vehicles travelling into the town centre and out of the town centre by each individual site on an average weekday. By examining these figures, it is possible to determine some patterns of behaviour in the traffic. For example, people may prefer to use one road to enter the town centre in the mornings and another to leave the town at night.

Table 6 Net Loss/Gain in Vehicles on an Average Weekday, by Site

Site	Location	2000 inbound	2000 outbound	Net
DU01	Tipton Road	11400	10200	1200
DU02	Birmingham Road	22318	23126	-808
DU04	Priory Road	7693	7290	403
DU05	The Broadway	4949	3675	1274
DU08	Himley Road	9469	10082	-613
DU10	High Street Pensnett	13277	15963	-2686
DU11	Stourbridge Road	11566	11667	-101
DU12	Pedmore Road	12483	10878	1605
DU13	Peartree Lane	6041	7476	-1435
DU14	Cinder Bank	14743	14051	692
DU16	New Rowley Road	5139	5218	-79
DU17	Buffery Road	7049	4643	2406
DU18	Oakham Road	5170	5957	-787
DU19	Highland Road	11035	11687	-652
DU20	Dibdale Street	760	736	24
DU21	St. Johns Road	597	162	435
DU22	Lister Road	3340	2502	838

5.4 Mode of Travel

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

Table 7 shows a summary of the data collected from the four manually surveyed 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 goods vehicles greater than 1.5 tonnes.

In Table 7 the percentage the vehicle category contributes to the total vehicles in that hour is given in brackets. In Tables 8 and 10 we have multiplied these percentages by the number of vehicles counted automatically, giving an indication of the number of each type of vehicle.

Table 7 Summary of inbound modal data from manual surveys

Time Starting	Total Vehs	Pedal Cycles	Bus & Coach	Total Light Vehicles	Total Heavy Vehicles
07:00	3,747	12(0.32%)	73(1.95%)	3,499(93.38%)	163(4.35%)
08:00	4,579	16(0.35%)	56(1.22%)	4,301(93.93%)	206(4.50%)
09:00	3,756	10(0.27%)	52(1.38%)	3,473(92.47%)	221(5.88%)
10:00	3,367	10(0.30%)	58(1.72%)	3,065(91.03%)	240(7.13%)
11:00	3,441	2(0.06%)	63(1.83%)	3,082(89.57%)	294(8.54%)
12:00	3,527	4(0.11%)	57(1.62%)	3,206(90.90%)	260(7.37%)
13:00	3,797	4(0.11%)	56(1.47%)	3,498(92.13%)	239(6.29%)
14:00	3,733	9(0.24%)	61(1.63%)	3,395(90.95%)	268(7.18%)
15:00	3,655	6(0.16%)	54(1.48%)	3,353(91.74%)	242(6.62%)
16:00	4,208	21(0.50%)	45(1.07%)	4,002(95.10%)	140(3.33%)
17:00	4,191	11(0.26%)	32(0.76%)	4,056(96.78%)	32(0.76%)
18:00	3,522	6(0.17%)	34(0.97%)	3,447(97.87%)	34(0.97%)
Total	45,523	111(0.24%)	641(1.41%)	42,377(93.09%)	2,339(5.14%)

Table 8 Estimated inbound mode of transport figures

Time Starting	No. Vehs counted automatically	estimated ped cyc	estimated bus	estimated light vehs	estimated heavy vehs
07:00	10,315	33	201	9,632	449
08:00	13,347	47	163	12,537	600
09:00	9,938	26	138	9,189	585
10:00	8,357	25	144	7,607	596
11:00	8,403	5	154	7,526	718
12:00	8,717	10	141	7,924	643
13:00	9,119	10	134	8,401	574
14:00	9,291	22	152	8,450	667
15:00	9,528	16	141	8,741	631
16:00	10,797	54	115	10,268	359
17:00	10,758	28	82	10,411	82
18:00	9,057	15	87	8,864	87
Total	117,627	291	1,653	109,551	5,991

Figure 9 Estimated inbound mode of transport figures

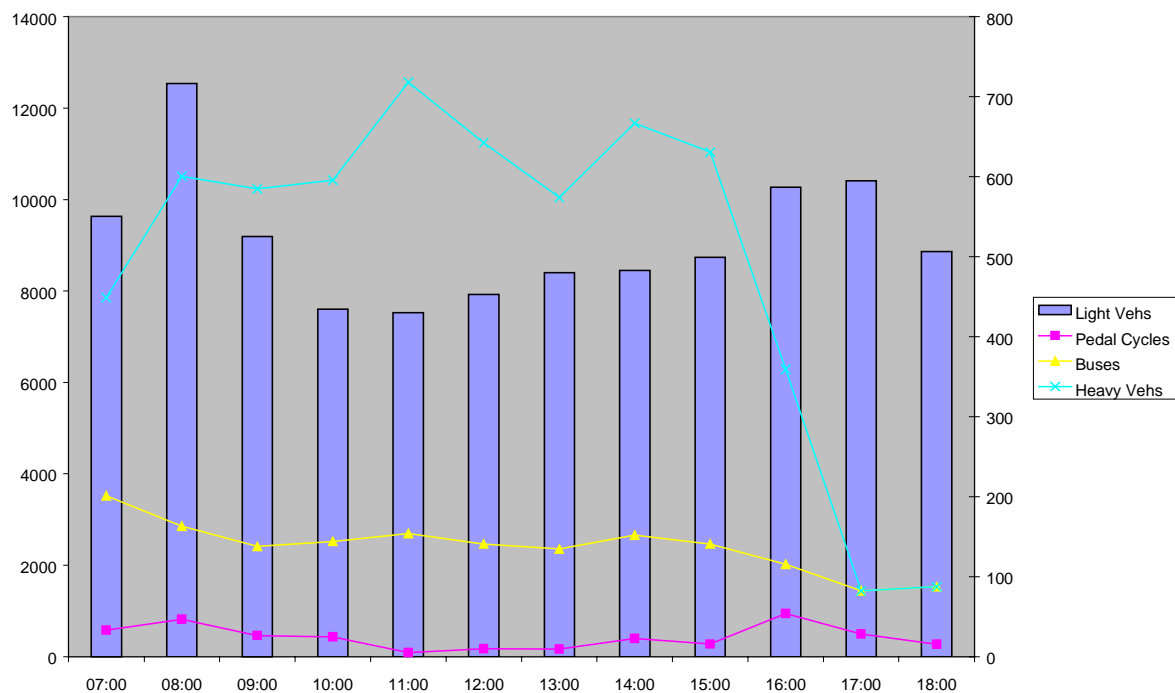


Figure 9 graphically illustrates the figures in Table 8. The lines in the graph are to be read from the right hand axis and the bar (light vehicles) from the left hand axis. The corresponding figures for manually counted outbound vehicles are given in Table 9, and estimated figures in Table 10 and Figure 10.

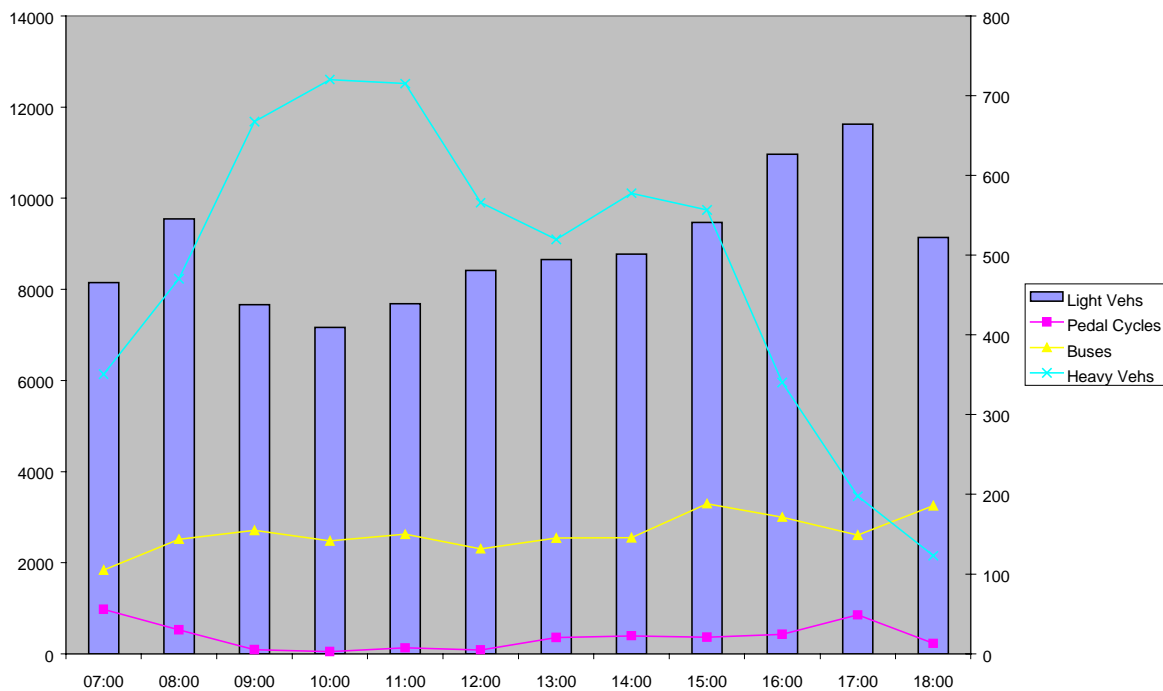
Table 9 Summary of outbound modal data from manual surveys

Time Starting	Total Vehs	Pedal Cycles	Bus & Coach	Total Light Vehicles	Total Heavy Vehicles
07:00	4,199	27(0.64%)	51(1.21%)	3,951(94.09%)	170(4.05%)
08:00	4,395	13(0.30%)	62(1.41%)	4,117(93.67%)	203(4.62%)
09:00	3,346	2(0.06%)	61(1.82%)	3,020(90.26%)	263(7.86%)
10:00	3,065	1(0.03%)	54(1.76%)	2,735(89.23%)	275(8.97%)
11:00	3,541	3(0.08%)	62(1.75%)	3,180(89.81%)	296(8.36%)
12:00	3,738	2(0.05%)	54(1.44%)	3,450(92.30%)	232(6.21%)
13:00	3,666	8(0.22%)	57(1.55%)	3,397(92.66%)	204(5.56%)
14:00	3,789	9(0.24%)	58(1.53%)	3,492(92.16%)	230(6.07%)
15:00	3,914	8(0.20%)	72(1.84%)	3,621(92.51%)	213(5.44%)
16:00	4,225	9(0.21%)	63(1.49%)	4,028(95.34%)	125(2.96%)
17:00	4,439	18(0.41%)	55(1.24%)	4,293(96.71%)	73(1.64%)
18:00	3,616	5(0.14%)	71(1.96%)	3,493(96.90%)	47(1.30%)
Total	45,933	105(0.23%)	720(1.57%)	42,777(93.13%)	2,331(5.07%)

Table 10 Estimated outbound mode of transport figures

Time Starting	No. Vehs counted automatically	estimated ped cyc	estimated bus	estimated light vehs	estimated heavy vehs
07:00	8,659	56	105	8,148	351
08:00	10,186	30	144	9,542	470
09:00	8,489	5	155	7,662	667
10:00	8,028	3	141	7,164	720
11:00	8,554	7	150	7,682	715
12:00	9,113	5	132	8,411	566
13:00	9,337	20	145	8,652	520
14:00	9,517	23	146	8,771	578
15:00	10,230	21	188	9,464	557
16:00	11,501	24	171	10,965	340
17:00	12,015	49	149	11,620	198
18:00	9,457	13	186	9,135	123
Total	115,086	256	1,812	107,215	5,804

Figure 10 Estimated outbound mode of transport figures



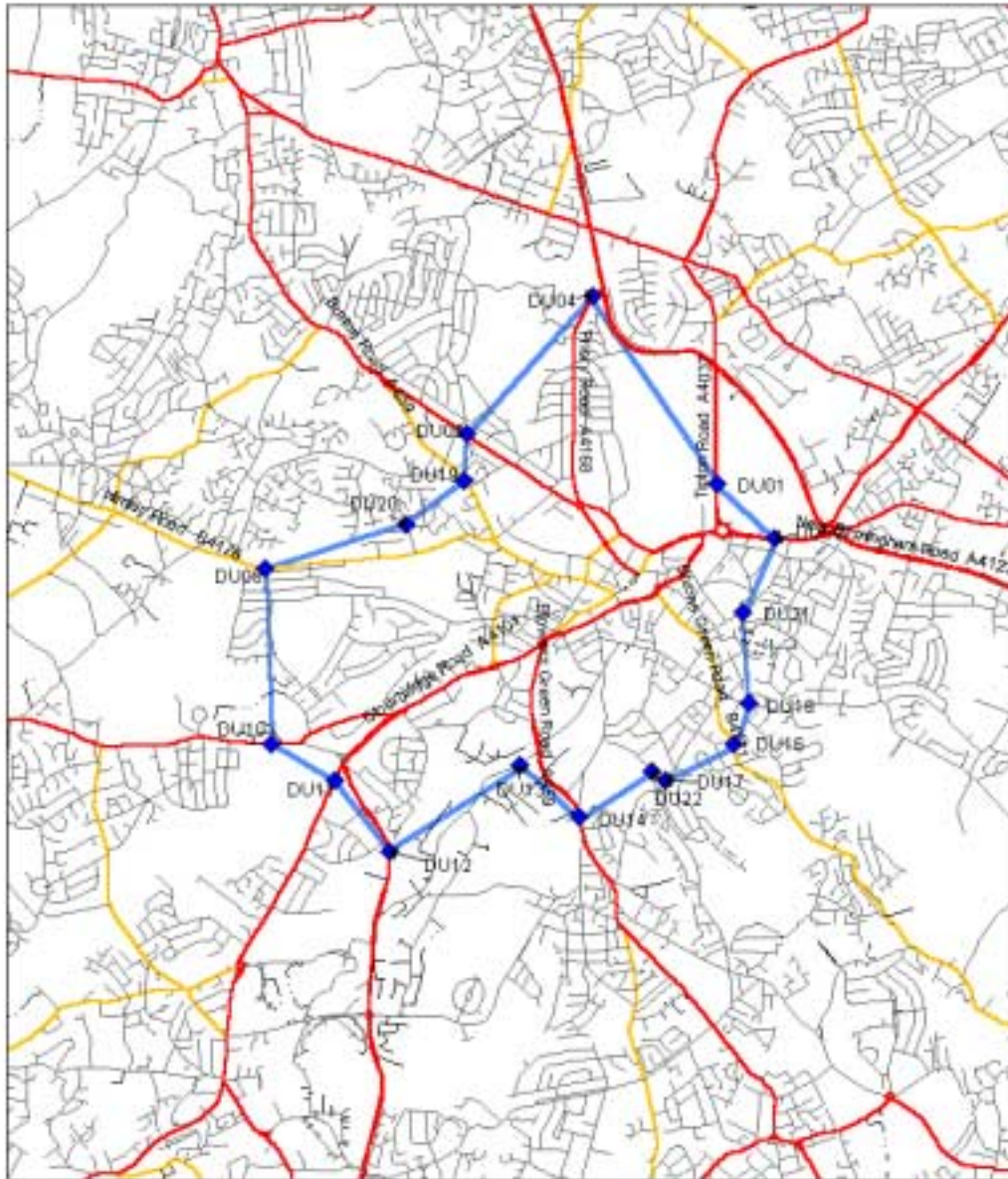
6 Appendix 1 Position Of Cordon Sites

The sites were chosen so as to create a closed cordon. The sites remain in the same position as those carried out manually in previous years. The map overleaf shows roughly where the sites were positioned, a description of the exact locations are given below.

Table A1. 1 Description of the Position of the Cordon Sites

Site	Location	Exact Position
DU01	Tipton Road	North of Castle Hill
DU02	Birmingham Road	near Arras Road
DU04	Priory Road	west of New Birmingham Road
DU05	The Broadway	south of Limepit Lane
DU08	Himley Road	east of Milking Bank
DU10	High Street Pensnett	west of Kingswinford Road
DU11	Stourbridge Road	north of Holly Street
DU12	Pedmore Road	south of Cochrane Road
DU13	Peartree Lane	west of Cinder Bank
DU14	Cinder Bank	south of Jubilee Terrace
DU16	New Rowley Road	south of Oakham Avenue
DU17	Buffery Road	between Lister Road and School Drive
DU18	Oakham Road	between Bennetts Hill and Oakham Avenue
DU19	Highland Road	between Dibdale Road and Nith Place
DU20	Dibdale Street	between Newey Street and Corser Street
DU21	St. Johns Road	between Price Street and Alton Grove
DU22	Lister Road	between Buffery Road and Fairfield Road

Figure 11 Location of Dudley ATC Sites



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 \Bdc01\users\47995\monitoring\Dudley_Cordon_2000\du01a.wm

Title Position of sites within Dudley Cordon					 Mott MacDonald Limited Canterbury House 85 Newhall Street, Birmingham, B3 1LZ Telephone 0121-237-4002 Fax 0121-237-4003	
Date	Drawn	Checked	Approved	Status	Drawing no.	Rev.
11/01/01	JS	BWS	BWS	Final	47995/BA07/01	A

7 Appendix 2 Comparison of Manual and Automatic Counts

Four of the automatic sites were manually surveyed for the 12 hour period (0700 – 1900) on one weekday.

The figures presented here compare the results of the manual surveys with the results of the automatic surveys (average weekday) for certain time periods.

Table A2.1 DU02 Birmingham Road

	INBOUND		OUTBOUND	
	Manual	Automatic	Manual	Automatic
Time Period				
07.30 - 09.30	2,881	2,874	2,692	2,911
16.30 - 18.30	3,495	3,266	3,454	2,634
07.00 - 19.00	17,455	17,289	17,655	17,089

Table A2.2 DU04 Priory Road

	INBOUND		OUTBOUND	
	Manual	Automatic	Manual	Automatic
Time Period				
07.30 - 09.30	1,245	1,250	1,396	1,291
16.30 - 18.30	1,028	1,454	1,399	1,338
07.00 - 19.00	5,674	6,370	6,065	5,938

Table A2.3 DU10 High Street - Pensnett

	INBOUND		OUTBOUND	
	Manual	Automatic	Manual	Automatic
Time Period				
07.30 - 09.30	2,661	2,529	1,537	1,989
16.30 - 18.30	1,534	1,511	2,362	2,357
07.00 - 1900	10,844	10,541	11,074	12,724

Table A2.4 DU14 Cinder Bank

	INBOUND		OUTBOUND	
	Manual	Automatic	Manual	Automatic
Time Period				
07.30 - 09.30	2,020	2,298	2,100	2,160
16.30 - 18.30	2,147	2,503	2,022	2,106
07.00 - 1900	11,550	12,150	11,139	11,346

8 Appendix 3 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. Pedal Cyc	Est. Bus & Coach	Est. Light Vehs	Est. Heavy Vehs
07:00	3747	12	73	3499	163	0.32%	1.95%	93.38%	4.35%	10315	33	201	9632	449
08:00	4579	16	56	4301	206	0.35%	1.22%	93.93%	4.50%	13347	47	163	12537	600
09:00	3756	10	52	3473	221	0.27%	1.38%	92.47%	5.88%	9938	26	138	9189	585
10:00	3367	10	58	3065	240	0.30%	1.72%	91.03%	7.13%	8357	25	144	7607	596
11:00	3441	2	63	3082	294	0.06%	1.83%	89.57%	8.54%	8403	5	154	7526	718
12:00	3527	4	57	3206	260	0.11%	1.62%	90.90%	7.37%	8717	10	141	7924	643
13:00	3797	4	56	3498	239	0.11%	1.47%	92.13%	6.29%	9119	10	134	8401	574
14:00	3733	9	61	3395	268	0.24%	1.63%	90.95%	7.18%	9291	22	152	8450	667
15:00	3655	6	54	3353	242	0.16%	1.48%	91.74%	6.62%	9528	16	141	8741	631
16:00	4208	21	45	4002	140	0.50%	1.07%	95.10%	3.33%	10797	54	115	10268	359
17:00	4191	11	32	4056	32	0.26%	0.76%	96.78%	0.76%	10758	28	82	10411	82
18:00	3522	6	34	3447	34	0.17%	0.97%	97.87%	0.97%	9057	15	87	8864	87
Total	45523	111	641	42377	2339	0.24%	1.41%	93.09%	5.14%	117627	291	1653	109551	5991
10-12 Total	6808	12	121	6147	534					16760	30	298	15134	1314
07:00	682	4	21	623	34	0.59%	3.08%	91.35%	4.99%	1948	11	60	1779	97
07:15	808	3	18	744	43	0.37%	2.23%	92.08%	5.32%	2277	8	51	2097	121
07:30	1013	3	21	944	45	0.30%	2.07%	93.19%	4.44%	2862	8	59	2667	127
07:45	1244	2	13	1188	41	0.16%	1.05%	95.50%	3.30%	3228	5	34	3083	106
08:00	1140	5	17	1059	59	0.44%	1.49%	92.89%	5.18%	3283	14	49	3050	170
08:15	1104	3	9	1044	48	0.27%	0.82%	94.57%	4.35%	3347	9	27	3165	146
08:30	1159	4	16	1091	48	0.35%	1.38%	94.13%	4.14%	3433	12	47	3232	142
08:45	1176	4	14	1107	51	0.34%	1.19%	94.13%	4.34%	3284	11	39	3091	142
09:00	1004	3	13	940	48	0.30%	1.29%	93.63%	4.78%	3017	9	39	2825	144
09:15	967	4	12	899	52	0.41%	1.24%	92.97%	5.38%	2331	10	29	2167	125
Total	10297	35	154	9639	469	0.34%	1.50%	93.61%	4.55%	29010	99	434	27155	1321
16:30	1051	9	12	1006	24	0.86%	1.14%	95.72%	2.28%	2802	24	32	2682	64
16:45	1070	5	7	1032	26	0.47%	0.65%	96.45%	2.43%	2697	13	18	2601	66
17:00	1056	3	11	1013	29	0.28%	1.04%	95.93%	2.75%	2857	8	30	2741	78
17:15	1038	5	10	992	31	0.48%	0.96%	95.57%	2.99%	2724	13	26	2603	81
17:30	1144	3	6	1113	22	0.26%	0.52%	97.29%	1.92%	2670	7	14	2598	51
17:45	953	0	5	938	10	0.00%	0.52%	98.43%	1.05%	2507	0	13	2468	26
18:00	959	3	8	937	11	0.31%	0.83%	97.71%	1.15%	2442	8	20	2386	28
18:15	933	2	13	909	9	0.21%	1.39%	97.43%	0.96%	2319	5	32	2259	22
Total	8204	30	72	7940	162	0.37%	0.88%	96.78%	1.97%	21018	77	185	20338	417

Outbound

Start Time

07:00	4199	27	51	3951	170	0.64%	1.21%	94.09%	4.05%	8659	56	105	8148	351
08:00	4395	13	62	4117	203	0.30%	1.41%	93.67%	4.62%	10186	30	144	9542	470
09:00	3346	2	61	3020	263	0.06%	1.82%	90.26%	7.86%	8489	5	155	7662	667
10:00	3065	1	54	2735	275	0.03%	1.76%	89.23%	8.97%	8028	3	141	7164	720
11:00	3541	3	62	3180	296	0.08%	1.75%	89.81%	8.36%	8554	7	150	7682	715
12:00	3738	2	54	3450	232	0.05%	1.44%	92.30%	6.21%	9113	5	132	8411	566
13:00	3666	8	57	3397	204	0.22%	1.55%	92.66%	5.56%	9337	20	145	8652	520
14:00	3789	9	58	3492	230	0.24%	1.53%	92.16%	6.07%	9517	23	146	8771	578
15:00	3914	8	72	3621	213	0.20%	1.84%	92.51%	5.44%	10230	21	188	9464	557
16:00	4225	9	63	4028	125	0.21%	1.49%	95.34%	2.96%	11501	24	171	10965	340
17:00	4439	18	55	4293	73	0.41%	1.24%	96.71%	1.64%	12015	49	149	11620	198
18:00	3616	5	71	3493	47	0.14%	1.96%	96.60%	1.30%	9457	13	186	9135	123
Total	45933	105	720	42777	2331	0.23%	1.57%	93.13%	5.07%	115086	256	1812	107215	5804
10-12 Total	6606	4	116	5915	571					16582	10	291	14846	1435
07:00	809	4	13	760	32	0.49%	1.61%	93.94%	3.96%	1689	8	27	1587	67
07:15	1039	8	14	964	53	0.77%	1.35%	92.78%	5.10%	2069	16	28	1920	106
07:30	1080	5	12	1017	46	0.46%	1.11%	94.17%	4.26%	2288	11	25	2155	97
07:45	1271	10	12	1210	39	0.79%	0.94%	95.20%	3.07%	2613	21	25	2488	80
08:00	1105	5	18	1039	43	0.45%	1.63%	94.03%	3.89%	2547	12	41	2395	99
08:15	1154	4	12	1095	43	0.35%	1.04%	94.89%	3.73%	2562	9	27	2431	95
08:30	1129	1	19	1043	66	0.09%	1.68%	92.38%	5.85%	2582	2	43	2385	151
08:45	1007	3	13	940	51	0.30%	1.29%	93.35%	5.06%	2495	7	32	2329	126
09:00	910	1	15	824	70	0.11%	1.65%	90.55%	7.69%	2292	3	38	2075	176
09:15	870	0	19	794	57	0.00%	2.18%	91.26%	6.55%	2117	0	46	1932	139
Total	10374	41	147	9686	500	0.40%	1.42%	93.37%	4.82%	23254	88	333	21696	1137
16:30	1086	1	12	1037	36	0.09%	1.10%	95.49%	3.31%	2952	3	33	2819	98
16:45	1004	2	15	964	23	0.20%	1.49%	96.02%	2.29%	2987	6	45	2868	68
17:00	1238	6	12	1194	26	0.48%	0.97%	96.45%	2.10%	3144	15	30	3032	66
17:15	1101	4	11	1072	14	0.36%	1.00%	97.37%	1.27%	2992	11	30	2913	38
17:30	1157	8	15	1113	21	0.69%	1.30%	96.20%	1.82%	3012	21	39	2897	55
17:45	943	0	17	914	12	0.00%	1.80%	96.92%	1.27%	2867	0	52	2779	36
18:00	943	2	11	915	15	0.21%	1.17%	97.03%	1.59%	2777	6	32	2695	44
18:15	1003	2	23	967	11	0.20%	2.29%	96.41%	1.10%	2463	5	56	2375	27
Total	8475	25	116	8176	158	0.29%	1.37%	96.47%	1.86%	23194	66	317	22378	433

9 Appendix 4 Estimates of Persons From Occupancy Data

Total Inbound

Start Time	Number of vehicles with					Total Veh	Total Pass	Ave Occupancy	Automatically	Estimated	Estimated	Est. Light Vehs.	ExAve Occ	F+C	Estimated	Est People Heavy Vehs
	1	2	3	4	5				Counted Vehicles	Number of Buses	Pedal Cycles			Est People Light Vehs + Ped Cyc	Heavy Vehs	
Occupants																
07:00	498	71	4	0	1	574	657	1.14	1948	60	11	1779	2037	2048	97	97
07:15	662	105	9	4	0	780	915	1.17	2277	51	8	2097	2460	2468	121	121
07:30	789	140	15	3	0	947	1126	1.19	2862	59	8	2667	3171	3180	127	138
07:45	1021	172	16	3	1	1213	1430	1.18	3228	34	5	3083	3634	3639	106	118
08:00	958	139	16	1	2	1116	1298	1.16	3283	49	14	3050	3547	3561	170	180
08:15	939	139	17	0	1	1096	1273	1.16	3347	27	9	3165	3676	3685	146	154
08:30	943	162	18	8	3	1134	1368	1.21	3433	47	12	3232	3898	3910	142	163
08:45	880	171	15	2	0	1068	1275	1.19	3284	39	11	3091	3690	3702	142	148
09:00	808	175	14	4	1	1002	1221	1.22	3017	39	9	2825	3442	3451	144	151
09:15	740	169	14	1	1	925	1129	1.22	2331	29	10	2167	2645	2655	125	137
07:30-09:30	7078	1267	125	22	9	8501	10120	1.19	24785	324	79	23279	27705	27783	1103	1190
09:30	744	205	29	4	3	985	1272	1.29								
09:45	647	174	19	6	3	849	1091	1.29								
10:00	608	195	20	6	1	830	1087	1.31								
10:15	507	175	21	7	3	713	963	1.35								
10:30	527	175	21	3	1	727	957	1.32								
10:45	534	165	17	3	1	720	932	1.29								
11:00	538	176	18	2	1	735	957	1.30								
11:15	564	172	16	2	2	756	974	1.29								
11:30	533	170	15	3	1	722	935	1.30								
11:45	598	153	17	5	2	775	985	1.27								
10:00-12:00	4409	1381	145	31	12	5978	7790	1.30								
12:00	583	133	17	2	0	735	908	1.24								
12:15	605	153	20	5	0	783	991	1.27								
07:00-12:30	15226	3489	368	74	28	19185	23744	1.24								

Total Outbound

Start Time	Number of vehicles with					Total Veh	Total Pass	Ave Occupancy	Automatically	Estimated	Estimated			F+C	Estimated	
	1	2	3	4	5				Counted Vehicles	Number of Buses	Pedal Cycles	Est. Light Vehs.	ExAve Occ	Est People Light Vehs + Ped Cyc	Heavy Vehs	Est People Heavy Vehs
	Occupants															
07:00	864	81	9	0	0	954	1053	1.10	1689	27	8	1587	1751	1760	67	71
07:15	750	96	3	1	0	850	955	1.12	2069	28	16	1920	2157	2173	106	107
07:30	923	118	9	4	0	1054	1202	1.14	2288	25	11	2155	2457	2468	97	106
07:45	937	114	12	4	0	1067	1217	1.14	2613	25	21	2488	2837	2858	80	87
08:00	975	137	11	2	0	1125	1290	1.15	2547	41	12	2395	2746	2758	99	107
08:15	1025	126	15	3	1	1170	1339	1.14	2562	27	9	2431	2782	2791	95	117
08:30	806	116	15	8	4	949	1135	1.20	2582	43	2	2385	2853	2855	151	159
08:45	853	115	12	3	3	986	1146	1.16	2495	32	7	2329	2707	2714	126	138
09:00	778	113	8	5	0	904	1048	1.16	2292	38	3	2075	2406	2409	176	186
09:15	690	134	9	1	2	836	999	1.19	2117	46	0	1932	2309	2309	139	153
07:30-09:30	6987	973	91	30	10	8091	9376	1.16	19496	278	64	18190	21097	21161	965	1053
09:30	639	124	9	4	1	777	935	1.20								
09:45	570	119	11	6	0	706	865	1.23								
10:00	468	126	10	2	0	606	758	1.25								
10:15	465	90	11	5	0	571	698	1.22								
10:30	564	114	9	3	0	690	831	1.20								
10:45	567	141	14	6	1	729	920	1.26								
11:00	482	152	22	8	0	664	884	1.33								
11:15	529	193	25	4	0	751	1006	1.34								
11:30	530	201	23	1	1	756	1010	1.34								
11:45	592	171	23	8	0	794	1035	1.30								
10:00-12:00	4197	1188	137	37	2	5561	7142	1.28								
12:00	622	191	27	8	3	851	1132	1.33								
12:15	630	175	24	4	3	836	1083	1.30								
07:00-12:30	15259	2947	311	90	19	18626	22541	1.21								