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LEOMINSTER

TRAFFIC SURVEY REPORT

MT/NWK/SC/558/HO

November 2007

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1. STUDY BACKGROUND

1.1 Morgan Tucker has been commissioned by Leominster Town Council to carry out a comprehensive traffic study in the town of Leominster in Herefordshire, the main purpose of the project being to identify the volume of traffic which would potentially use a new southern bypass of the town, were it to be constructed at some time in the future. In addition, the brief for the study also includes confirming what proportion of traffic could be removed from the route in the town centre known as Bargates as a direct result of the construction of the bypass. The Town Council are particularly concerned about this section of the town centre road network, as it currently suffers from traffic congestion at peak times, and is likely to experience an increase in daily traffic flows in the future as a result of the completion of a large residential development to the west of the town at Baron's Cross.

1.2 Representatives of Morgan Tucker were initially invited to attend a meeting in Leominster in early September to discuss the Town Council's requirements for the study. Following this meeting, which included a site visit to Bargates and other key locations within the town centre to review existing traffic conditions, a written proposal identifying the necessary data collection requirements was put together for their consideration. This proposal was subsequently approved by the Town Council in early October and confirmed the brief for the study. The data collection phase of the project then proceeded during the third week in October followed by the detailed analysis of the recorded traffic data in the first half of November 2007.

1.3 This final report of survey firstly provides detailed information on the traffic survey methodology adopted by Morgan Tucker in order to satisfy the requirements of the study brief. This is set out in Chapter 2 of the report. The extent of the data collection exercise is also discussed and information is presented on the various survey techniques adopted and their purpose in the overall context of the study. This is followed in Chapter 3 by a review of the key results from each element of the data collection exercise, with graphs and diagrams provided which illustrate the main findings. In Chapter 4, an assessment of the impact of the provision of the bypass is undertaken using the information identified in the data collection exercise. This includes the scale of the reductions in traffic which would be experienced on Bargates today were the southern route to be completed. Consideration is then given in Chapter 5 to the current and future air quality situation on Bargates and how the provision of a southern bypass would significantly reduce the levels of nitrogen dioxide within the declared Air Quality Management Area (AQMA) which covers the section of Bargates adjacent to the Cursneh Road / Dishley Street traffic signal controlled junction. Finally in Chapter 6, the overall study is summarised and answers are provided to the critical questions identified in the brief provided by the Town Council.

1.4 Further technical information, maps etc. are provided at the rear of the report in a series of Appendices.

2. DATA COLLECTION EXERCISE

2.1 Introduction

2.1.1 As discussed at the initial fact finding meeting with representatives of Leominster Town Council in September 2007, Morgan Tucker decided to gather the required survey data, which could be used to firstly establish the existing traffic movements around the town and subsequently confirm the possible volume of traffic which might use a southern bypass route, using a combination of traffic data collection methods including the following: -

- Vehicle registration number surveys
- Automatic traffic counters
- A high mast video survey
- Journey time surveys

2.1.2 The vehicle registration number surveys were carried out in order to verify the routeing patterns of traffic through the town and consequently confirm the number of vehicles which would potentially use a southern bypass. Automatic traffic counters were installed at key locations on the outskirts of the town to firstly, provide an accurate estimate of the total daily traffic movements at the sites where the registration number surveys were undertaken and secondly, to identify the daily variation in traffic flows on the principal routes around Leominster. The high mast video survey identified the turning movements and classification of vehicles at the Bargates / Cursneh Road / Dishley Street / West Street junction in the centre of town, over a normal 12 hour weekday. This information was subsequently used in the assessment of how many vehicles would be removed from Bargates as a result of the construction of the bypass. Finally, the journey time surveys provided information on the average time it takes a driver to travel between the various registration number survey points at peak times of the day. This information was needed in order to accurately identify the matched pairs of registration numbers from the various monitoring sites around the town.

2.1.3 Further details of each of these elements of the data collection exercise, including the methodology adopted and any unforeseen issues which arose on the day of the survey, are documented in the following sections.

2.2 Registration Number Surveys

2.2.1 The most critical part of the data collection exercise in respect of identifying what effect a proposed bypass would have on the town centre traffic was the monitoring of registration number surveys at various locations on the principal road network around Leominster. A desktop exercise was initially carried out to provide a preliminary assessment of how strategic long distance traffic currently travels through the town i.e. what alternative route options are available to them. On the basis of the outcome of this exercise, site inspections were subsequently undertaken at the key locations on the edge of the town to establish practical safe sites for the surveys to be carried out. .

2.2.2 In order to provide a complete and accurate picture of the potentially by-passable traffic currently travelling through the town centre, it was decided in the light of the desktop appraisal to carry out registration number surveys at the following six locations in and around the outskirts of Leominster :-

- A44 Worcester Road to the east of the A49/A44 roundabout junction.
- B4361 Hereford Road just south of the Southern Avenue junction
- Worcester Road just east of the Southern Avenue roundabout
- A44 Mill Street just east of Bridge Street junction
- A44 Monkland Road just west of Baron’s Cross Road junction.
- B4360 Cholstrey Road just west of Baron’s Cross Road junction.

Drawing number **MT/NWK/558/001** in **Appendix A,** attached towards the rear of the report, provides a map illustrating the locations of these surveys in the context of the town and its surroundings. It should be noted that during initial discussions the possibility of monitoring a specific ‘rat run’ in the centre of the town was raised, however it was concluded during the desktop appraisal that no beneficial information supporting the bypass assessment process would be gained by undertaking surveys at this location.

2.2.3 The vehicle registration number surveys were carried out between the hours of 08:00 and 10:00 and 16:00 to 18:00 on Wednesday 17 October 2007. The two-hour periods were chosen in the morning and afternoon to ensure that the busiest hours were covered. October is also regarded as a ‘neutral’ month by the Department for Transport, which means that the results of travel surveys carried out in this month are representative of typical conditions and can be justifiably applied in bypass feasibility studies. The analysis of the automatic traffic counter data also confirmed that the Wednesday represented a typical weekday, with no unusual events or incidents influencing the traffic flow in the area.

2.2.4 During each peak period, the registration numbers of vehicles travelling in both directions at each survey location were recorded in 15-minute intervals. This was to ensure that matching registration numbers could be accurately identified during the analysis phase of the exercise. Two enumerators were situated at each of the six survey locations, with each enumerator responsible for vehicles travelling in one direction. The enumerators were instructed to record the full registration number of the vehicle whenever possible to ensure the maximum degree of accuracy in the analysis phase of the exercise and also to record the presence of any vehicles where the number plate was missed due to problems with visibility, dirty plates etc. During busy periods, the enumerators were able to help each other by working in pairs, with one reading out the number plate as it passed, whilst the other noted the number down on the form. This ensured a very high sample rate even at the busiest locations, with very few vehicles being missed completely.

2.2.5 **Plates 1, 2,** and **3** below show the surveys being conducted at three of the selected sites around the town. It can be seen that the enumerators were carefully positioned at each location so as to monitor as high a sample of vehicles as possible.

Plate 1- Cholstrey Road/Baron Cross Road Junction

Plate 2 - A44 Worcester Road / A49 Roundabout

Plate 3 - A44 Mill Street/Broad Street Roundabout

2.2.6 An example of a completed registration survey form used in the survey is included at the rear of the report in **Appendix B**.

2.3 Automatic Traffic Counters

2.3.1 In order to provide supplementary information on the daily variability of traffic flows on various roads around the town and also to confirm the hourly volumes of traffic outside of the peak hours on the key routes where the registration numbers were recorded, automatic traffic counters (ATC's) were installed on Sunday 14th October 2007 at the following four locations on the outskirts of Leominster:-

- B4360 Cholstrey Road west of the Baron's Cross junction.
- A44 Monkland Road west of the Baron's Cross junction.
- A44 Worcester Road to the east of the A49/A44 roundabout junction.
- B4361 Hereford Road just south of the Southern Avenue junction

2.3.2 Drawing number **MT/NWK/558/001** in **Appendix A** identifies the locations of each automatic traffic counter and confirms their position relative to the registration number surveys.

2.3.3 The counters used at each site were set up to record the class of vehicle i.e. car, heavy goods vehicle, van etc. and total traffic volumes passing along the road in both directions on an hourly basis. Pneumatic road tubes were installed across the carriageway at each site and a counter attached to the tubes at a secure position in the verge. The counter sites were carefully chosen to ensure that their installation and removal could be carried out safely and vehicle speeds were compatible with the limits set for achieving accurate results.

2.3.4 The automatic traffic counters were removed on Sunday 21st October, thus providing a full week of classified vehicle data at each site. Unfortunately the tubes attached to the counter situated on Cholstrey Road were found to have been broken at some time prior to the survey day on the Wednesday, but these were repaired on the survey day and subsequently provided continuous data for the rest of the week.

2.4 Video Survey

2.4.1 The primary output from the traffic study, as agreed with Leominster Town Council, is to evaluate the impact the provision of a southern bypass/ relief road will have on traffic levels on Bargates, one of the key routes in the centre of the town which currently experiences peak hour congestion. Accordingly, it was a key requirement of the data collection phase of the project to monitor the traffic movements at the Bargates / Cursneh Road / West Street traffic signal controlled crossroads so as to provide current traffic flow information on which the bypass impact assessment could be based.

2.4.2 The method considered to be the most appropriate and accurate to undertake the data collection exercise at the crossroads was through the use of a high mast video camera survey. The video survey was conducted on the same day as the registration number surveys i.e. the 17th October 2007, to ensure a robust analysis of the bypass impact could be subsequently undertaken. The survey took place between the hours of 07:00 and 19:00 hours, thereby providing a full 12 hour profile of traffic movements at the junction, in line with the Department for Transport's requirements for bypass appraisal. To ensure the unobstructed visibility of all traffic movements at the junction, the van with the integrated high mast camera unit was positioned immediately to the north of the crossroads on an available parking space at the adjacent filling station. Drawing number **MT/NWK/558/001** in **Appendix A** also pinpoints the precise location of the video survey.

2.4.3 The survey was conducted on a continuous basis throughout the 12-hour period without any problems to the monitoring equipment and there were no unusual circumstances or events at the junction during the day that affected the statistical accuracy of the results. The six DVD's containing the full video output from the survey can be made available to the Town Council if required.

2.5 Journey Times

2.5.1 The final element of the data collection exercise involved the recording of journey times on key routes through the town. This information was needed to support the validation of the registration number plate matching exercise by providing an estimate of how long it would take a vehicle to travel from one side of the town to the other via Bargates at peak times.

2.5.2 The journey time monitoring exercise comprised one vehicle being driven through the town in both directions during the time when the registration number surveys were being conducted. Two alternative journey routes were selected between the A44 Worcester Road roundabout and the Baron's Cross Road / Cholstrey Road junction, the first following Worcester Road to the west of the roundabout and then travelling north along Hereford Road towards the town centre and from there out along Bargates towards Baron's Cross. The second route from the A44 Worcester Road headed north along the A49 bypass and then back into town along Mill Street before travelling out again on Bargates to Barons Cross. Both routes are highlighted on Drawing No. **MT/NWK/558/001** in **Appendix A**.

2.5.3 The detailed analysis and results of the range of surveys identified in the previous sections is set out in the following chapter.

3. SURVEY RESULTS

3.1 Registration Number Plate Surveys

3.1.1 As described earlier in the report, vehicle registration number surveys were carried out at the following six locations around the town during the morning and evening peak periods on Wednesday 17 October 2007 :-

- A44 Worcester Road to the east of the A49/A44 roundabout junction.
- B4361 Hereford Road just south of the Southern Avenue junction
- Worcester Road just east of the Southern Avenue roundabout
- A44 Mill Street just east of Bridge Street junction
- A44 Monkland Road just west of Baron's Cross Road junction.
- B4360 Cholstrey Road just west of Baron's Cross Road junction.

In order to provide an accurate analysis of the large number of registration numbers which were recorded over the survey day, Morgan Tucker utilised a bespoke number plate matching technique based on the Microsoft Excel spreadsheet program. The initial phase of the analysis comprised the transcription of every number plate recorded at each of the survey locations into a series of Excel spreadsheets, with one worksheet set up for each fifteen minute period of data. This exercise was undertaken manually, as the identification of the written number plates involved an element of subjective judgement where the occasional number plate could not be easily recognised due to poor handwriting.

3.1.2 Each spreadsheet was then run through a validation process to identify any spurious number plates and a list of entries identified and output which required further manual checking. This included partial number plates, which could not be accurately matched by the software, but which could be identified through visual analysis. A final input file with the full set of validated registration numbers was then entered into the computer and the matching software run to complete the analysis.

3.1.3 In undertaking the matching of the number plates, it was essential to identify the approximate time it would take for a vehicle to cross the town between the various survey locations without stopping, as this would help to substantiate the proportion of actual through traffic which could be expected to use a bypass were one to be built. This information was provided by the journey time surveys as described earlier. The surveys confirmed that the average journey time through the town on various alternative routes was less than 10 minutes. Consequently any number plates, which were matched outside this time threshold, were discarded from the final analysis as they were clearly not genuine through traffic movements and not assignable to a possible southern bypass.

3.1.4 The output from the analysed data initially comprised a series of journey matrices for each 15 minute interval which identified the numbers of vehicles travelling directly through the town centre between the various survey points during the peak hours. A sample of this matrix output from the number plate matching exercise is presented in **Appendix C** at the rear of the report. These 15 minute interval matrices were then aggregated to provide a final summary trip matrix for the four hours covered in the registration number surveys i.e. between 0800 and 1000 and 1600 to 1800. This matrix was then used to assess the volume of traffic which would use the southern bypass, as described in the next Chapter. The final summary trip matrix for the four hours recorded in the registration number surveys is also provided in **Appendix C** at the rear of the report.

3.1.5 In order to illustrate graphically what the output matrices actually mean in terms of peak hour through movements between the four locations to the south and west of the town centre, a series of graphs have been drawn on a base map of the town. This diagram is presented in Drawing No. **MT/NWK/558/002** attached at **Appendix D** towards the rear of the report**.** The results for each of the four sites are outlined in more detail in the following sub-sections.

A44 Worcester Road to the east of the A49 roundabout.

3.1.6 According to the automatic traffic counter which was installed immediately adjacent to the registration number plate recording site, a total of 283 vehicles were recorded travelling west towards Leominster during the busiest AM peak hour i.e. 0800-0900. This practically matches the 280 number plates which were identified in the survey, i.e. the sample rate was almost 100% at this site. In terms of the vehicle destinations, 51 of these were identified travelling through the town to the B4360 Cholstrey Road and 13 were picked up at the A44 Monkland Road. These movements, which represent almost 23% of the total traffic heading westbound, currently pass through the town without stopping. Therefore they would use a southern bypass were one to be provided. In addition, 11 vehicles were identified heading south from the town on Hereford Road. The remaining 208 vehicles were not matched at any of the survey points indicating they had destinations either within the town or were travelling along the A49 to the north and south of Leominster. Similarly, during the busiest PM peak hour, i.e. between 1600 and 1700, a total of 246 vehicles were identified heading west towards the A49 roundabout. As in the AM peak, the registration number sample rate was almost 100%. On this occasion, 43 vehicles were confirmed as travelling to the B4360 Cholstrey Road, with 11 picked up at the A44 Monkland Road. 18 headed southbound along Hereford Road from the town centre. On this occasion the proportion of through traffic which would use the southern bypass was equivalent to 22% of the total flow westbound on Leominster Road. Analysis of the other two hours adjacent to the busiest peak periods also confirmed similar through trip proportions, although actual numbers were lower.

Hereford Road south of Southern Avenue

3.1.7 Registration numbers of all vehicles travelling in both directions were recorded at Hereford Road, immediately south of the Southern Avenue junction. An automatic traffic counter was also installed in close proximity to the survey site to monitor daily variations and conditions throughout the day. As before, the sample rate achieved at this site was very high with practically all registrations recorded in both directions. In the AM peak hour between 0800 and 0900, a total of 234 vehicles were monitored travelling northbound towards the town centre. Of those, 12 were traced to the B4360 Cholstrey Road and 10 to the A44 Monkland Road within a 10-minute timeframe i.e. 9.4 % of the total vehicle flow. A further 8 were identified travelling to the A44 Worcester Road. The remaining 204 vehicles were not traced, meaning they probably had destinations within the town. During the busiest PM peak hour, which was between 1700 and 1800, a total of 310 vehicles were identified travelling northbound. Of those, 21 were picked up again at the B4360 Cholstrey Road and 15 at the A44 Monkland Road giving a bypassable figure of 11.6% of the total vehicle flow. Analysis of the other two hours monitored in the morning and evening confirmed slightly higher proportions of through traffic the figures ranging from 12% to 15%, however absolute numbers were very similar i.e. around 30 vehicles per hour.

Cholstrey Road to the north west of A44 Baron's Cross junction

3.1.8 As described earlier in the report, the automatic traffic counter on Cholstrey Road failed prior to the survey day due to the road tubes becoming disconnected. This prevented an accurate sampling rate being calculated at this registration number site on the survey day. However the enumerators reported that at least 90% of vehicles were recorded, which was a satisfactory result for a registration plate survey on a reasonably busy road. In terms of the output analysis, during the AM peak hour between 0800 and 0900 a total of 210 registration plates were recorded, with 19 of these identified as through trips to Hereford Road south of the town centre and 29 travelling straight through to the A44 Worcester Road. Therefore the proportion of all traffic travelling eastbound on Cholstrey Road during this hour, which potentially would use a southern bypass, was equal to 22.8%. In the PM peak hour, the total recorded inbound flow was 205 vehicles, with 16 of these travelling south on Hereford Road and 35 heading through the town to the A44 eastbound on Worcester Road. The combined total of 51 through trips is equivalent to almost 25% of the total eastbound traffic flow.

A44 Monkland Road west of Baron's Cross Road junction

3.1.9 The final external site where registration numbers were recorded was on the A44 Monkland Road immediately to the west of the Baron's Cross Road junction. This was the busiest of the four external locations with higher peak hour flows and obtaining a 100% sample rate was not possible. However, enumerators again reported that at least 80% of all vehicles were identified and registrations noted. This is borne out by the automatic traffic counter figures, which despite not being entirely compatible due to the location of the counter on the A44 on the edge of the town, did confirm that higher flows were recorded in the registration survey. This is consistent with the extra traffic which would have joined and exited Monkland Road between the ATC site and the registration number survey site i.e. from the residential development to the west of Monkland Road. The total inbound AM peak hour flow on Monkland Road, as recorded in the registration number survey, was 369 with 19 of these being identified as travelling directly through the town centre to Hereford Road and 10 heading through to the A44 Worcester Road. This is equivalent to less than 8% of the total traffic being assignable to a southern bypass. In the busiest PM peak hour (1700-1800), the total flow was 266 vehicles eastbound with 12 of these travelling to Hereford Road south and 16 to the A44 Worcester Road eastbound. This gave a bypassable traffic flow of around 10% of the total eastbound peak hour flow. Similar proportions were again identified in the other AM and PM peak hour surveys.

3.1.10 The analysis of the other two registration number survey sites, although not significantly affecting the results of the overall traffic assignment to the southern bypass, did provide an indication of the choice of routes taken by drivers heading through the town between the four external locations. These surveys also helped to identify any other potential bypassable traffic e.g. vehicles travelling up the A49 from the south and heading to the west on the A44 or Cholstrey Road, which did not choose to use the most direct route i.e. Hereford Road, but preferred to enter the town via Southern Avenue or Mill Street.

3.2 Automatic Traffic Counter Data

3.2.1 Automatic traffic counters (ATC's) were installed at each of the four external registration survey sites to provide supplementary information on the daily variation in traffic flows and also details of the typical hourly flows outside the surveyed peak periods. In addition, the ATC's were also able to identify the classification breakdown of the vehicles travelling in each direction at each location.

3.2.2 With the exception of the Cholstrey Road counter, which experienced a malfunction soon after it was installed, a full weeks data was recorded at each site. The information was successfully downloaded from each counter at the weekend after the registration number survey and subsequently analysed in the office using appropriate software. **Appendix E** contains the detailed tabular information obtained by each counter, including the Cholstrey Road site, where only a partial week was collected.

3.2.3 Some key outputs from each site are provided below in an easy to understand graphical format. These include the typical breakdown in vehicle classification and also how the total daily flows vary throughout the week. The hourly variation in flows throughout a normal average weekday is also depicted.

Cholstrey Road

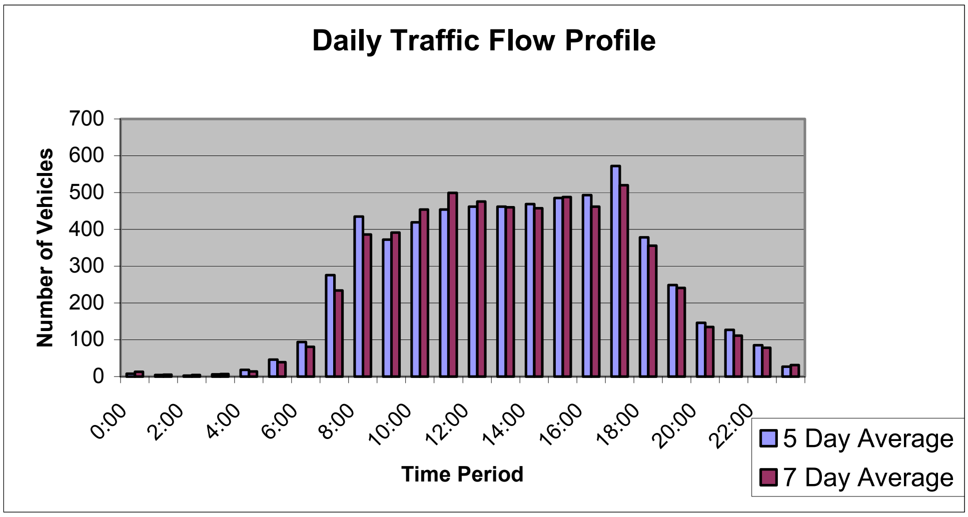


Figure 1 - Cholstrey Road traffic flow profile.

3.2.4 **Figure 1** indicates that the daily traffic flow profile at Cholstrey Road follows a fairly typical pattern with a maximum peak hour between 17:00 and 18:00 in the evening, when the two-way combined flow reaches almost 600 vehicles. There is also a discernible morning peak between 0800 and 0900, however flows throughout the afternoon are actually higher than this peak, which is unusual for a main road on the edge of an urban area. The variation in flows between the 5 day average and the 7 day average is most noticeable in the late morning and early afternoon, with the 7 day average figures being slightly higher. This is probably due to the inclusion of Saturday and Sunday figures for this time period, which is typically busier due to it being the peak time for shopping at weekends. Traffic volumes between 22:00 and 07:00 are very low, with two-way flows being less than 100 vehicles.

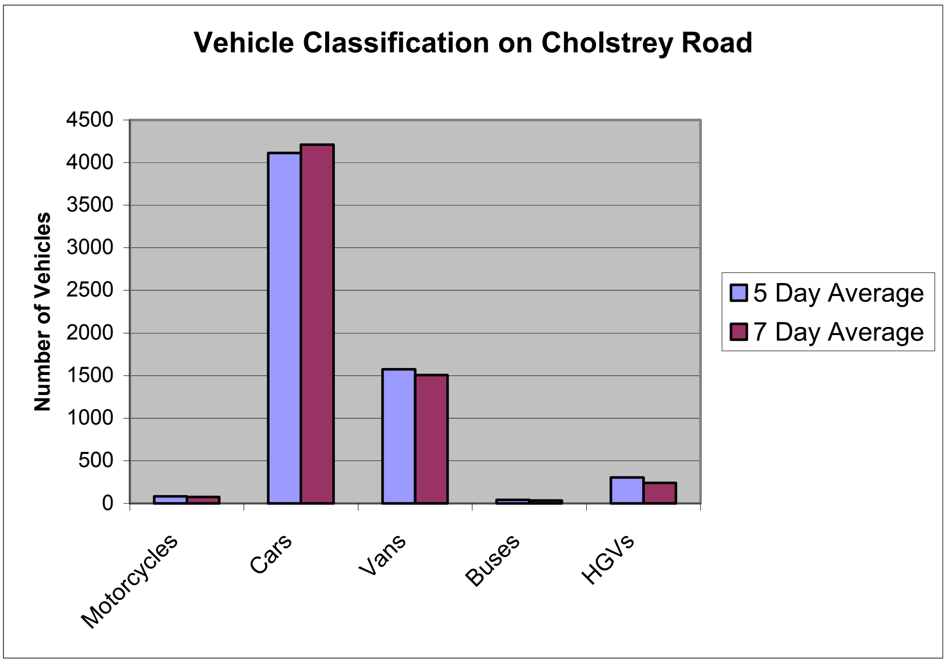


Figure 2 – Vehicle Classification on Cholstrey Road

3.2.4 The bar chart in **Figure 2** highlights the proportion of each principal vehicle type making up the normal daily flow over a weekly average period on Cholstrey Road. Not surprisingly, by far the greatest proportion of vehicles comprises cars, with over 4,000 of these recorded over an average 24-hour period. The second most common vehicle type recorded is vans, with around 1,500 of these travelling along Cholstrey Road in a typical 24-hour period. Based on the 5-day average weekday period i.e. between Monday and Friday, the average number of HGVs which travel along Cholstrey Road to enter and exit Leominster is around 300. From the chart it can be seen that this reduces to around 250 over a 7-day average period, indicating that the frequency of HGV’s at the weekend is considerably lower. Motorcycles and buses are the least common vehicle classification to travel along Cholstrey Road, with very low flows recorded by the ATC.

3.2.5 The busiest day of the week for vehicles using Cholstrey Road is on a Thursday with 7177 vehicles being counted. Friday is the second busiest 24-hour period with 7159 vehicles travelling on Cholstrey Road, Tuesday is the quietest day of the week when a total 4385 vehicles use Cholstrey Road. The highest volume of traffic recorded at the weekend is on a Saturday, when 5971 vehicles use Cholstrey Road; on a Sunday there are 4362 vehicles. Figure 3 below refers.

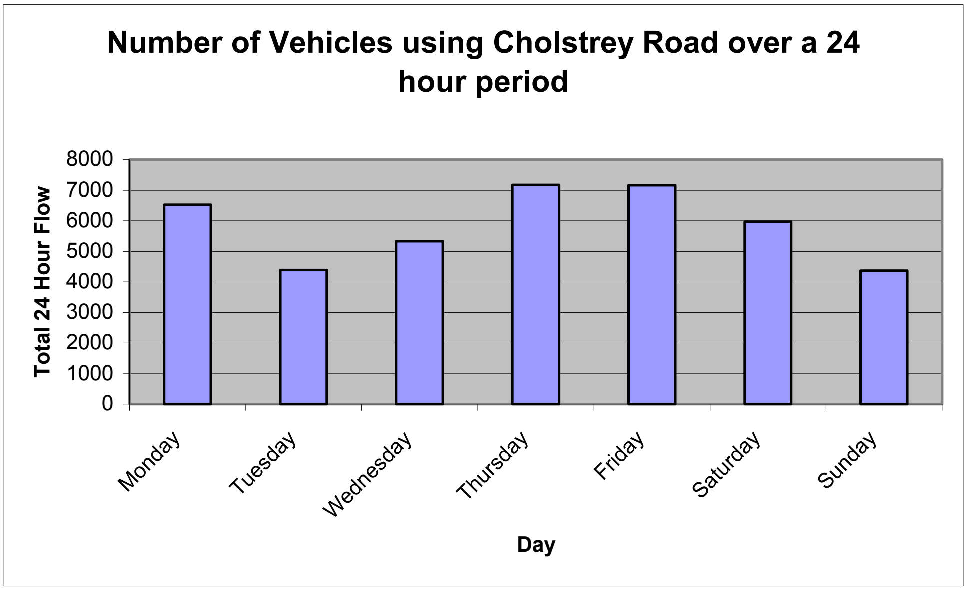


Figure 3 – Cholstrey Road daily variation in flow

A44 Monkland Road

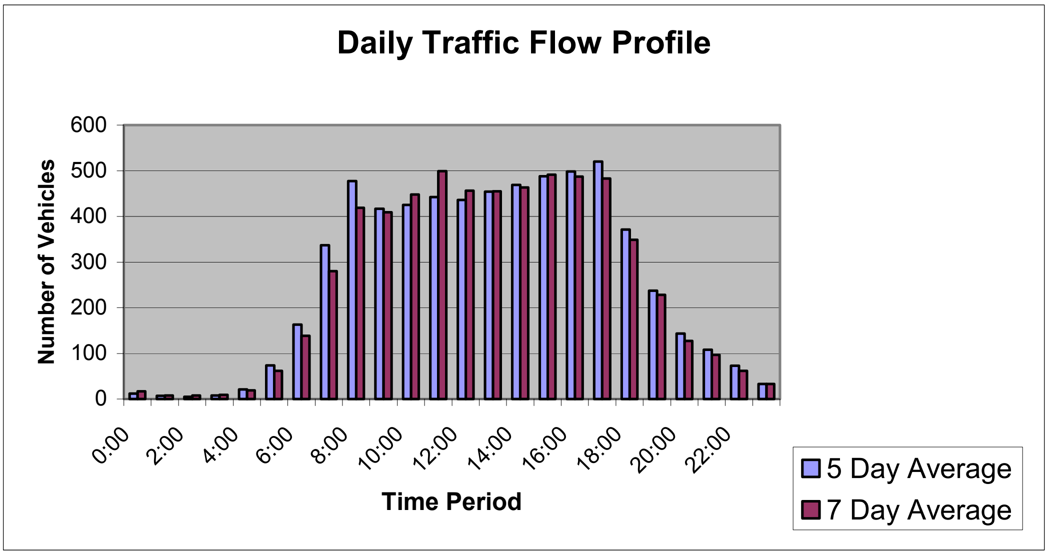


Figure 4 - Monkland Road traffic flow profile.

3.2.6 The A44 Monkland Road follows a very similar daily profile to that described for Cholstrey Road above, with two clear peak hours during the morning and evening, which coincide with commuters travelling to and from work. However where Monkland Road differs from Cholstrey Road, is that flows actually drop slightly between the two peak hours from levels of around 500 vehicles to values between 400 and 500 vehicles. After 18:00, the hourly flows quickly drop off, reducing to below 100 vehicles per hour after 22:00. They then remain at this level until 06:00 in the morning, after which they quickly pick up again reaching a peak between 08:00 and 09:00. The comparison between the 5-day Monday to Friday average and the 7 day average, again highlights how traffic movements are higher in the middle of the day over the weekend, but generally lower for the rest of the day. As for the Cholstrey Road, this is a reflection of the peak period shopper activity on a Saturday and a Sunday.

3.2.7 **Figure 5** illustrates the average number of vehicles by classification using the A44 Monkland Road over a 5-day period and a 7-day period. As previously described for Cholstrey Road, cars make up the largest share of the total traffic flow with an average of 4,500 recorded over a 24-hour period. The number of vans identified by the ATC totalled some 1000 per day with large commercial vehicles accounting for around 500 movements per day. The average daily flow of buses and motorcycles was extremely low.

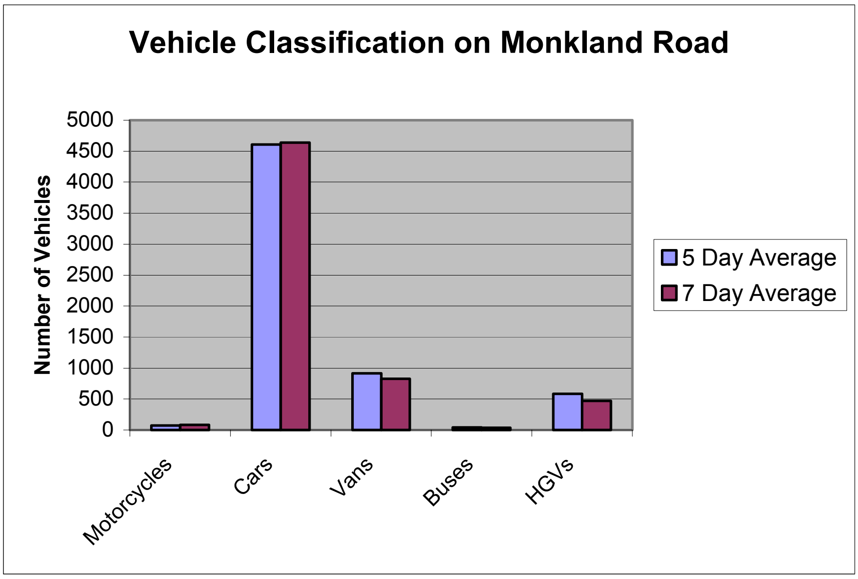


Figure 5 - Classification of vehicles using A44 Monkland Road

3.2.8 **Figure 6** indicates that Friday is the busiest weekday for traffic on Monkland Road. Over a period of 24 hours 7170 vehicles use Monkland Road on a Friday. Wednesday is the quietest day of the week when 2937 vehicles use Monkland Road. Saturday is the busiest day at the weekend for volumes of traffic exiting and entering Leominster along Monkland Road, with a total 5633 vehicles. On a Sunday 4992 vehicles travel along Monkland Road.

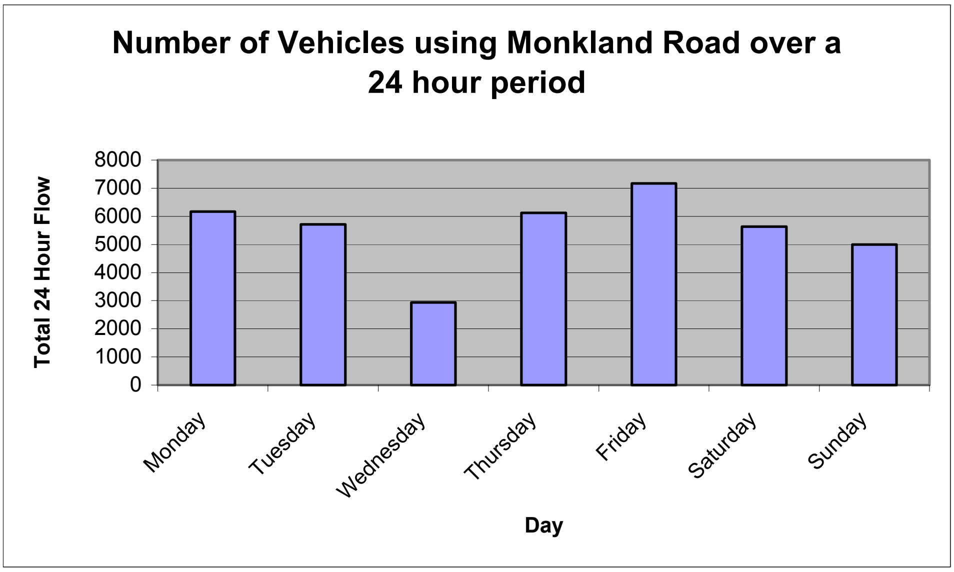


Figure 6 – A44 Monkland Road daily variation in flow

Hereford Road

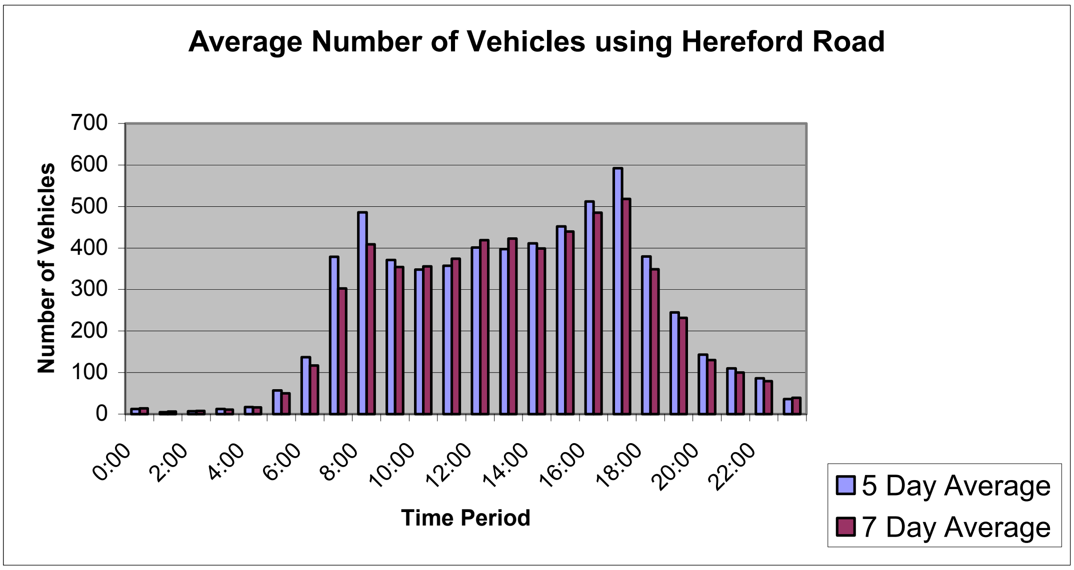


Figure 7 - Hereford Road traffic flow profile.

3.2.9 **Figure 7** provides the average 24 hour daily profile for Hereford Road to the south of the town centre. Two obvious peaks are displayed on the chart in respect of the 5 day average traffic flows, one in the morning between 08:00 and 09:00 and a second in the late afternoon between 17:00 and 18:00. These peaks coincide with the results at the other ATC sites, being the periods during which commuters travel to and from work in the town. During the morning peak, the hourly 2-way flow is just under 500 vehicles. In the late afternoon peak, the hourly flow rises to almost 600 vehicles, which represents the maximum hourly flow over the week. Hourly flows during the inter-peak period between 09:00 and 17:00, initially drop off to levels below 400 vehicles per hour for the rest of the morning, but then they gradually pick up again in the afternoon until they reach the peak between 17:00 and 18:00. After 18:00, the hourly volumes quickly drop off with 2-way flows between 22:00 and 06:00 being less than 100 vehicles per hour. The comparison between the 5-day average figures and the 7- day figures demonstrate that as for the other two sites, traffic flows in the late morning and early afternoon at the weekends are higher than during the week.

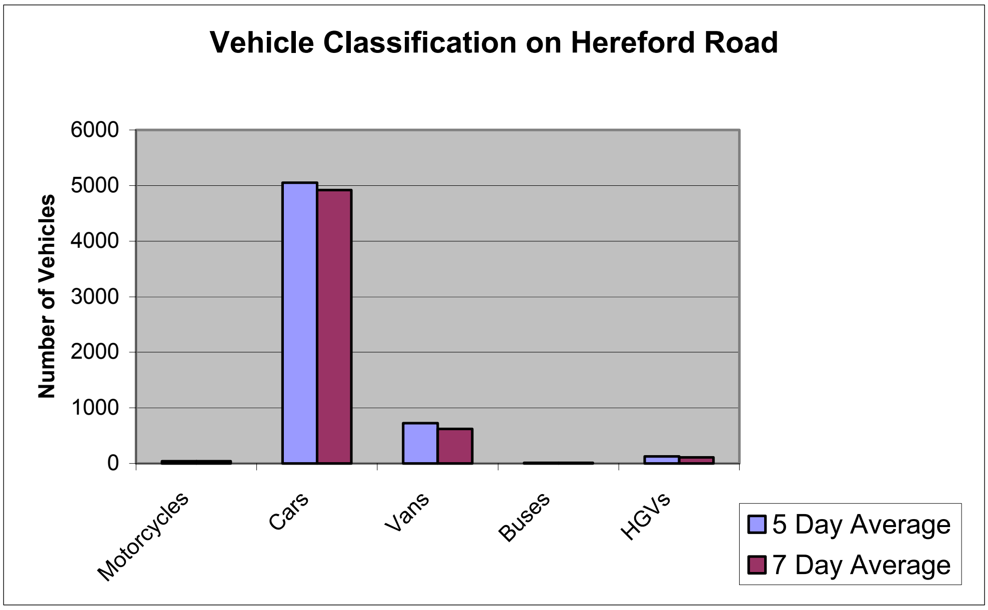


Figure 8 - Classification of vehicles using Hereford Road

3.2.10 Cars are the vehicle classification with the highest average flow over a 5-day period, with just over 5000 recorded travelling along Hereford Road. Over a 7-day period, the average number of cars counted by the ATC was slightly less at 4920. The average number of vans travelling along Hereford Road over a 5-day week totalled some 720, whilst over 7-days the average dropped to just over 600. HGV traffic was very low, totalling just over 100 per day, with bus and motorcycle movements being negligible.

3.2.11 The busiest 24-hour period for vehicles using Hereford Road is on a Friday when a total of 6209 were counted. The quietest day of the week is on a Sunday with 3984 vehicles travelling along Hereford Road. On a Saturday a total of 5068 vehicles use Hereford Road to either enter or exit Leominster. **Figure 9** refers.

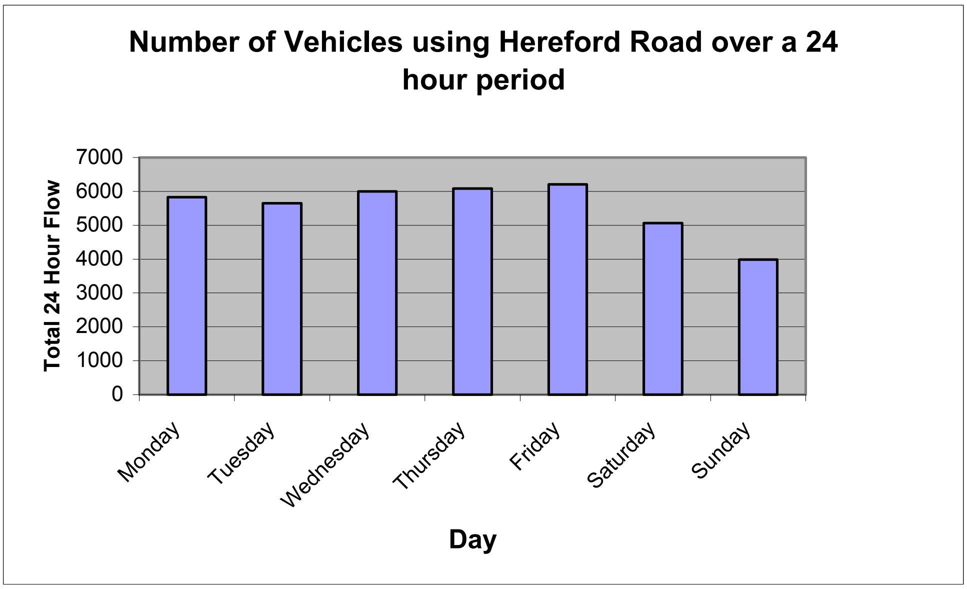


Figure 9 – Hereford Road daily variation in flow

A44 Worcester Road

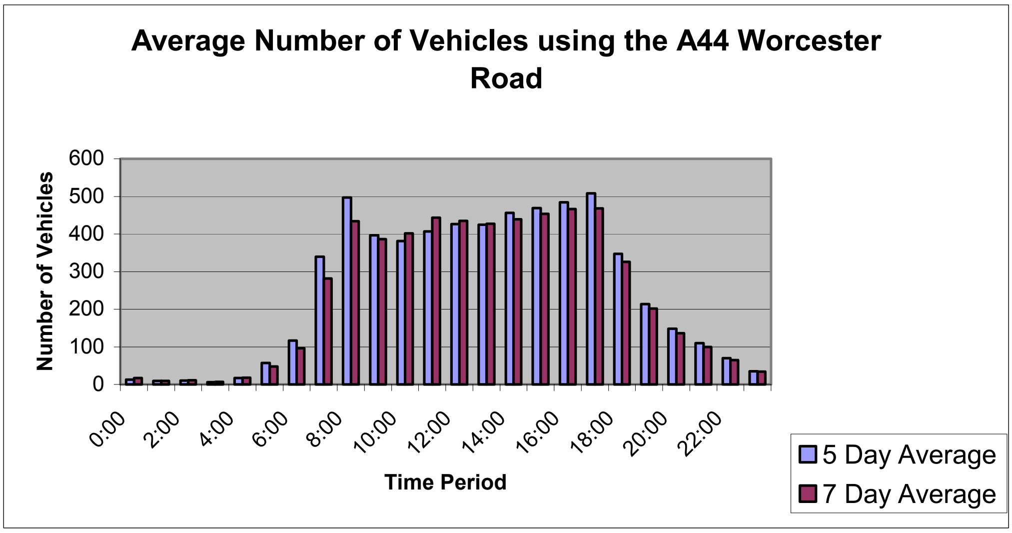


Figure 10 - A44 Worcester Road traffic flow profile

3.2.12 The A44 Worcester Road to the east of the A49 roundabout, also follows a similar daily profile to the other ATC sites monitored during the survey, with two obvious peak hours in the morning and evening, when hourly 2-way flows reach around 500 vehicles. During the inter-peak period, flows drop to between 380 and 470 movements 2-way, and flows from the late evening to the early morning are very low, at less than 100 vehicles per hour.

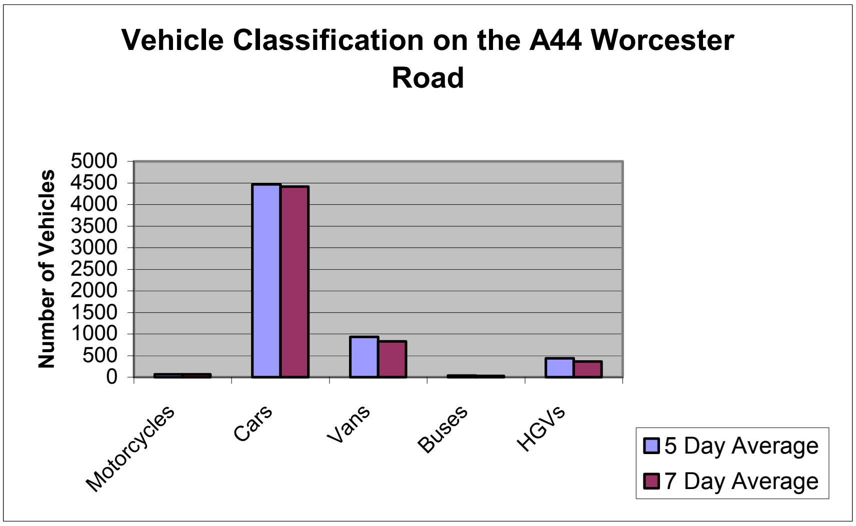


Figure 11 – Classification of vehicles using the A44 Worcester Road

3.2.13 The vehicle classification breakdown for the A44 Worcester Road, as illustrated in **Figure 11,** confirms almost 4500 cars travelling along the road in an average 24 hour day. Vans are again the second most common vehicle class, with just less than 1000 recorded per day. HGV movements totalled some 450 per 24 hours, which is roughly 10% of the volume of cars monitored. As for the other ATC sites, the number of motorcycles and buses was extremely low.

3.2.14 The busiest day of the week for vehicles using the A44 Worcester Road to enter or exit Leominster is on a Friday when 6499 vehicles chose this route. The quietest period is on a Sunday with 4410 vehicles using the A44, on a Saturday 5099 vehicles entered or exited the town via the A44 Worcester Road. Monday is the quietest weekday when a total of 5540 vehicles using this route.

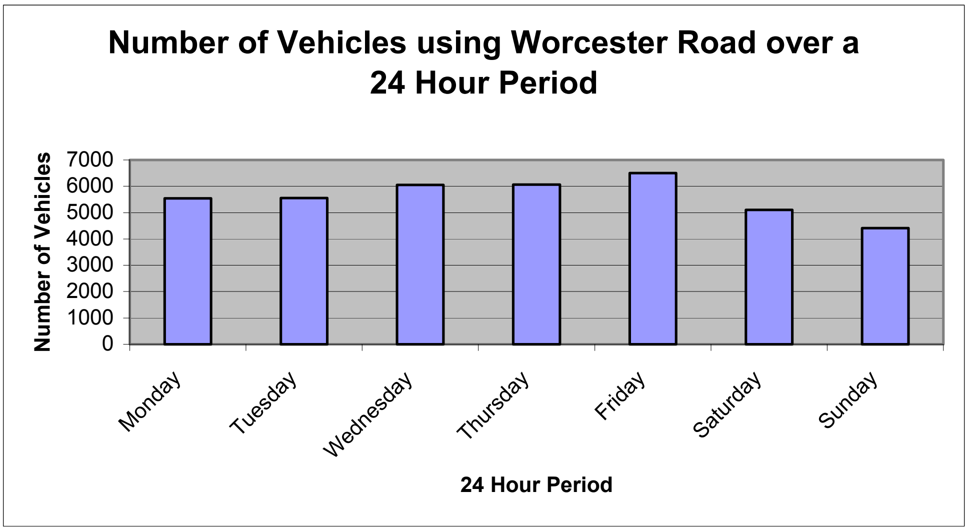


Figure 12 – A44 Worcester Road daily variation in flow

3.3 Video Survey Results

3.3.1 In order to provide an accurate record of the traffic movements throughout a typical weekday at the Bargates / Curseh Road/ Dishley Street/ West Street traffic signal controlled junction in the centre of Leominster, Morgan Tucker commissioned a specialist high mast video survey to be undertaken over a 12 hour period between 7.00 am and 7.00 pm on Wednesday 17th October 2007. The output from this survey was required to establish the peak hourly flows on Bargate at the junction which could then be used as a base figure against which any reduction in traffic flows as a result of the southern bypass could be quantified.

3.3.2 The recorded images from the 12 hour video survey are available on a series of six DVD discs which can be made available to the Town Council should they wish to view the detailed output from the survey. In terms of the AM and PM peak hour analysis, Table 1 below provides a summary of the two-way flows on each approach to the junction. The full results of the video survey for the peak periods are attached in a spreadsheet at **Appendix F.**

Peak Hours	Cursneh Rd			West St			Bargates			Dishley St		
	NB	SB	Total	EB	WB	Total	EB	WB	Total	NB	SB	Total
08:00-09:00	416	441	857	70	0	70	617	453	1070	374	493	867
17:00-18:00	431	576	1007	63	0	63	519	768	1287	572	405	977

Table 1: Peak hour traffic flows

3.3.3 The table above confirms that the busiest leg of the junction during the morning peak hour from 08:00 and 09:00 was Bargates. A total two-way flow of 1070 vehicles was recorded, with the predominant movement being eastbound towards the town centre, which is consistent with commuters heading into town. The two-way flows on both Cursneh Street and Dishley Street were very similar, both roads carrying just under 900 vehicles in the hour. The hourly flow on West Street, which operates one-way eastbound only, was just 70 vehicles i.e. just over 1 vehicle per minute on average.

3.3.4 During the evening peak hour, between 17:00 and 18:00, Bargates was again the busiest leg of the junction. The two-way hourly flow recorded was 1287 vehicles, which is 20% higher than the flows measured during the morning peak. The predominant flow in the evening was out of town with 60% of the two way total heading in this direction i.e. people travelling home from work. Both Cursneh Street and Dishley Street were busier than in the morning peak hour, two-way flows being around 15% higher. The one –way flow on West Street was very similar to the morning peak, with only 63 vehicles travelling along the road.

3.3.5 From the results in Table 1, it can be seen that in overall traffic terms the junction was significantly busier in the PM peak hour between 1700 and 1800, than in the morning peak hour. The total volume of traffic travelling through the junction in the morning peak hour was 1,432 vehicles. This figure rose to 1,667 vehicles in the evening peak i.e. an increase of just over 16%. This level of demand is equivalent to around 28 vehicles per minute or approximately 1 every 2 seconds, which confirms the reason why the traffic signal control arrangement currently struggles to cope efficiently with the traffic demands.

3.3.6 In terms of turning movements at the junction, a distribution diagram identifying the peak hour traffic flows has been drawn up using the information from the video survey. This diagram is also attached at **Appendix F.** The diagram confirms the busiest movement at the junction in the AM peak hour is traffic turning right from Bargates into Dishley Street. 300 vehicles were recorded making this manoeuvre in the hour, which is equivalent to 5 vehicles per minute or 1 every 12 seconds. A high volume of traffic was also recorded turning left from Bargates into Cursneh Road. The straight on movements between Cursneh Road and Dishley Street were slightly lower, both hourly flows being less than 200 vehicles. During the evening peak, the two busiest movements were from Cursneh Street and Dishley Street into Bargates. The hourly flows for both these movements were almost identical with 382 vehicles turning left from Dishley Street and 386 turning right from Cursneh Road. The straight ahead flows between Cursneh Road and Dishley Street were broadly similar to the levels recorded in the morning peak.

3.3.7 Further analysis of the hourly variation in flows and the volumes of heavy goods vehicle traffic on Bargates has been carried out using the video survey output. **Table 2** below highlights the hourly flows entering and leaving Bargates at the crossroads junction for each of the 12 hours the video survey was in operation on Wednesday 17 October.

Time (Hourly)	Bargates (Vehicles)		
	Entering	Exiting	TOTAL
07:00-08:00	310	396	**706**
08:00-09:00	401	617	**1018**
09:00-10:00	358	555	**913**
10:00-11:00	345	468	**813**
11.00-12.00	631	602	**1233**
12.00-13.00	468	422	**890**
13.00-14.00	469	494	**963**
14.00-15.00	495	538	**1033**
15:00-16:00	614	556	**1170**
16:00-17:00	478	536	**1014**
17:00-18:00	565	519	**1084**
18:00-19:00	523	514	**1037**
TOTAL	**5458**	**6217**	**11675**

Table 2- Total Vehicle Hourly Profile - Bargates

3.3.8 From Table 2 it can be seen that almost 12,000 vehicles travelled along Bargates over the 12 hour period, which averages out at approximately 1000 vehicles per hour throughout the day. The proportion of traffic travelling in each direction was broadly similar, with a slight bias (53%) in favour of traffic travelling eastbound i.e. exiting Bargates at the traffic signals. In terms of the hourly profile, the peak hour was perhaps surprisingly between 1100 and 1200, when a total of 1233 vehicles were recorded in both directions. The reasons for this untypical peak are unclear, but the ATC data from the other sites on the edge of the town also confirmed this hour as being particularly busy. Generally, the variation in the hourly profile throughout the 12 hours is fairly flat, the only hour showing any significant change being between 0700 and 0800 when 706 vehicles were recorded. The next lowest hourly flow occurred between 1000 and 1100 with a two-way flow of 813, but for the rest of the day the hourly figures only ranged from 890 to 1233.

3.3.9 The video survey also recorded the vehicle classification breakdown throughout the day on Bargates and the hourly volumes of heavy goods vehicles travelling along the route are identified in **Table 3** below.

Time (Hourly)	Bargates (HGV's)		
	Entering	Exiting	TOTAL
07:00-08:00	35	16	**51**
08:00-09:00	28	23	**51**
09:00-10:00	29	38	**67**
10:00-11:00	25	34	**59**
11.00-12.00	43	25	**68**
12.00-13.00	20	29	**49**
13.00-14.00	32	21	**53**
14.00-15.00	30	23	**53**
15:00-16:00	29	34	**63**
16:00-17:00	28	24	**52**
17:00-18:00	19	10	**29**
18:00-19:00	12	14	**26**
TOTAL	**330**	**291**	**621**

Table 3 - HGV's entering and exiting Bargates

3.3.10 **Table 3** indicates that a total of 621 HGV's travelled along Bargates over the 12 hour period, i.e. approximately 50 per hour or almost 1 movement per minute on average. The proportional split in movements was as for the total traffic flows, very similar, with a slight bias in favour of vehicles heading westbound i.e. away from the traffic signals. In terms of the proportion of the overall traffic flow, the heavy commercial vehicles represented just over 5% of the traffic, which is typical for an urban centre like Leominster. The only period of the day when the numbers of HGV's dropped was between 1700 and 1900. For the rest of the day, the hourly volumes stayed between 50 and 70.

3.4 Journey time results

3.4.1 A number of journey times were monitored on Wednesday 17 October 2007 during the morning and evening peak hours, in order to confirm how long a car normally takes to travel from one side of the town to the other via certain routes. The actual routes followed are highlighted on the map in **Appendix A**. The information was required to facilitate the accurate matching of the number plate information and consequently confirm the scale of the through trips, which potentially would use a southern bypass.

3.4.2 A total of five runs were completed during the day, with three being undertaken during the morning peak hours and two in the evening peak hours. Brief summaries of the main parameters in respect of each run are highlighted below.

Run 1 took approximately 10 minutes, beginning at 08:54 and ending at 09:04 hours. The run began at the junction of Baron's Cross Road / Cholstrey Road and finished at the A44 Worcester Road roundabout. The route followed included travelling along Bargates, New Street, Broad Street, Mill Street and the A49 bypass.

Run 2 commenced at the A44 Worcester Road roundabout and travelled along Southern Avenue, South Street, Dishley Street and Bargates ending at the Cholstrey Road / Baron's Cross Road junction. In total it took 7 minutes, beginning at 09:08 and finishing at 09:15 hours.

Run 3 followed the same route as Run 1. The journey time recorded on this run was 7 minutes, with the run commencing at 09:34 and finishing at 09:41 hours.

Run 4 was the first of the late afternoon runs and began at 16:12 at Barons Cross Road / Cholstrey Road junction. The run finished at 16:22 at the A44 Worcester Road roundabout, taking approximately 10 minutes. The run followed the same route choice as Run 1.

Run 5 began on the A44 Worcester Road roundabout at 16:42 and finished at 16:54 at Barons Cross Road / Cholstrey Road. This run took approximately 12 minutes and followed the same route as Run 2.

3.4.3 The analysis of the runs, which were completed in both the morning and afternoon periods, identified a range of typical journey times from a minimum of 7 minutes to a maximum of 12 minutes. In order to carry out the number plate matching exercise it was therefore decided that all externally matched numbers within a 15 minute timeframe could be realistically considered a through trip, which had not stopped within the town. Any matched pair outside this time limit, would not be a genuine through trip and would consequently not be assignable to a southern bypass.

morgan tucker consulting engineers

4. SOUTHERN BYPASS TRAFFIC ASSESSMENT

4.1 As discussed in the initial meeting in Leominster and subsequently agreed as part of the overall brief for the study, the main objective of the data collection exercise was to obtain the relevant traffic information needed to allow a robust appraisal to be made of how much traffic would be removed from Bargates should a southern bypass be built linking Hereford Road at its junction with Southern Avenue to a suitable point on the A44 Monklands Road, somewhere to the west of the edge of the built up area of Leominster.

4.2 The previous sections have described the scope of this data collection exercise and provided specific output information from the survey results. The methodology adopted to calculate the traffic which would possibly use a southern bypass and consequently be removed from Bargates, makes use of the registration plate matching output data and the video survey count data to reach a final conclusion.

4.3 The first step in assessing the impact of the bypass was to identify the traffic movements monitored in the registration number surveys, which could reasonably be expected to transfer to the new bypass route were it to be built. In making this judgement, the principal route choice factor taken into consideration was journey distance i.e. if the bypass offered a shorter route, traffic would choose to use it in preference to their existing route through the town centre. On this basis, the following through trip movements identified in the registration number survey were considered to be potential bypass trips.

- A44 Worcester Road to Cholstrey Road
- A44 Worcester Road to A44 Monklands Road
- B4361 Hereford Road to A44 Monklands Road
- B4361 Hereford Road to Cholstrey Road
- Cholstrey Road to A44 Worcester Road
- Cholstrey Road to B4361 Hereford Road
- A44 Monklands Road to A44 Worcester Road
- A44 Monklands Road to B4361 Hereford Road

4.4 Additional movements which were considered as possible bypassable trips and which could be identified from the registration number surveys, included trips from the A49 south which used Southern Avenue to pass through the town before travelling to A44 Worcester Road and Cholstrey Road. Given the location of the bypass route on the southern edge of the town it was not considered feasible that traffic from the A49 north heading towards the west of Leominster, would make any journey time savings by making use of the bypass. Similarly, it was also concluded that traffic with an origin in the north or the west of the town centre heading westbound on the A44 or Cholstrey Road, or making the reverse movement, would not divert to the bypass, although an element of trips from the south side of the town, making these journeys would possibly find the bypass route more convenient. However, it would require further more detailed analysis of traffic movements within the town using a traffic model to ascertain the nature and scale of these local trips.

4.5 Using the vehicle trip matrices identified from the registration number surveys, as discussed in Chapter 3, the volume of traffic, which might use the southern bypass route, can be estimated for each of the eight through trip movements identified in 4.3. The hourly flows are listed below in **Table 4** :-

Movement	Hourly assigned flow (0800-0900)	Hourly assigned flow (0900-1000)	Hourly assigned flow (1600-1700)	Hourly assigned flow (1700-1800)
A44 Worcester Road to Cholstrey Rd	51	32	43	38
A44 Worcester Road to Monkland Rd	13	12	11	11
B4361 Hereford Road to Monkland Rd	10	15	12	15
B4361 Hereford Road to Cholstrey Rd	12	12	22	21
Cholstrey Road to A44 Worcester Rd	29	26	36	35
Cholstrey Road to B4361 Hereford Rd	19	21	20	16
A44 Monkland Rd to Worcecster Rd	10	19	16	16
A44 Monkland Rd to Hereford Rd.	19	15	8	12
Total	**163**	**152**	**168**	**164**

Table 4 - Hourly assigned bypass traffic flows

4.6 The total assigned hourly flows in Table 4 reveal that if the southern bypass route were to be constructed immediately, a minimum of around 150 to 170 vehicles per peak hour in the morning and evening would use the road, to avoid having to pass through the congested town centre. In addition to these externally generated trips, there would also be an element of traffic travelling to and from the southern side of the town which might also choose to use the bypass. It is estimated that this could total around 30-40 two-way movements per hour, which when added to the calculated through traffic volumes gives a total of approximately 200 trips per peak hour assigned to the bypass. By using the ATC data, as described in the previous Chapter, a factor of 3.2 can be calculated to convert this assigned flow over the four peak hours monitored in the registration survey to a 24 hour daily total. The total average weekday 24 hour bypass traffic flow can therefore be estimated to be around 200 x 4 x 3.2 = 2560 vehicles.

4.7 Taking the hourly traffic volumes identified for Bargates in Table 2 earlier and then applying the reductions in traffic which would result from the construction of a southern bypass as confirmed above, produces a revised 'with bypass' traffic flow scenario for Bargates, based on current measured flows. The impact of this is graphically illustrated below in Figure 13.

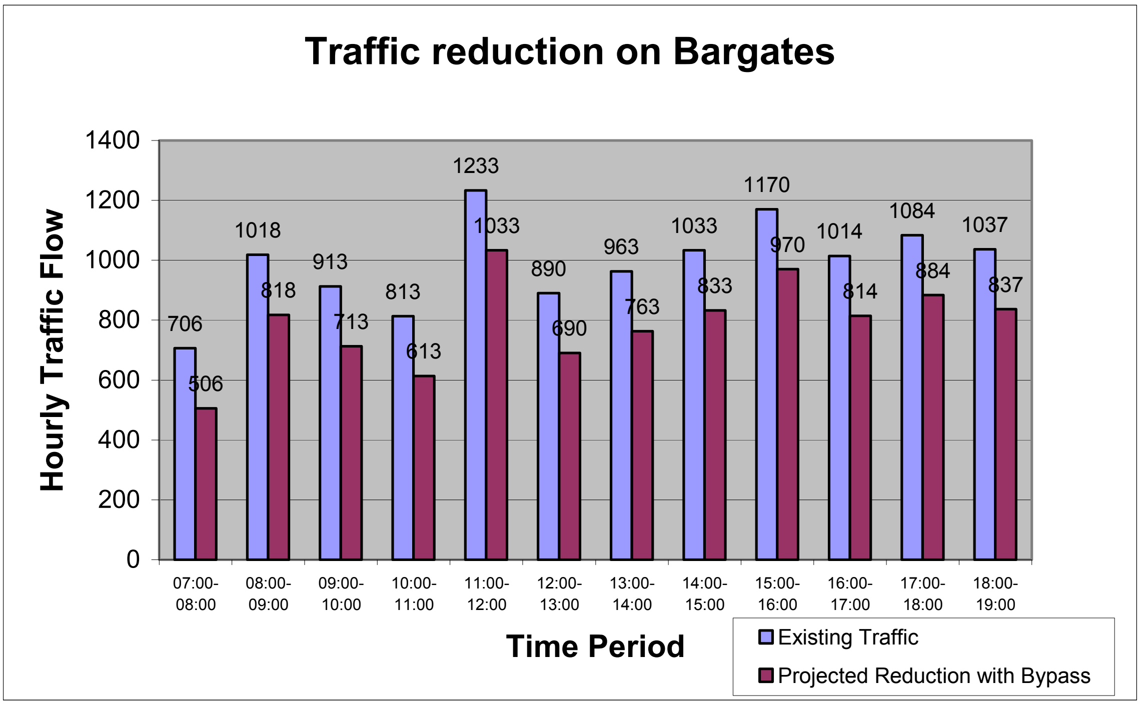


Figure 13 - Impact of Bypass on Bargates

4.8 It can be seen from the graph that the bypass would reduce traffic flows on Bargates by over 2000 vehicles per 12 hour day between 0700 and 1900 or around 2600 vehicles per 24 hour day. This would undoubtedly help to relieve the pressure on the link and would ease the congestion at the traffic signal controlled crossroads at Dishley Street / Cursneh Road / West Street.

5. AIR QUALITY

5.1 The reduction in traffic flows resulting from the construction of a southern bypass, as discussed in Chapter 4, would not only deliver a safer and less congested road network in the centre of Leominster, but would also have a significant impact in terms of the potential benefits to air quality on Bargates.

5.2 Herefordshire Council has monitored nitrogen dioxide on Bargates since the mid 1990's and in 2001 the readings indicated that NO^2 levels in the vicinity of the crossroads junction were the highest in the County and consistently above the Government's target. The Council confirmed that this air quality problem was clearly attributable to the volume of HGV's and standing traffic at the traffic signals. Further monitoring has been carried out by the Council over the past few years to assess any deterioration in NO^2 levels and in January 2006, following the submission of a detailed 'Screening Assessment Report' to DEFRA, the Council formally declared an Air Quality Management Area (AQMA) for the section of Bargates in the vicinity of the Dishley Street / New Street crossroads junction.

5.3 Following the AQMA declaration, Herefordshire Council has continued to monitor nitrogen dioxide levels on Bargates and is now in the process of drawing up a draft Air Quality Action Plan which will comprise a package of measures whose combined effect will be to reduce the nitrogen dioxide levels to the statutory required limits.

5.4 Herefordshire Council is currently consulting relevant local stakeholders to confirm the nature of the measures which will comprise the Action Plan. It is almost certain that these will include alterations to the traffic light sequence at the crossroads and the relocation of the pedestrian crossing on Bargates to a more westerly position on the A44. However it is understood that the provision of a southern bypass will not be included within the plan despite it being initially recommended as an option.

5.5 In assessing whether or not the anticipated package of small scale Action Plan measures will be effective in reducing the levels of nitrogen dioxide along Bargates over the medium to long term, consideration has been given to how traffic flows are likely to increase in the town centre over the next five to ten years. Traffic growth on Bargates over this period will comprise two main elements, namely: -

- The normal background traffic growth associated with increased car use and car ownership levels.
- The additional traffic which will be generated by committed development in the town i.e. Barons Cross to the west.

5.6 The rate of background traffic growth, which will occur in Leominster over the next five to ten years, has been calculated using the 1997 National Road Traffic Forecasts (NRTF) adjusted by TEMPRO to take into account predicted local land use changes in the town. The resultant factors are confirmed below: -

	AM Peak	PM Peak	Average Weekday
2008-2013	1.052	1.072	1.064
2008-2018	1.099	1.132	1.122

It can be seen that on average, traffic flows will increase by around 6% over the next five years and around 12% by 2018. These predicted rates of growth are consistent with the recent increases in traffic flow experienced on Bargates.

5.7 Applying these rates of growth to the peak hour vehicle flows per 12 hour day, identified earlier in the report for Bargates, results in the following predicted two-way traffic volumes in 2013 and 2018: -

	AM Peak	PM Peak	12-hour daily flow
2013	1071	1162	12422
2018	1119	1227	13100

5.8 Further traffic increases will occur on the Bargates corridor as a direct result of the construction of the Barons Cross residential development on the western edge of the town. It is expected that following the completion of this development comprising 450 dwellings, that the following additional 2-way peak hour traffic volumes could be generated on Bargates :-

AM Peak (0800-0900) – 149 trips
PM Peak (1700-1800) – 214 trips

Assuming that the Barons Cross development could be completed in 10 years time, it is possible that 2-way peak hour flows on Bargates could reach the following levels by 2018: -

AM Peak (0800-0900) - 1268
PM Peak (1700-1800) – 1441

In comparison to current flow levels recorded on Bargates as highlighted in Figure 13, this represents an increase of around 25% in the AM peak traffic levels and 33% in the PM peak.

5.9 In terms of what this potential increase in traffic could mean for the operational efficiency of the traffic signal crossroads, an assessment using the industry standard LINSIG programme has been undertaken to determine the existing capacity of the junction and also confirm what impact the predicted increase in background traffic plus the Barons Cross generated traffic will have on congestion in the area by 2018.

5.10 The LINSIG for the two existing peak hours in 2008 confirm that the junction is operating within capacity in the morning peak hour with a reasonable degree of reserve capacity i.e. the signals can easily cope with the traffic demands without creating significant delays to drivers. However, in the evening peak i.e. between 1700 and 1800, the situation is worse with queues building up on all approaches to the junction, due to the traffic signal's inability to clear the traffic demands within one cycle of the traffic lights. This creates congestion, which in turn makes the local air quality worse.

5.11 The results of the future year peak hour assessments for 2018 clearly indicate that the junction will experience major delays in the PM peak period and will operate at a level which is considerably over the theoretical capacity of the junction. A sensitivity test was also undertaken to check what would happen were the Barons Cross development not to proceed within the expected timetable. This also confirmed that the junction would not operate within capacity in 2018 in the PM peak. These operational assessment results provide unequivocal evidence that the traffic signal controlled junction in its current form will not be able to accommodate the future levels of traffic which are likely to occur in the centre of Leominster within the next ten years. Significant congestion will become a regular feature at the junction with vehicle queues extending back along Bargates for some distance. As a result, a further deterioration in air quality will be inevitable.

5.12 Possible modifications to the phasing and cycle time of the traffic light operation including the relocation of the pedestrian crossing, as recommended by Herefordshire Council as part of the Air Quality Action Plan, have also been tested to determine the impact this change could have on the local congestion levels. This exercise revealed that despite some short-term relief to drivers, any benefits delivered by the suggested changes would be temporary, with conditions at the junction quickly returning to their pre-modified levels as a result of continuing traffic growth in the town.

5.13 As revealed above, the implementation of the measures currently being considered for inclusion in Herefordshire Council's Draft Air Quality Action Plan is unlikely to produce the scale of reduction in nitrogen dioxide levels in the air quality management area needed to satisfy Government targets over the medium to long term. The provision of a southern relief road / bypass, which would as discussed earlier, remove a significant volume of traffic from Bargates, remains the only effective solution to what is clearly going to become a more serious environmental issue for Leominster in the future.

6 SUMMARY AND CONCLUSIONS

6.1 Morgan Tucker was appointed by Leominster Town Council in October 2007 to undertake a traffic study in the town of Leominster in Herefordshire, the principal objective of the commission being to determine how much traffic would be removed from the town centre road network in the event that a southern bypass route was constructed.

6.2 The methodology for the study, agreed with the Town Council following an initial fact finding visit to the town, comprised carrying out a programme of traffic surveys whose aim was to identify the existing traffic movements around the town which would realistically transfer to a southern bypass, and also to confirm the current traffic movements at the Bargates / Cursneh Road / Dishley Street / West Street traffic signal controlled junction in the centre of town. The traffic survey programme designed to satisfy the requirements of the study brief incorporated the following main elements :-

- Registration number surveys at six strategic locations around the town.
- Automatic traffic counters installed on four principal external road sites.
- A high mast video survey to record traffic flows at Bargates / Cursneh Road / Dishley Street / West Street.
- Journey time surveys between external sites around the town.

6.3 The main data collection exercise was undertaken on Wednesday 17 October 2007, which is a typical weekday in a neutral month, as recommended by the Department for Transport in their major road scheme assessment procedures. The automatic traffic counters were installed for a week either side of the main data collection exercise, to confirm the daily variation in traffic flow and also to provide a validation check to the registration number surveys.

6.4 The registration number surveys were undertaken between 0800 and 1000 and again between 1600 and 1800, these durations chosen to ensure the busiest peak hours were monitored. The video survey was conducted for a 12 hour period between 0700 and 1900, providing a full analysis of turning movements at the main junction in the centre of town. No incidents were recorded on the day of the survey, which would have adversely influenced the results of the study, and very high sample rates were achieved in the registration number surveys. This confirmed the overall robustness of the data collection phase and provided reassurance that accurate results were obtained.

6.5 The analysis of the survey results was undertaken using appropriate techniques. Of particular importance to the outcome of the study, was the registration matching exercise. This was carried out using a bespoke matching program, based on the Excel spreadsheet, which initially provided a thorough validation of the recorded number plates and then following a visual check to identify and edit any spurious entries, produced a series of peak hour trip matrices which confirmed the pattern of through trips related to each of the survey locations. The transcription of the video survey was undertaken manually from the DVD's and the ATC data was analysed using software incorporated into the traffic counter.

6.6 The peak hour trip matrices were then used to determine how much traffic would transfer to a southern bypass route linking Hereford Road to Monkland Road. The choice as to whether certain through trips would transfer to the bypass was based on journey length i.e. if the journey via the bypass was shorter, the vehicle would choose to use the new road in preference to travelling through the town centre. This assessment was undertaken for all the trips identified in the peak hour trip matrices and it confirmed that approximately 170 vehicles would use the bypass every hour. In addition, a further desktop appraisal of potential local trips, which could use the bypass, was also carried out. This identified a further 30 possible movements per hour reassigning to the bypass, resulting in a total hourly flow of about 200 vehicles. Factoring this to a daily 12-hour flow, confirms that around 2,500 vehicles could potentially use a southern bypass on a typical weekday.

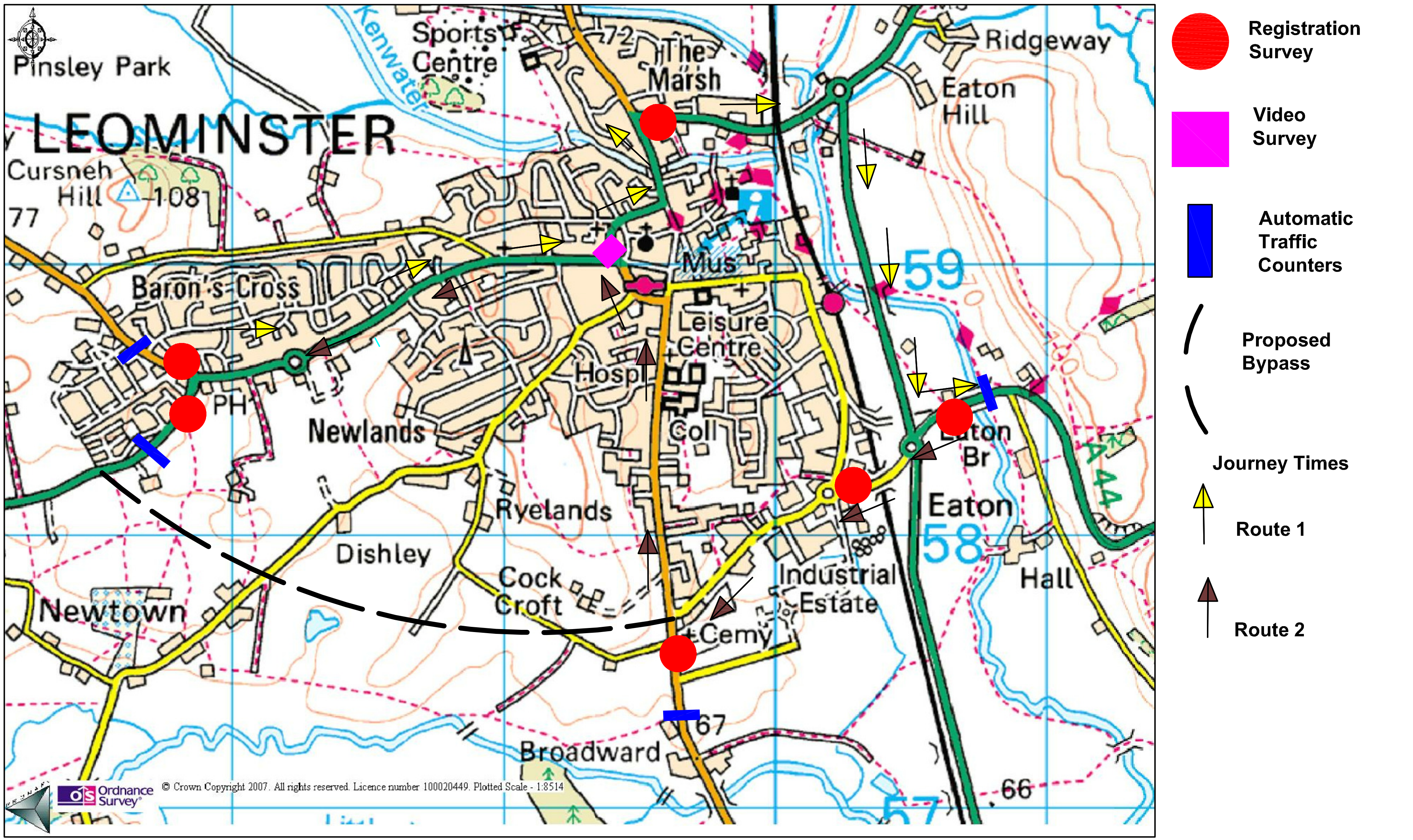
6.7 Finally, the impact of the transfer of a proportion of the traffic, which currently travels along Bargates to the bypass route, was undertaken, based on the vehicle numbers confirmed in the trip matrices. This demonstrated that approximately 20 % of traffic currently on Bargates would be removed as result of the bypass being constructed. This scale of change on Bargates would clearly alleviate congestion and improve air quality on this route by significantly reducing the delays experienced at the traffic signal controlled crossroads.

6.8 The benefits to air quality are of particular significance as Herefordshire Council have recently declared an air quality management area (AQMA) comprising the section of Bargates immediately adjacent to the crossroads. The declaration has been made following a recommendation from the Government, because of the consistently high concentration of nitrogen dioxide which is produced by standing traffic at this location. At the present time the Council are considering some minor modifications to the signal settings as part of their Action Plan to reduce NO^2 levels to the levels required by Government, however it is clear that with traffic volumes predicted to increase by up to 40 % over the next ten years on Bargates, assuming the construction of the Barons Cross development, that the only effective long term solution to the environmental issues in the town centre will be to construct the southern bypass.

6.9 In conclusion, based on the results of this study, the construction of the southern bypass route would definitely confer a significant degree of traffic relief to Bargates and the rest of the town centre network. The removal of this traffic would not only deliver major benefits in terms of road safety and local amenity but would offer an effective long term solution to Herefordshire's most critical air quality issue, namely the unacceptably high levels of nitrogen dioxide which currently exist on Bargates.

APPENDIX A

Map of Survey Locations



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Client	Leominster Town Council
Project Title	Traffic Study
Drawing Title	Survey Sites Location Plan
Drawn By	SC
Checked By	BS
Approved By	BS
Date	November 2007
Scale	NTS
Purpose	
Drawing Number	MT/NWK/558/001
Licence number	

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APPENDIX B

Registration Number Survey Form

Leominster Traffic Survey 17th October 2007

Time:

8.00 - 8.15.

VA05 HKK	UN54 UPB.	MW54 ZVT
RE56 ZNC	W777 BOO	VO52 HHM
T803 SWP	MISSED.	CN53 WFR.
R800 JMC.	BG57 WRO	AO51 HZU
X56 XON	MISSED.	S454 WUJ
CV52 DXF.	S490. CHW.	M522 NAW
VA54 KTV.	V615 EUY	X575 EGS
DN51 TUH	N698 DWB	MISSED.
EJ52 XGH	P588. LWP.	S120 BVV.
Y174 LCJ	T817 BCY.	BD51 KKP.
R413 YOG.	M/L 2958.	CU04 YCV
X414 DKU	EHZ 1603.	GV05 XHD
P532 VDG.	MX54 UGG	YU57 NPJ
M348 SOK	MISSED.	DX02 UOL.
M356 TNP.	S186 BWU	G146 BLK.
X287 HFA	Y656 AER	VK54 UJW.
K23 GTD	DN07 YWA.	L412 JVP
X664	K554 AVK.	VK53 ASO.
J395 KRK.	N443 HGN	N691 JNM
EK07 DVJ	T331 MNV.	YX54 TF

APPENDIX C

Output Sample 15 Minute Matrix Plus Final Matrix Table

Vehicle Matrix For Complete Registrations 830

==

	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H	Site I	Site J	Site K	Site L
Site A	0	21	1	3	5	4	4	0	9	7	5	1
Site B	21	0	3	3	3	8	1	1	2	12	12	0
Site C	1	3	0	1	2	1	2	1	1	2	1	0
Site D	3	3	1	0	4	16	1	4	7	4	0	0
Site E	5	3	2	4	0	7	3	1	6	12	3	1
Site F	4	8	1	16	7	0	5	2	18	22	4	0
Site G	4	1	2	1	3	5	0	7	4	1	3	0
Site H	0	1	1	4	1	2	7	0	4	5	4	0
Site I	9	2	1	7	6	18	4	4	0	4	2	0
Site J	7	12	2	4	12	22	1	5	4	0	2	1
Site K	5	12	1	0	3	4	3	4	2	2	0	1
Site L	1	0	0	0	1	0	0	0	0	1	1	0

Time	A44 Worcester Rd towards Leominster					Hereford Rd towards Leominster					Cholstrey Rd towards Leominster					Monkland Rd towards Leominster				
	A	B	C	F	G	A	B	F	E	H	B	C	D	E	H	A	C	D	E	H
08:00-09:00	51 (F)	13 6% (229)	11 4% (245)	43	52	12 (F)	10 4% (229)	2	8 4% (224)	0	10 4% (229)	19 8% (245)	30	29 13% (224)	1	41 (F)	19 8% (245)	15	10 4% (224)	0
09:00-10:00	32 (F)	12 7% (164)	9 5% (175)	39	49	12 (F)	15 9% (164)	4	7 4% (190)	0	12 7% (164)	21 12% (175)	38	26 14% (190)	2	24 (F)	15 9% (175)	21	19 10% (190)	0
16:00-17:00	43 14% (315)	11 5% (242)	18 6% (302)	35	63	22 7% (315)	12 5% (242)	3	8 3% (278)	1	29 12% (242)	20 7% (302)	33	36 13% (278)	0	31 10% (315)	8 3% (302)	9	16 6% (278)	0
17:00-18:00	38 9% (416)	11 4% (276)	15 4% (367)	27	52	21 5% (416)	15 5% (276)	11	9 3% (281)	1	23 8% (276)	16 4% (367)	24	35 12% (281)	2	34 8% (416)	12 3% (367)	13	16 6% (281)	0
Total	164	47 5% (911)	53 5% (1089)	144	216	67	52 6% (911)	20	32 3% (973)	2	74 8% (911)	76 7% (1089)	125	126 13% (973)	5	130	54 5% (1089)	58	61 6% (973)	0

<u>Key</u>

A=Cholstrey Rd away from Leominster
B=Monkland Rd away from Leominster
C=Hereford Rd away from Leominster
D=Mill St away from Leominster
E=A44 Worcester Rd away from Leominster
F=Mill St towards Leominster
G=Southern Ave Towards Leominster
H=Souther Ave away from Leominster

Number in () =ATC count statistics

F represents ATC failure

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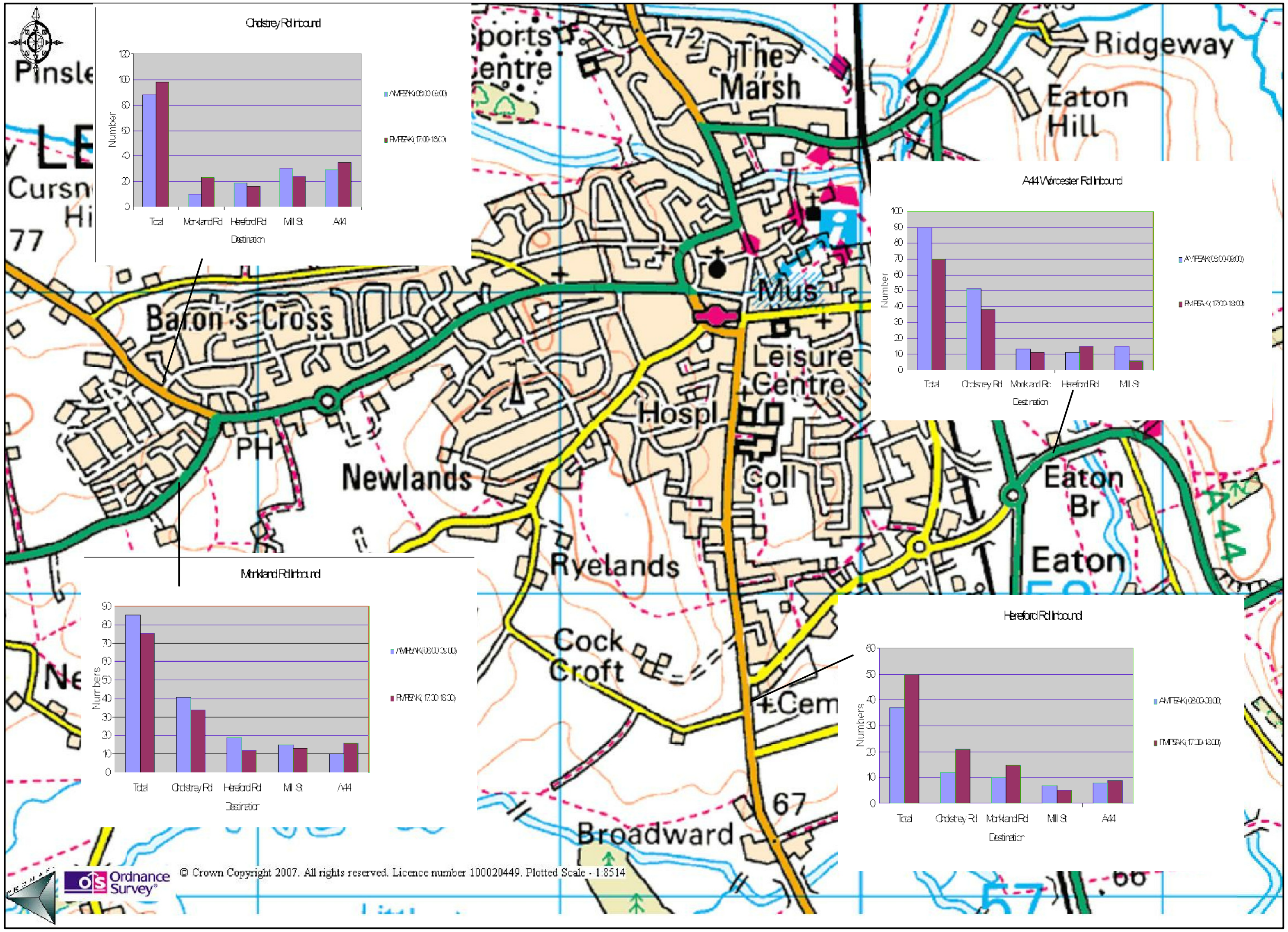
APPENDIX D

Trip Distributions Map



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DO NOT SCALE. USE FIGURED DIMENSIONS ONLY. CHECK ON SITE AND REPORT ALL DISCREPANCIES TO MORGAN TUCKER.

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Client	Leominster Town Council
Project Title	Traffic Study
Drawing Title	Peak Hour Through Movements
Drawn By	SC
Checked By	BS
Approved By	BS
Date	November 2007
Scale	NTS
Purpose	
Drawing Number	MT/NWK/558/002
Licence number	

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consulting engineers

APPENDIX E

ATC Outputs

Vehicle Matrix For Complete Registrations 830

==

	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H	Site I	Site J	Site K	Site L
Site A	0	21	1	3	5	4	4	0	9	7	5	1
Site B	21	0	3	3	3	8	1	1	2	12	12	0
Site C	1	3	0	1	2	1	2	1	1	2	1	0
Site D	3	3	1	0	4	16	1	4	7	4	0	0
Site E	5	3	2	4	0	7	3	1	6	12	3	1
Site F	4	8	1	16	7	0	5	2	18	22	4	0
Site G	4	1	2	1	3	5	0	7	4	1	3	0
Site H	0	1	1	4	1	2	7	0	4	5	4	0
Site I	9	2	1	7	6	18	4	4	0	4	2	0
Site J	7	12	2	4	12	22	1	5	4	0	2	1
Site K	5	12	1	0	3	4	3	4	2	2	0	1
Site L	1	0	0	0	1	0	0	0	0	1	1	0

Site No: 00040003

Site Reference: 00040

Worcester Road
Week Begin: 14 October 2007

Vehicle Count Report

Channel: Inbound

Time Begin	Sun Oct 14	Mon Oct 15	Tue Oct 16	Wed Oct 17	Thu Oct 18	Fri Oct 19	Sat Oct 20	5-Day Av	7-Day Av
0:00	-	8	9	7	9	9	15	8	10
1:00	-	5	4	6	5	5	5	5	5
2:00	-	4	7	9	7	3	6	6	6
3:00	-	1	1	1	4	4	4	2	3
4:00	-	4	5	8	10	11	9	8	8
5:00	-	22	15	23	19	25	14	21	19
6:00	-	52	45	65	54	47	24	53	44
7:00	-	179	183	172	174	167	64	175	143
8:00	-	279	268	283	292	295	167	283	250
9:00	-	190	216	223	230	233	200	218	213
10:00	-	176	217	212	204	220	255	206	220
11:00	-	210	212	199	218	213	303	210	237
12:00	-	195	169	218	195	227	237	201	211
13:00	-	190	195	193	207	246	230	206	213
14:00	-	197	197	240	234	264	224	226	226
15:00	129	207	222	254	233	279	209	239	219
16:00	171	206	207	246	251	288	195	240	223
17:00	159	234	225	224	235	235	155	231	210
18:00	130	172	157	168	193	195	130	177	164
19:00	83	97	84	118	114	154	78	113	104
20:00	45	55	71	69	65	117	51	75	68
21:00	35	39	60	53	54	66	50	54	51
22:00	26	25	34	28	37	60	29	37	34
23:00	14	12	15	16	18	26	27	17	18
12H,7-19	-	2435	2468	2632	2666	2862	2369	2613	2543
16H,6-22	-	2678	2728	2937	2953	3246	2572	2908	2812
18H,6-24	-	2715	2777	2981	3008	3332	2628	2963	2867
24H,0-24	-	2759	2818	3035	3062	3389	2681	3013	2918
Am	-	8:00	7:45	8:15	8:15	8:15	11:00	-	-
Peak	-	279	269	287	295	296	303	285	290
Pm	-	16:30	16:45	16:45	16:15	15:30	12:15	-	-
Peak	-	245	238	267	263	295	242	262	256

Site No: 00040003

Site Reference: 0004000

Worcester Road
Week Begin: 21 October 2007

Vehicle Count Report

Channel: Inbound

Time Begin	Sun Oct 21	Mon Oct 22	Tue Oct 23	Wed Oct 24	Thu Oct 25	Fri Oct 26	Sat Oct 27	5-Day Av	7-Day Av
0:00	14	-	-	-	-	-	-	-	-
1:00	6	-	-	-	-	-	-	-	-
2:00	6	-	-	-	-	-	-	-	-
3:00	2	-	-	-	-	-	-	-	-
4:00	6	-	-	-	-	-	-	-	-
5:00	6	-	-	-	-	-	-	-	-
6:00	12	-	-	-	-	-	-	-	-
7:00	40	-	-	-	-	-	-	-	-
8:00	61	-	-	-	-	-	-	-	-
9:00	133	-	-	-	-	-	-	-	-
10:00	190	-	-	-	-	-	-	-	-
11:00	215	-	-	-	-	-	-	-	-
12:00	195	-	-	-	-	-	-	-	-
13:00	172	-	-	-	-	-	-	-	-
14:00	165	-	-	-	-	-	-	-	-
15:00	-	-	-	-	-	-	-	-	-
16:00	-	-	-	-	-	-	-	-	-
17:00	-	-	-	-	-	-	-	-	-
18:00	-	-	-	-	-	-	-	-	-
19:00	-	-	-	-	-	-	-	-	-
20:00	-	-	-	-	-	-	-	-	-
21:00	-	-	-	-	-	-	-	-	-
22:00	-	-	-	-	-	-	-	-	-
23:00	-	-	-	-	-	-	-	-	-
12H,7-19	-	-	-	-	-	-	-	-	-
16H,6-22	-	-	-	-	-	-	-	-	-
18H,6-24	-	-	-	-	-	-	-	-	-
24H,0-24	-	-	-	-	-	-	-	-	-
Am Peak	11:00 215	- -	- -	- -	- -	- -	- -	- -	- -
Pm Peak	- -	- -	- -	- -	- -	- -	- -	- -	- -

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040003

Site Reference: 00040003

Worcester Road
Week Begin: 14 October 2007

Vehicle Count Report

Channel: Outbound

Time Begin	Sun Oct 14	Mon Oct 15	Tue Oct 16	Wed Oct 17	Thu Oct 18	Fri Oct 19	Sat Oct 20	5-Day Av	7-Day Av
0:00	-	5	4	5	5	8	10	5	7
1:00	-	1	1	3	4	9	4	4	4
2:00	-	2	1	8	2	6	7	4	5
3:00	-	5	3	4	5	2	3	4	4
4:00	-	9	8	7	9	12	11	9	10
5:00	-	38	34	40	31	36	11	36	29
6:00	-	57	61	79	61	61	23	64	52
7:00	-	161	153	167	168	178	74	165	139
8:00	-	222	196	224	229	199	110	214	184
9:00	-	159	174	190	184	186	160	179	173
10:00	-	175	169	177	178	176	199	175	182
11:00	-	174	198	188	203	220	231	197	206
12:00	-	223	199	231	228	242	224	225	224
13:00	-	202	214	227	205	249	202	219	214
14:00	-	230	225	241	223	230	172	230	213
15:00	293	214	207	227	231	269	204	230	235
16:00	273	237	224	278	231	251	209	244	243
17:00	204	276	263	281	292	275	216	277	258
18:00	149	139	154	169	196	192	137	170	162
19:00	86	95	88	98	116	108	96	101	98
20:00	64	63	57	75	78	92	44	73	68
21:00	38	54	61	40	75	49	23	56	49
22:00	18	25	27	42	37	34	34	33	31
23:00	7	15	20	11	17	26	14	18	16
12H,7-19	-	2412	2376	2600	2568	2667	2138	2525	2414
16H,6-22	-	2681	2643	2892	2898	2977	2324	2818	2677
18H,6-24	-	2721	2690	2945	2952	3037	2372	2869	2727
24H,0-24	-	2781	2741	3012	3008	3110	2418	2930	2784
Am	-	7:45	7:45	7:45	7:45	7:45	11:00	-	-
Peak	-	240	204	241	239	228	231	230	231
Pm	-	16:30	16:45	16:45	17:00	16:45	12:15	-	-
Peak	-	284	267	302	292	282	224	285	268

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040003

Site Reference: 00040003

Worcester Road
Week Begin: 21 October 2007

Vehicle Count Report

Channel: Outbound

Time Begin	Sun Oct 21	Mon Oct 22	Tue Oct 23	Wed Oct 24	Thu Oct 25	Fri Oct 26	Sat Oct 27	5-Day Av	7-Day Av
0:00	19	-	-	-	-	-	-	-	-
1:00	5	-	-	-	-	-	-	-	-
2:00	3	-	-	-	-	-	-	-	-
3:00	9	-	-	-	-	-	-	-	-
4:00	2	-	-	-	-	-	-	-	-
5:00	4	-	-	-	-	-	-	-	-
6:00	20	-	-	-	-	-	-	-	-
7:00	57	-	-	-	-	-	-	-	-
8:00	70	-	-	-	-	-	-	-	-
9:00	108	-	-	-	-	-	-	-	-
10:00	159	-	-	-	-	-	-	-	-
11:00	200	-	-	-	-	-	-	-	-
12:00	215	-	-	-	-	-	-	-	-
13:00	207	-	-	-	-	-	-	-	-
14:00	185	-	-	-	-	-	-	-	-
15:00	-	-	-	-	-	-	-	-	-
16:00	-	-	-	-	-	-	-	-	-
17:00	-	-	-	-	-	-	-	-	-
18:00	-	-	-	-	-	-	-	-	-
19:00	-	-	-	-	-	-	-	-	-
20:00	-	-	-	-	-	-	-	-	-
21:00	-	-	-	-	-	-	-	-	-
22:00	-	-	-	-	-	-	-	-	-
23:00	-	-	-	-	-	-	-	-	-
12H,7-19	-	-	-	-	-	-	-	-	-
16H,6-22	-	-	-	-	-	-	-	-	-
18H,6-24	-	-	-	-	-	-	-	-	-
24H,0-24	-	-	-	-	-	-	-	-	-
Am	11:00	-	-	-	-	-	-	-	-
Peak	200	-	-	-	-	-	-	-	-
Pm	-	-	-	-	-	-	-	-	-
Peak	-	-	-	-	-	-	-	-	-

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00400050

Site Reference: 00400050

Monklands Road
Week Begin: 14 October 2007

Vehicle Count Report

Channel: Outbound

Time Begin	Sun Oct 14	Mon Oct 15	Tue Oct 16	Wed Oct 17	Thu Oct 18	Fri Oct 19	Sat Oct 20	5-Day Av	7-Day Av
0:00	-	10	9	7	7	8	17	8	11
1:00	-	5	5	5	1	5	4	4	4
2:00	-	5	1	2	3	1	9	2	4
3:00	-	3	4	5	4	4	3	4	4
4:00	-	11	6	10	12	10	6	10	9
5:00	-	42	48	50	49	40	24	46	40
6:00	-	93	77	86	76	75	27	81	66
7:00	-	178	194	184	200	158	74	183	152
8:00	-	243	213	229	232	208	149	225	203
9:00	-	164	158	164	179	202	190	173	178
10:00	-	197	189	183	199	233	254	200	216
11:00	-	247	205	214	198	248	362	222	262
12:00	-	218	203	235	204	270	298	226	247
13:00	223	239	220	195	207	287	260	230	233
14:00	166	210	216	203	225	306	286	232	230
15:00	190	266	218	233	246	306	268	254	247
16:00	185	252	225	242	254	315	234	258	244
17:00	154	298	271	276	270	350	220	293	263
18:00	127	157	140	173	215	263	138	190	173
19:00	85	99	86	108	120	219	111	126	118
20:00	56	58	68	76	91	126	24	84	71
21:00	42	66	56	52	77	85	33	67	59
22:00	20	33	38	34	44	57	21	41	35
23:00	12	14	14	13	16	38	22	19	18
12H,7-19	-	2669	2452	2531	2629	3146	2733	2685	2699
16H,6-22	-	2985	2739	2853	2993	3651	2928	3044	3011
18H,6-24	-	3032	2791	2900	3053	3746	2971	3104	3066
24H,0-24	-	3108	2864	2979	3129	3814	3034	3179	3137
Am	-	7:45	7:30	7:45	7:30	11:00	11:00	-	-
Peak	-	253	222	240	237	248	362	240	275
Pm	-	16:45	16:45	16:45	16:30	17:00	12:00	-	-
Peak	-	320	276	287	271	350	298	301	300

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00400050

Site Reference: 00400050

Monklands Road
Week Begin: 21 October 2007

Vehicle Count Report

Channel: Outbound

Time Begin	Sun Oct 21	Mon Oct 22	Tue Oct 23	Wed Oct 24	Thu Oct 25	Fri Oct 26	Sat Oct 27	5-Day Av	7-Day Av
0:00	19	-	-	-	-	-	-	-	-
1:00	9	-	-	-	-	-	-	-	-
2:00	10	-	-	-	-	-	-	-	-
3:00	4	-	-	-	-	-	-	-	-
4:00	4	-	-	-	-	-	-	-	-
5:00	9	-	-	-	-	-	-	-	-
6:00	8	-	-	-	-	-	-	-	-
7:00	24	-	-	-	-	-	-	-	-
8:00	53	-	-	-	-	-	-	-	-
9:00	115	-	-	-	-	-	-	-	-
10:00	193	-	-	-	-	-	-	-	-
11:00	249	-	-	-	-	-	-	-	-
12:00	248	-	-	-	-	-	-	-	-
13:00	213	-	-	-	-	-	-	-	-
14:00	198	-	-	-	-	-	-	-	-
15:00	-	-	-	-	-	-	-	-	-
16:00	-	-	-	-	-	-	-	-	-
17:00	-	-	-	-	-	-	-	-	-
18:00	-	-	-	-	-	-	-	-	-
19:00	-	-	-	-	-	-	-	-	-
20:00	-	-	-	-	-	-	-	-	-
21:00	-	-	-	-	-	-	-	-	-
22:00	-	-	-	-	-	-	-	-	-
23:00	-	-	-	-	-	-	-	-	-
12H,7-19	-	-	-	-	-	-	-	-	-
16H,6-22	-	-	-	-	-	-	-	-	-
18H,6-24	-	-	-	-	-	-	-	-	-
24H,0-24	-	-	-	-	-	-	-	-	-
Am	11:00	-	-	-	-	-	-	-	-
Peak	249	-	-	-	-	-	-	-	-
Pm	-	-	-	-	-	-	-	-	-
Peak	-	-	-	-	-	-	-	-	-

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00400050 Site Reference: 00400050

Monklands Road
Week Begin: 14 October 2007

Vehicle Count Report

Channel: Inbound

Time Begin	Sun Oct 14	Mon Oct 15	Tue Oct 16	Wed Oct 17	Thu Oct 18	Fri Oct 19	Sat Oct 20	5-Day Av	7-Day Av
0:00	-	3	6	2	7	4	11	4	6
1:00	-	0	1	3	4	5	8	3	4
2:00	-	1	3	4	3	6	4	3	4
3:00	-	3	5	5	5	4	8	4	5
4:00	-	14	7	12	14	10	5	11	10
5:00	-	35	24	27	31	21	7	28	22
6:00	-	87	84	90	73	76	46	82	72
7:00	-	165	153	141	164	145	63	154	128
8:00	-	273	267	258	233	231	125	252	216
9:00	-	241	244	231	233	269	200	244	231
10:00	-	200	225	231	234	237	247	225	232
11:00	-	239	216	181	197	265	279	220	237
12:00	-	218	181	195	192	262	206	210	209
13:00	210	238	193	198	213	277	225	224	222
14:00	228	242	210	234	244	256	219	237	233
15:00	331	212	233	230	204	292	204	234	244
16:00	285	239	217	253	235	256	213	240	243
17:00	223	225	206	242	245	219	182	227	220
18:00	194	179	161	182	197	186	135	181	176
19:00	111	107	86	93	112	158	104	111	110
20:00	57	52	42	57	67	76	42	59	56
21:00	40	45	43	26	41	49	25	41	38
22:00	10	32	28	29	36	35	18	32	27
23:00	9	13	12	13	15	17	23	14	15
12H,7-19	-	2671	2506	2576	2591	2895	2298	2648	2548
16H,6-22	-	2962	2761	2842	2884	3254	2515	2941	2819
18H,6-24	-	3007	2801	2884	2935	3306	2556	2987	2864
24H,0-24	-	3063	2847	2937	2999	3356	2599	3040	2914
Am	-	8:30	8:00	8:15	8:45	9:15	10:45	-	-
Peak	-	277	267	275	251	284	285	271	275
Pm	-	13:15	15:15	16:45	15:45	15:00	13:30	-	-
Peak	-	247	240	264	253	292	240	259	254

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00400050

Site Reference: 00400050

Monklands Road
Week Begin: 21 October 2007

Vehicle Count Report

Channel: Inbound

Time Begin	Sun Oct 21	Mon Oct 22	Tue Oct 23	Wed Oct 24	Thu Oct 25	Fri Oct 26	Sat Oct 27	5-Day Av	7-Day Av
0:00	19	-	-	-	-	-	-	-	-
1:00	8	-	-	-	-	-	-	-	-
2:00	6	-	-	-	-	-	-	-	-
3:00	1	-	-	-	-	-	-	-	-
4:00	3	-	-	-	-	-	-	-	-
5:00	2	-	-	-	-	-	-	-	-
6:00	32	-	-	-	-	-	-	-	-
7:00	45	-	-	-	-	-	-	-	-
8:00	71	-	-	-	-	-	-	-	-
9:00	115	-	-	-	-	-	-	-	-
10:00	209	-	-	-	-	-	-	-	-
11:00	174	-	-	-	-	-	-	-	-
12:00	223	-	-	-	-	-	-	-	-
13:00	178	-	-	-	-	-	-	-	-
14:00	229	-	-	-	-	-	-	-	-
15:00	-	-	-	-	-	-	-	-	-
16:00	-	-	-	-	-	-	-	-	-
17:00	-	-	-	-	-	-	-	-	-
18:00	-	-	-	-	-	-	-	-	-
19:00	-	-	-	-	-	-	-	-	-
20:00	-	-	-	-	-	-	-	-	-
21:00	-	-	-	-	-	-	-	-	-
22:00	-	-	-	-	-	-	-	-	-
23:00	-	-	-	-	-	-	-	-	-
12H,7-19	-	-	-	-	-	-	-	-	-
16H,6-22	-	-	-	-	-	-	-	-	-
18H,6-24	-	-	-	-	-	-	-	-	-
24H,0-24	-	-	-	-	-	-	-	-	-
Am	10:00	-	-	-	-	-	-	-	-
Peak	209	-	-	-	-	-	-	-	-
Pm	-	-	-	-	-	-	-	-	-
Peak	-	-	-	-	-	-	-	-	-

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040004

Site Reference: 00040004

Hereford Road
Week Begin: 14 October 2007

Vehicle Count Report

Channel: Outbound

Time Begin	Sun Oct 14	Mon Oct 15	Tue Oct 16	Wed Oct 17	Thu Oct 18	Fri Oct 19	Sat Oct 20	5-Day Av	7-Day Av
0:00	-	8	7	7	5	6	13	7	8
1:00	-	3	1	5	3	3	6	3	4
2:00	-	2	3	5	1	4	8	3	4
3:00	-	4	4	6	4	5	6	5	5
4:00	-	9	4	9	3	2	3	5	5
5:00	-	9	21	22	19	21	12	18	17
6:00	-	55	39	30	39	29	18	38	33
7:00	-	112	115	123	112	143	44	121	99
8:00	-	256	250	245	284	271	104	261	216
9:00	-	188	199	175	191	175	146	186	174
10:00	-	163	145	142	184	195	166	166	166
11:00	-	180	179	189	170	195	192	183	185
12:00	-	190	166	233	194	233	237	203	213
13:00	-	219	182	211	230	220	255	212	225
14:00	165	235	203	226	215	246	206	225	214
15:00	191	251	234	257	245	276	269	253	246
16:00	234	290	305	302	307	297	262	300	285
17:00	128	365	326	367	345	385	275	358	313
18:00	134	182	214	208	267	190	170	212	195
19:00	112	114	111	142	149	167	98	137	128
20:00	59	71	74	76	76	104	52	80	73
21:00	39	50	49	53	65	75	40	58	53
22:00	28	45	53	49	43	53	43	49	45
23:00	24	10	23	15	18	30	32	19	22
12H,7-19	-	2631	2518	2678	2744	2826	2326	2679	2578
16H,6-22	-	2921	2791	2979	3073	3201	2534	2993	2862
18H,6-24	-	2976	2867	3043	3134	3284	2609	3061	2932
24H,0-24	-	3011	2907	3097	3169	3325	2657	3102	2975
Am	-	8:00	8:15	8:00	8:15	8:00	11:00	-	-
Peak	-	256	255	245	284	271	192	262	242
Pm	-	17:00	16:45	17:00	16:30	16:45	15:15	-	-
Peak	-	365	338	367	371	398	287	368	345

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040004

Site Reference: 00040004

Hereford Road
Week Begin: 21 October 2007

Vehicle Count Report

Channel: Outbound

Time Begin	Sun Oct 21	Mon Oct 22	Tue Oct 23	Wed Oct 24	Thu Oct 25	Fri Oct 26	Sat Oct 27	5-Day Av	7-Day Av
0:00	37	-	-	-	-	-	-	-	-
1:00	13	-	-	-	-	-	-	-	-
2:00	11	-	-	-	-	-	-	-	-
3:00	8	-	-	-	-	-	-	-	-
4:00	5	-	-	-	-	-	-	-	-
5:00	6	-	-	-	-	-	-	-	-
6:00	8	-	-	-	-	-	-	-	-
7:00	32	-	-	-	-	-	-	-	-
8:00	46	-	-	-	-	-	-	-	-
9:00	98	-	-	-	-	-	-	-	-
10:00	129	-	-	-	-	-	-	-	-
11:00	152	-	-	-	-	-	-	-	-
12:00	172	-	-	-	-	-	-	-	-
13:00	162	-	-	-	-	-	-	-	-
14:00	201	-	-	-	-	-	-	-	-
15:00	-	-	-	-	-	-	-	-	-
16:00	-	-	-	-	-	-	-	-	-
17:00	-	-	-	-	-	-	-	-	-
18:00	-	-	-	-	-	-	-	-	-
19:00	-	-	-	-	-	-	-	-	-
20:00	-	-	-	-	-	-	-	-	-
21:00	-	-	-	-	-	-	-	-	-
22:00	-	-	-	-	-	-	-	-	-
23:00	-	-	-	-	-	-	-	-	-
12H,7-19	-	-	-	-	-	-	-	-	-
16H,6-22	-	-	-	-	-	-	-	-	-
18H,6-24	-	-	-	-	-	-	-	-	-
24H,0-24	-	-	-	-	-	-	-	-	-
Am	11:00	-	-	-	-	-	-	-	-
Peak	152	-	-	-	-	-	-	-	-
Pm	-	-	-	-	-	-	-	-	-
Peak	-	-	-	-	-	-	-	-	-

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040004

Site Reference: 00040004

Hereford Road
Week Begin: 14 October 2007

Vehicle Count Report

Channel: Inbound

Time Begin	Sun Oct 14	Mon Oct 15	Tue Oct 16	Wed Oct 17	Thu Oct 18	Fri Oct 19	Sat Oct 20	5-Day Av	7-Day Av
0:00	-	7	3	6	4	7	9	5	6
1:00	-	3	0	2	3	3	2	2	2
2:00	-	3	3	6	2	4	4	4	4
3:00	-	8	7	6	5	7	5	7	6
4:00	-	18	7	8	15	12	9	12	11
5:00	-	48	41	35	36	37	18	39	33
6:00	-	116	91	98	102	90	44	99	84
7:00	-	274	271	248	253	244	68	258	204
8:00	-	230	245	212	232	207	112	225	193
9:00	-	190	171	203	175	187	168	185	180
10:00	-	201	176	188	188	155	211	182	190
11:00	-	181	184	176	153	174	228	174	189
12:00	-	175	174	202	215	224	225	198	206
13:00	-	162	177	188	191	205	231	185	198
14:00	168	168	174	192	185	211	197	186	185
15:00	162	202	180	230	179	206	200	199	194
16:00	157	210	204	207	209	232	182	212	200
17:00	137	200	232	256	241	240	129	234	205
18:00	120	167	171	153	182	165	121	168	154
19:00	75	100	87	107	134	113	110	108	104
20:00	43	60	51	59	89	56	39	63	57
21:00	36	44	47	65	60	42	38	52	47
22:00	20	35	31	30	48	40	34	37	34
23:00	9	15	12	21	12	23	27	17	17
12H,7-19	-	2360	2359	2455	2403	2450	2072	2405	2310
16H,6-22	-	2680	2635	2784	2788	2751	2303	2728	2606
18H,6-24	-	2730	2678	2835	2848	2814	2364	2781	2662
24H,0-24	-	2817	2739	2898	2913	2884	2411	2850	2725
Am	-	7:15	7:15	7:30	7:30	7:30	10:45	-	-
Peak	-	297	287	278	286	254	231	280	266
Pm	-	16:15	17:00	17:00	16:45	16:15	12:15	-	-
Peak	-	237	232	256	243	261	243	246	245

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040004

Site Reference: 00040004

Hereford Road
Week Begin: 21 October 2007

Vehicle Count Report

Channel: Inbound

Time Begin	Sun Oct 21	Mon Oct 22	Tue Oct 23	Wed Oct 24	Thu Oct 25	Fri Oct 26	Sat Oct 27	5-Day Av	7-Day Av
0:00	27	-	-	-	-	-	-	-	-
1:00	15	-	-	-	-	-	-	-	-
2:00	9	-	-	-	-	-	-	-	-
3:00	6	-	-	-	-	-	-	-	-
4:00	2	-	-	-	-	-	-	-	-
5:00	10	-	-	-	-	-	-	-	-
6:00	30	-	-	-	-	-	-	-	-
7:00	43	-	-	-	-	-	-	-	-
8:00	67	-	-	-	-	-	-	-	-
9:00	88	-	-	-	-	-	-	-	-
10:00	173	-	-	-	-	-	-	-	-
11:00	187	-	-	-	-	-	-	-	-
12:00	212	-	-	-	-	-	-	-	-
13:00	159	-	-	-	-	-	-	-	-
14:00	179	-	-	-	-	-	-	-	-
15:00	-	-	-	-	-	-	-	-	-
16:00	-	-	-	-	-	-	-	-	-
17:00	-	-	-	-	-	-	-	-	-
18:00	-	-	-	-	-	-	-	-	-
19:00	-	-	-	-	-	-	-	-	-
20:00	-	-	-	-	-	-	-	-	-
21:00	-	-	-	-	-	-	-	-	-
22:00	-	-	-	-	-	-	-	-	-
23:00	-	-	-	-	-	-	-	-	-
12H,7-19	-	-	-	-	-	-	-	-	-
16H,6-22	-	-	-	-	-	-	-	-	-
18H,6-24	-	-	-	-	-	-	-	-	-
24H,0-24	-	-	-	-	-	-	-	-	-
Am	11:00	-	-	-	-	-	-	-	-
Peak	187	-	-	-	-	-	-	-	-
Pm	-	-	-	-	-	-	-	-	-
Peak	-	-	-	-	-	-	-	-	-

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040006

Site Reference: 00040006

Choistrey Road
Week Begin: 14 October 2007

Vehicle Count Report

Channel: Inbound

Time Begin	Sun Oct 14	Mon Oct 15	Tue Oct 16	Wed Oct 17	Thu Oct 18	Fri Oct 19	Sat Oct 20	5-Day Av	7-Day Av
0:00	-	4	3	0	5	4	8	3	5
1:00	-	4	2	0	2	3	5	2	3
2:00	-	2	3	0	2	2	1	2	2
3:00	-	4	4	0	2	5	5	3	4
4:00	-	12	12	0	10	15	3	10	8
5:00	-	45	36	0	23	31	11	27	22
6:00	-	81	64	2	79	71	30	59	51
7:00	-	201	199	0	182	177	80	152	131
8:00	-	325	318	0	334	312	157	258	229
9:00	-	298	270	5	305	341	275	244	253
10:00	-	246	250	236	235	253	330	244	269
11:00	-	226	229	231	236	256	351	236	269
12:00	250	222	209	226	227	247	284	226	238
13:00	185	225	234	238	242	217	224	231	224
14:00	206	216	217	244	219	233	243	226	225
15:00	191	226	194	251	266	272	208	242	230
16:00	174	238	10	208	238	296	161	198	189
17:00	186	291	13	285	295	285	170	234	218
18:00	126	183	1	219	219	225	160	169	162
19:00	102	133	0	144	145	133	107	111	109
20:00	40	52	0	82	130	61	55	65	60
21:00	35	52	0	93	119	57	30	64	55
22:00	17	26	0	41	89	31	55	37	37
23:00	4	15	0	14	5	25	25	12	13
12H,7-19	-	2897	2144	2143	2998	3114	2643	2659	2655
16H,6-22	-	3215	2208	2464	3471	3436	2865	2959	2932
18H,6-24	-	3256	2208	2519	3565	3492	2945	3008	2990
24H,0-24	-	3327	2268	2519	3609	3552	2978	3055	3033
Am	-	8:30	8:15	10:15	8:30	8:30	11:00	-	-
Peak	-	349	329	242	363	379	351	332	338
Pm	12:00	16:45	12:45	17:00	17:00	15:45	12:00	-	-
Peak	250	296	251	285	295	304	284	286	281

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040006

Site Reference: 00040006

Choistrey Road
Week Begin: 21 October 2007

Vehicle Count Report

Channel: Inbound

Time Begin	Sun Oct 21	Mon Oct 22	Tue Oct 23	Wed Oct 24	Thu Oct 25	Fri Oct 26	Sat Oct 27	5-Day Av	7-Day Av
0:00	21	-	-	-	-	-	-	-	-
1:00	12	-	-	-	-	-	-	-	-
2:00	6	-	-	-	-	-	-	-	-
3:00	10	-	-	-	-	-	-	-	-
4:00	4	-	-	-	-	-	-	-	-
5:00	4	-	-	-	-	-	-	-	-
6:00	28	-	-	-	-	-	-	-	-
7:00	34	-	-	-	-	-	-	-	-
8:00	75	-	-	-	-	-	-	-	-
9:00	125	-	-	-	-	-	-	-	-
10:00	236	-	-	-	-	-	-	-	-
11:00	185	-	-	-	-	-	-	-	-
12:00	256	-	-	-	-	-	-	-	-
13:00	219	-	-	-	-	-	-	-	-
14:00	-	-	-	-	-	-	-	-	-
15:00	-	-	-	-	-	-	-	-	-
16:00	-	-	-	-	-	-	-	-	-
17:00	-	-	-	-	-	-	-	-	-
18:00	-	-	-	-	-	-	-	-	-
19:00	-	-	-	-	-	-	-	-	-
20:00	-	-	-	-	-	-	-	-	-
21:00	-	-	-	-	-	-	-	-	-
22:00	-	-	-	-	-	-	-	-	-
23:00	-	-	-	-	-	-	-	-	-
12H,7-19	-	-	-	-	-	-	-	-	-
16H,6-22	-	-	-	-	-	-	-	-	-
18H,6-24	-	-	-	-	-	-	-	-	-
24H,0-24	-	-	-	-	-	-	-	-	-
Am	10:00	-	-	-	-	-	-	-	-
Peak	236	-	-	-	-	-	-	-	-
Pm	-	-	-	-	-	-	-	-	-
Peak	-	-	-	-	-	-	-	-	-

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040006

Site Reference: 00040006

Choistrey Road
Week Begin: 14 October 2007

Vehicle Count Report

Channel: Outbound

Time Begin	Sun Oct 14	Mon Oct 15	Tue Oct 16	Wed Oct 17	Thu Oct 18	Fri Oct 19	Sat Oct 20	5-Day Av	7-Day Av
0:00	-	6	5	0	10	6	15	5	8
1:00	-	1	5	0	1	2	3	2	2
2:00	-	2	4	0	0	0	3	1	2
3:00	-	4	7	0	4	2	1	3	3
4:00	-	9	14	0	10	8	2	8	6
5:00	-	26	21	1	21	24	14	19	17
6:00	-	46	43	2	40	43	19	35	30
7:00	-	156	158	1	152	152	50	124	103
8:00	-	230	213	1	223	216	109	177	157
9:00	-	149	145	4	169	174	163	128	138
10:00	-	164	151	166	188	205	209	175	185
11:00	-	199	196	233	233	230	258	218	230
12:00	182	242	230	221	233	254	306	236	238
13:00	193	235	222	237	240	219	304	231	236
14:00	168	200	223	248	265	280	242	243	232
15:00	185	270	206	294	267	314	271	270	258
16:00	180	315	166	315	342	336	260	295	273
17:00	177	395	106	416	394	380	249	338	302
18:00	134	216	2	257	315	254	182	209	194
19:00	98	131	0	147	195	217	137	138	132
20:00	53	74	0	116	101	115	64	81	75
21:00	35	71	0	73	90	80	44	63	56
22:00	18	42	0	52	62	69	47	45	41
23:00	10	11	0	22	13	27	41	15	18
12H,7-19	-	2771	2018	2393	3021	3014	2603	2643	2632
16H,6-22	-	3093	2061	2731	3447	3469	2867	2960	2934
18H,6-24	-	3146	2061	2805	3522	3565	2955	3020	3001
24H,0-24	-	3194	2117	2806	3568	3607	2993	3058	3040
Am	-	7:45	7:45	11:00	11:00	10:45	11:00	-	-
Peak	-	236	227	233	233	234	258	233	240
Pm	16:30	17:00	14:30	17:00	17:00	17:00	12:15	-	-
Peak	211	395	249	416	394	380	312	367	337

- Edited Data, L - Local Event, G1 - Global Event + Event Level

Site No: 00040006

Site Reference: 00040006

Choistrey Road
Week Begin: 21 October 2007

Vehicle Count Report

Channel: Outbound

Time Begin	Sun Oct 21	Mon Oct 22	Tue Oct 23	Wed Oct 24	Thu Oct 25	Fri Oct 26	Sat Oct 27	5-Day Av	7-Day Av
0:00	21	-	-	-	-	-	-	-	-
1:00	9	-	-	-	-	-	-	-	-
2:00	3	-	-	-	-	-	-	-	-
3:00	10	-	-	-	-	-	-	-	-
4:00	3	-	-	-	-	-	-	-	-
5:00	6	-	-	-	-	-	-	-	-
6:00	8	-	-	-	-	-	-	-	-
7:00	28	-	-	-	-	-	-	-	-
8:00	40	-	-	-	-	-	-	-	-
9:00	113	-	-	-	-	-	-	-	-
10:00	194	-	-	-	-	-	-	-	-
11:00	198	-	-	-	-	-	-	-	-
12:00	216	-	-	-	-	-	-	-	-
13:00	186	-	-	-	-	-	-	-	-
14:00	-	-	-	-	-	-	-	-	-
15:00	-	-	-	-	-	-	-	-	-
16:00	-	-	-	-	-	-	-	-	-
17:00	-	-	-	-	-	-	-	-	-
18:00	-	-	-	-	-	-	-	-	-
19:00	-	-	-	-	-	-	-	-	-
20:00	-	-	-	-	-	-	-	-	-
21:00	-	-	-	-	-	-	-	-	-
22:00	-	-	-	-	-	-	-	-	-
23:00	-	-	-	-	-	-	-	-	-
12H,7-19	-	-	-	-	-	-	-	-	-
16H,6-22	-	-	-	-	-	-	-	-	-
18H,6-24	-	-	-	-	-	-	-	-	-
24H,0-24	-	-	-	-	-	-	-	-	-
Am Peak	9:45 201	- -	- -	- -	- -	- -	- -	- -	- -
Pm Peak	- -	- -	- -	- -	- -	- -	- -	- -	- -

- Edited Data, L - Local Event, G1 - Global Event + Event Level

APPENDIX F

Video Survey Spreadsheet and Distribution Diagram

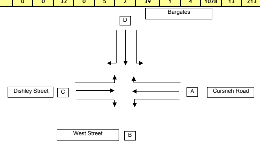
Junction: Bargates/Cursneh Road Signals X Roads
Date of Survey: 17th October 2007

Time		Movement A to B							Movement A to C							Movement A to D						
From	To	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL
7:00	7:15	0	0	0	0	0	0	0	0	1	16	1	4	0	22	0	0	16	0	13	10	39
7:15	7:30	0	0	0	0	0	0	0	0	0	13	0	8	2	23	0	1	23	0	4	13	41
7:30	7:45	0	0	0	0	0	0	0	0	0	19	0	8	0	27	0	0	22	0	12	3	37
7:45	8:00	0	0	0	0	0	0	0	0	0	35	0	8	1	44	0	0	30	0	9	5	44
		0	0	0	0	0	0	0	0	1	83	1	28	3	116	0	1	91	0	38	31	161
8:00	8:15	0	0	1	0	0	1	2	0	0	18	2	3	1	24	0	0	34	0	11	10	55
8:15	8:30	0	0	0	0	0	0	0	0	0	36	1	6	0	43	0	0	44	0	14	5	63
8:30	8:45	0	0	0	0	1	0	1	0	0	54	1	9	0	64	0	1	46	0	9	11	67
8:45	9:00	0	0	0	0	0	0	0	0	0	48	0	11	3	62	0	0	51	0	8	1	60
		0	0	1	0	1	1	3	0	0	156	4	29	4	193	0	1	175	0	42	27	245
9:00	9:15	0	0	1	0	0	0	1	0	0	34	0	7	3	44	0	0	35	0	10	5	50
9:15	9:30	0	0	3	0	0	0	3	0	0	29	0	8	0	37	0	0	49	0	12	8	69
9:30	9:45	0	0	1	0	0	0	1	0	0	29	1	4	1	35	0	0	26	0	8	6	40
9:45	10:00	0	0	1	0	0	0	1	0	1	27	0	7	0	35	0	0	49	1	12	7	69
		0	0	6	0	0	0	6	0	1	119	1	26	4	151	0	0	159	1	42	26	228
10:00	10:15	0	0	1	0	1	0	2	0	0	33	0	8	0	41	0	0	34	0	12	7	53
10:15	10:30	0	0	2	0	0	1	3	0	0	33	0	6	1	40	0	0	62	0	9	5	76
10:30	10:45	0	0	0	0	0	0	0	0	0	38	0	7	1	46	0	0	53	0	9	5	67
10:45	11:00	0	0	2	0	0	0	2	0	0	8	1	6	0	15	0	0	19	0	0	1	20
		0	0	5	0	1	1	7	0	0	112	1	27	2	142	0	0	168	0	30	18	216
15:00	15:15	0	0	2	0	0	0	2	0	0	58	0	14	0	72	0	0	63	0	8	6	77
15:15	15:30	0	0	3	0	0	0	3	0	1	38	0	6	0	45	0	0	51	0	8	11	70
15:30	15:45	0	0	2	0	1	0	3	0	0	49	0	9	1	59	0	0	52	0	14	3	69
15:45	16:00	0	0	0	0	0	0	0	0	0	27	1	7	0	35	0	1	70	0	7	5	83
		0	0	7	0	1	0	8	0	1	172	1	36	1	211	0	1	236	0	37	25	299
16:00	16:15	0	0	1	0	1	0	2	0	0	40	0	3	0	43	1	0	61	0	13	3	78
16:15	16:30	0	0	0	0	0	0	0	0	0	33	1	8	0	42	0	0	48	0	9	9	66
16:30	16:45	0	0	1	0	0	0	1	0	0	34	1	2	0	37	0	1	69	0	5	4	79
16:45	17:00	0	0	0	0	0	0	0	0	0	32	0	9	0	41	0	0	83	0	12	7	102
		0	0	2	0	1	0	3	0	0	139	2	22	0	163	1	1	261	0	39	23	325
17:00	17:15	0	0	5	0	0	0	5	1	0	42	0	3	0	46	1	0	89	0	11	6	107
17:15	17:30	0	0	2	0	0	0	2	0	0	39	1	4	0	44	2	1	79	0	6	2	90
17:30	17:45	0	0	0	0	0	0	0	0	0	48	0	5	0	53	0	0	77	0	21	4	102
17:45	18:00	0	0	0	0	0	0	0	0	0	32	1	7	0	40	0	0	69	0	12	6	87
		0	0	7	0	0	0	7	1	0	161	2	19	0	183	3	1	314	0	50	18	386
18:00	18:15	0	0	0	0	1	0	1	0	0	44	0	4	0	48	0	0	46	0	9	4	59
18:15	18:30	0	0	2	0	0	0	2	0	0	34	1	7	0	42	0	0	67	1	6	5	79
18:30	18:45	0	0	2	0	0	0	2	0	0	28	0	7	1	36	0	0	46	0	4	1	51
18:45	19:00	0	0	0	0	0	0	0	0	1	30	0	8	0	39	0	1	36	0	4	1	42
		0	0	4	0	1	0	5	0	1	136	1	26	1	165	0	1	195	1	23	11	231
TOTAL		0	0	32	0	5	2	39	1	4	1078	13	213	15	1324	4	6	1599	2	301	179	2091

Time		Movement B to A							Movement B to C							Movement B to D						
From	To	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL
7:00	7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
7:15	7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
8:00	8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15	8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
8:30	8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
8:45	9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
9:00	9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15	9:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30	9:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45	10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3

Time		Movement C to A							Movement C to B							Movement C to D						
From	To	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL
7:00	7:15	1	0	4	1	5	0	11	0	0	2	0	0	0	2	0	0	11	1	9	0	21
7:15	7:30	0	0	12	0	6	0	18	0	0	0	0	0	0	0	0	0	14	1	11	2	28
7:30	7:45	0	0	12	0	6	0	18	0	0	1	0	0	0	1	0	0	28	3	18	0	49
7:45	8:00	0	0	20	0	8	0	28	0	0	1	0	0	0	1	0	0	32	3	14	2	51
		1	0	48	1	25	0	75	0	0	4	0	0	0	4	0	0	85	8	52	4	149
8:00	8:15	0	0	19	2	10	0	31	0	0	0	0	2	0	2	0	0	38	0	12	1	51
8:15	8:30	0	0	17	2	6	0	25	0	0	0	0	2	0	2	0	0	38	21	0	0	59
8:30	8:45	0	0	39	0	14	0	53	0	0	3	0	0	0	3	0	0	48	2	3	0	53
8:45	9:00	0	0	38	1	7	0	46	0	0	4	0	0	0	4	0	0	38	0	7	0	45
		0	0	113	5	37	0	155	0	0	7	0	4	0	11	0	0	162	23	22	1	208
9:00	9:15	0	0	32	1	8	0	41	0	0	3	0	0	0	3	0	0	44	2	11	2	59
9:15	9:30	1	0	27	0	3	1	32	0	0	1	0	0	0	1	0	0	47	0	6	0	53
9:30	9:45	0	0	24	1	10	0	35	0	0	2	0	0	0	2	0	0	39	1	9	1	50
9:45	10:00	0	0	24	0	7	0	31	0	0	3	0	0	0	3	0	0	38	1	6	0	45
		1	0	107	2	28	1	139	0	0	9	0	0	0	9	0	0	168	4	32	3	207
10:00	10:15	0	0	25	1	3	1	30	0	0	1	0	1	0	2	0	0	46	1	10	0	57
10:15	10:30	0	0	24	0	4	1	29	0	0	1	0	0	0	1	0	0	40	0	14	5	59
10:30	10:45	0	0	28	0	6	1	35	0	0	5	0	0	0	5	0	0	46	1	12	0	59
10:45	11:00	0	0	15	0	2	2	19	0	0	1	0	0	0	1	0	0	24	0	2	2	28
		0	0	92	1	15	5	113	0	0	8	0	1	0	9	0	0	156	2	38	7	203
15:00	15:15	0	1	35	1	4	1	42	0	0	1	0	1	0	2	0	0	80	3	6	0	89
15:15	15:30	0	0	31	0	8	0	39	0	0	4	0	0	0	4	0	2	60	1	3	1	67
15:30	15:45	0	0	41	1	7	1	50	0	0	4	0	1	0	5	0	0	81	1	7	0	89
15:45	16:00	1	0	32	1	3	1	38	0	0	0	0	1	0	1	0	0	62	0	5	3	70
		1	1	139	3	22	3	169	0	0	9	0	3	0	12	0	2	283	5	21	4	315
16:00	16:15	0	0	39	2	6	2	49	0	0	5	0	3	0	8	0	0	67	2	9	2	80
16:15	16:30	0	0	38	0	4	0	42	0	1	1	0	0	0	2	1	2	63	1	7	1	75
16:30	16:45	0	0	31	0	4	0	35	0	0	2	0	0	0	2	0	0	63	1	16	1	81
16:45	17:00	0	0	28	1	9	3	41	0	0	1	0	0	0	1	0	0	73	0	5	1	79
		0	0	136	3	23	5	167	0	1	9	0	3	0	13	1	2	266	4	37	5	315
17:00	17:15	1	0	39	0	7	0	47	0	0	2	0	0	0	2	0	0	78	1	18	1	98
17:15	17:30	0	0	26	1	8	0	35	0	0	2	0	0	0	2	0	0	91	0	16	0	107
17:30	17:45	0	1	41	0	4	0	46	0	0	1	0	0	0	1	0	1	72	0	12	0	85
17:45	18:00	0	0	46	1	6	0	53	0	0	3	0	1	0	4	0	0	76	2	14	0	92
		1	1	152	2	25	0	181	0	0	8	0	1	0	9	0	1	317	3	60	1	382
18:00	18:15	0	0	36	0	6	0	42	0	0	4	0	0	0	4	0	0	88	0	6	0	94
18:15	18:30	0	0	32	0	1	0	33	0	0	3	0	0	0	3	0	1	62	0	8	1	72
18:30	18:45	1	0	38	0	0	0	39	0	0	2	0	1	0	3	0	0	53	0	9	0	62
18:45	19:00	0	0	23	1	2	1	27	0	0	0	0	0	0	0	0	0	61	0	3	0	64
		1	0	129	1	9	1	141	0	0	9	0	1	0	10	0	1	264	0	26	1	292
TOTAL		5	2	916	18	184	15	1140	0	1	63	0	13	0	77	1	6	1701	49	288	26	2071

Time		Movement D to A							Movement D to B							Movement D to C							TOTAL
From	To	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	Pedal	Motor cycle	Cars / Taxi	Bus and Coach	LGV/ Van	HGV	TOTAL	
7:00	7:15	0	0	11	0	11	3	25	0	0	4	0	0	0	4	0	2	25	0	11	2	40	165
7:15	7:30	0	0	25	0	12	0	2	0	0	3	0	3	0	6	0	0	50	0	11	2	63	181
7:30	7:45	0	0	25	0	13	3	41	1	0	3	0	1	0	5	1	1	52	0	15	0	69	247
7:45	8:00	0	0	35	0	11	6	52	0	0	9	0	5	0	14	0	0	57	0	18	0	75	309
		0	0	96	0	47	12	120	1	0	19	0	9	0	29	1	3	184	0	55	4	247	902
8:00	8:15	2	0	32	0	11	5	50	0	0	9	0	3	0	12	0	0	50	0	14	0	64	291
8:15	8:30	1	0	53	0	10	4	68	0	0	13	0	3	0	16	0	0	69	0	14	0	83	360
8:30	8:45	0	0	47	0	9	7	63	0	0	7	0	1	0	8	0	0	62	3	10	0	75	388
8:45	9:00	0	0	62	1	11	6	80	0	0	18	0	2	0	20	0	0	62	2	13	1	78	395
		3	0	194	1	41	22	261	0	0	47	0	9	0	56	0	0	243	5	51	1	300	1434
9:00	9:15	0	0	41	0	11	6	58	0	0	19	0	2	0	21	0	0	47	2	10	1	60	337
9:15	9:30	0	0	43	0	6	6	55	0	0	21	0	3	0	24	1	0	61	1	7	0	70	344
9:30	9:45	0	0	35	0	2	5	42	0	0	12	0	2	0	14	0	0	44	0	1	9	54	273
9:45	10:00	0	0	51	0	4	8	63	1	0	29	0	5	0	35	0	0	47	1	8	3	59	341
		0	0	170	0	23	25	218	1	0	81	0	12	0	94	1	0	199	4	26	13	243	1295
10:00	10:15	0	0	41	0	11	3	55	0	0	21	0	1	0	22	0	0	52	0	7	3	62	324
10:15	10:30	0	0	43	0	3	6	52	0	1	17	0	2	1	21	0	0	37	0	6	1	44	325
10:30	10:45	0	0	52	0	7	16	75	0	0	26	0	1	0	27	0	0	52	0	5	0	57	371
10:45	11:00	0	0	15	0	3	4	22	0	0	7	0	1	0	8	0	0	20	1	2	0	23	138
		0	0	151	0	24	29	204	0	1	71	0	5	1	78	0	0	161	1	20	4	186	1158
15:00	15:15	0	2	61	1	8	6	78	0	0	13	0	4	0	17	0	0	40	0	4	1	45	424
15:15	15:30	0	0	49	0	16	6	71	0	0	12	0	2	0	14	0	0	63	1	10	1	75	388
15:30	15:45	0	1	51	0	5	4	61	0	1	17	0	2	0	20	0	0	43	0	5	1	49	405
15:45	16:00	0	1	44	0	8	6	59	0	0	10	0	0	0	10	0	0	42	3	11	1	57	353
		0	4	205	1	37	22	269	0	1	52	0	8	0	61	0	0	188	4	30	4	226	1570
16:00	16:15	0	0	57	0	14	2	73	0	0	6	0	0	0	6	0	0	44	1	8	1	54	393
16:15	16:30	0	1	50	1	10	8	70	0	0	15	0	2	0	17	0	0	45	2	5	1	53	367
16:30	16:45	0	0	42	0	7	1	50	0	0	14	0	4	0	18	0	0	50	0	4	0	54	357
16:45	17:00	0	0	47	0	12	11	70	0	0	9	0	4	0	13	1	0	44	2	11	0	58	405
		0	1	196	1	43	22	263	0	0	44	0	10	0	54	1	0	183	5	28	2	219	1522
17:00	17:15	0	0	32	1	7	1	41	0	0	11	0	0	0	11	0	0	38	0	6	1	45	402
17:15	17:30	0	1	52	0	6	3	62	0	0	15	0	2	0	17	0	1	47	1	8	0	57	416
17:30	17:45	0	0	61	0	11	2	74	0	0	10	0	0	0	10	3	1	48	1	6	0	59	430
17:45	18:00	0	0	61	0	9	3	73	0	0	5	0	4	0	9	0	0	53	1	7	0	61	419
		0	1	206	1	33	9	250	0	0	41	0	6	0	47	3	2	186	3	27	1	222	1667
18:00	18:15	1	0	51	0	5	3	60	0	0	6	0	0	0	6	0	0	51	0	6	0	57	371
18:15	18:30	1	0	51	0	4	3	59	1	0	14	0	0	0	15	0	0	58	0	4	0	62	367
18:30	18:45	0	0	47	0	10	3	60	1	0	7	0	2	0	10	0	0	49	0	7	0	56	319
18:45	19:00	0	0	49	0	7	3	59	1	0	14	0	2	0	17	2	0	45	1	3	2	53	301
		2	0	198	0	26	12	238	3	0	41	0	4	0	48	2	0	203	1	20	2	228	1358
TOTAL		5	6	1416	4	274	153	1823	5	2	396	0	63	1	467	8	5	1547	23	257	31	1871	10906



AM PEAK HOUR (08:00-09:00)
PM PEAK HOUR (17:00-18:00)