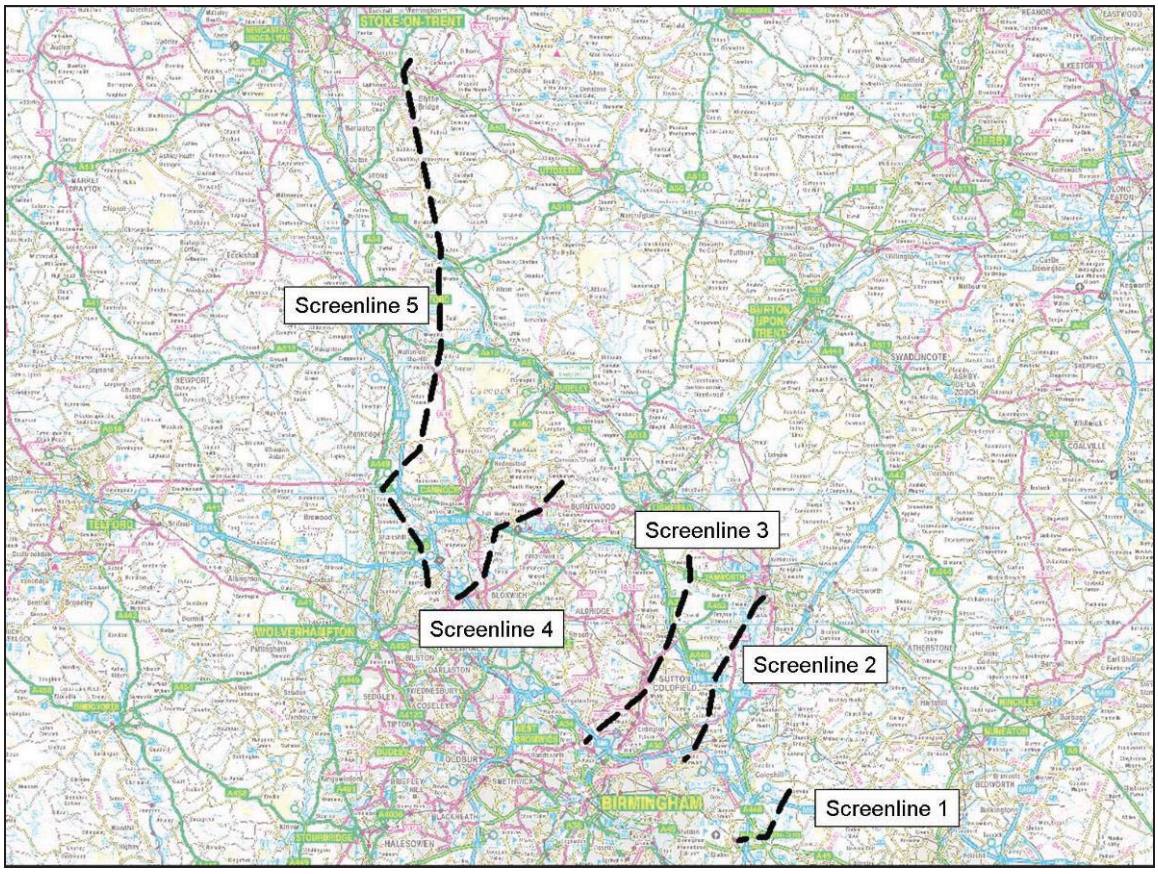
6. Strategic Screenlines

Introduction

6.1 Previous sections in this report have presented changes in traffic flows at individual count locations. Some of these count locations have also been grouped into 'screenlines'. A screenline can be described as an imaginary line intersecting routes on a map to allow easier analysis of vehicular movement across a wider corridor.

6.2 At the one year after stage, five strategic screenlines were identified which would enable the impacts of the M6 Toll to be analysed more clearly and at a wider strategic level. Unfortunately, there was not sufficient data available in order to repeat the analysis for all five strategic screenlines included in the one year after report, however this section provides analysis of the screenlines for which data is available, namely screenlines 2, 3, 4 and 5 shown in Figure 6.1 below:

Figure 6.1 - Location of Strategic Screenlines



6.3 Total traffic flows crossing the screenlines in the AM and PM peaks, and over 24 hours (AWT) are shown for March 2003 (before), March 2005 (one year after), and March 2009 (five years after), by direction in figures 6.2 to 6.5.

6.4 Where March data was not available at a specific count location, seasonal adjustment has been applied, which has been taken from nearby parallel routes with good long term data. Factors have also been applied to the 2003 and 2005 flows to take account of background traffic growth between those years and 2009. These background growth factors were included earlier in this report in Table 3.1 of Section 3.

6.5 Further detailed flows for each screenline are included in Appendix A of this report.

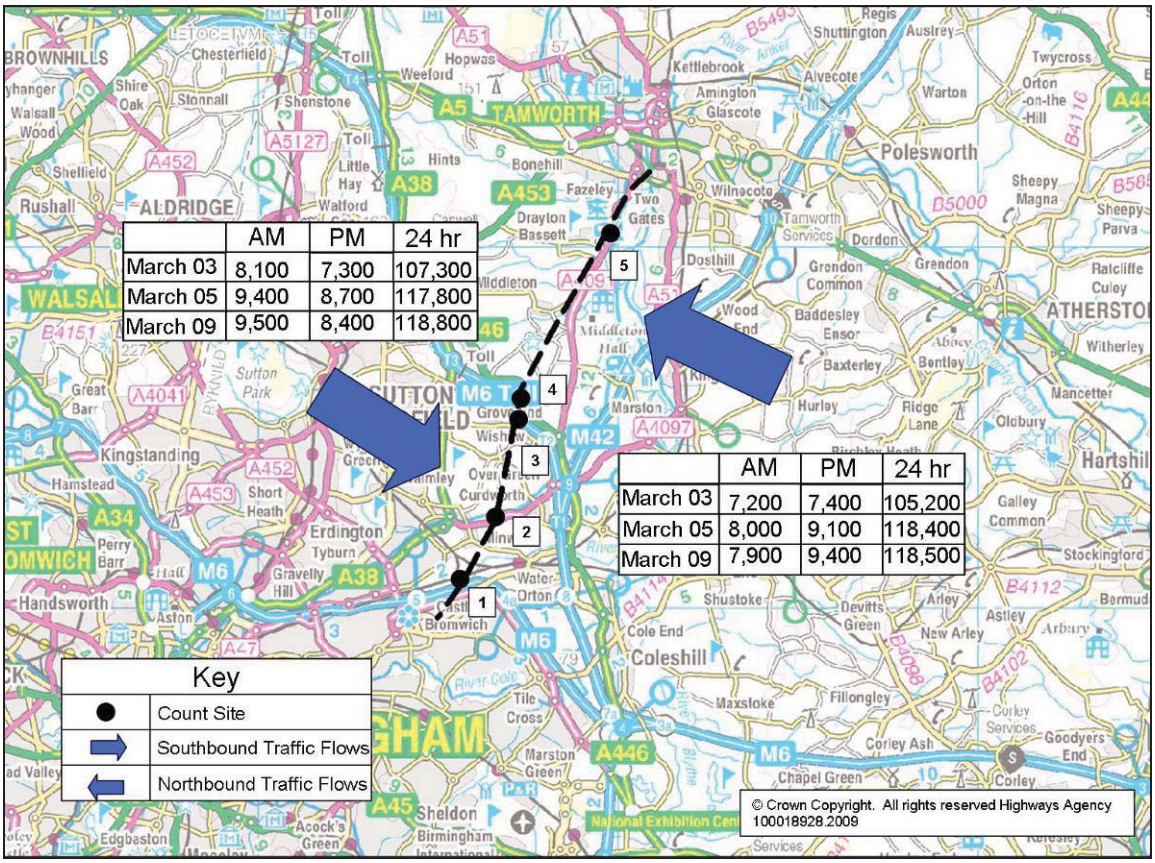
Screenline 1 – East of the southern tie-in of M6 Toll

6.6 There was insufficient data available across Screenline 1 in order to draw meaningful conclusions, therefore this screenline has not been included in this Section.

Screenline 2 – West of southern tie-in of M6 Toll

6.7 Screenline 2 is located to the north east of Birmingham and is west of the southern tie-in of the M6 Toll. It intersects a parallel section of the M6, the A4097, M6 Toll, A446 and the A4091. This is shown in Figure 6.2.

Figure 6.2 – Before and After Weekday Traffic Flows across Screenline 2



6.8 The following points can be made from Figure 6.2 and the Screenline tables included in the Appendix A.4:

- There has been a large increase in peak hour flows and in 24 hour weekday flows, in both directions since the opening of the M6 Toll. However, the vast majority of this increase occurred by March 2005; and
- Increases of 11% (11,500 vehicles) in the south-east direction, and 13% (13,300 vehicles) in the north-west direction were observed at the one year after stage. In 2009 however, there was very little change compared to 2005 when considering the total traffic crossing the screenline.

6.9 Looking in detail at the distribution of the flows over the routes within the screenline (included in Appendix A.4) and how this has changed, we can draw the following conclusions:

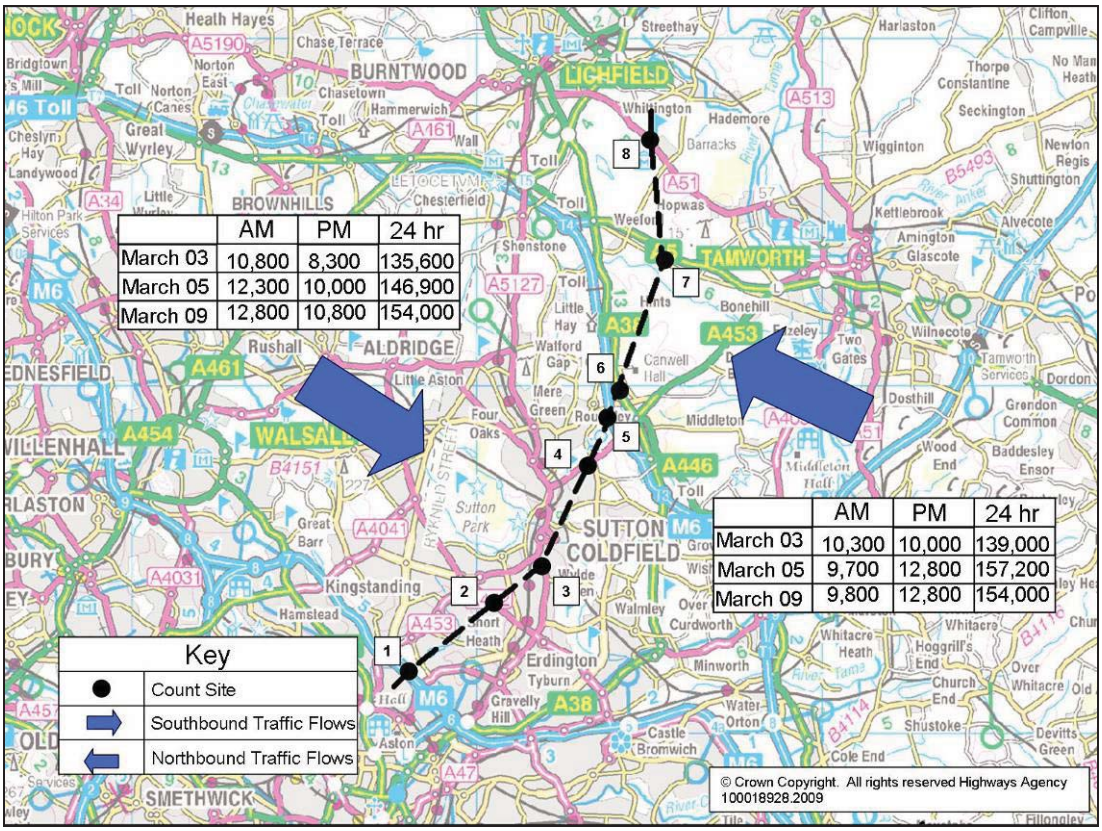
- The A446 is the only route on the screenline to show a slight increase in flows between 2003 and 2009. After the significant reduction which had been observed in 2005, it is clear that flows have returned to previous levels before the M6 Toll opened;

- Despite the total flows across the screenline remaining very similar between 2005 and 2009, the proportion of traffic on the individual routes has changed, with the M6 Toll flows reduced by around 20%, and the parallel A446 increased by approximately 28%. This indicates that whilst there has been little overall increase across this screenline since 2005, there has clearly been some re-assignment of traffic, away from the M6 Toll and some of this has been on to the A446.

Screenline 3 – Central Screenline

6.10 Screenline 3 is located to the north east of Birmingham, and intersects the M6, A452, A453, A5127, M6 Toll, A38, A5 and the A51. The screenline is shown in Figure 6.3.

Figure 6.3 – Before and After Weekday Traffic Flows across Screenline 3



6.11 The key points from Figure 6.3 are:

- Traffic flows on this screenline have shown the most significant increase overall between the years of 2003 and 2009, with an 11% increase northbound, and a 14% increase southbound. However, there was an increase southbound since 2005, and a slight reduction northbound; and
- There was a directional disparity between the total number of vehicles crossing the screenline in 2003, and to a greater extent in 2005, with more vehicles travelling in the north-west direction. This was mainly due to the directional split in flows on the M6 between J6 and J7. The directional split across the screenline no longer exists, with around 154,000 vehicles on an average weekday in each direction.

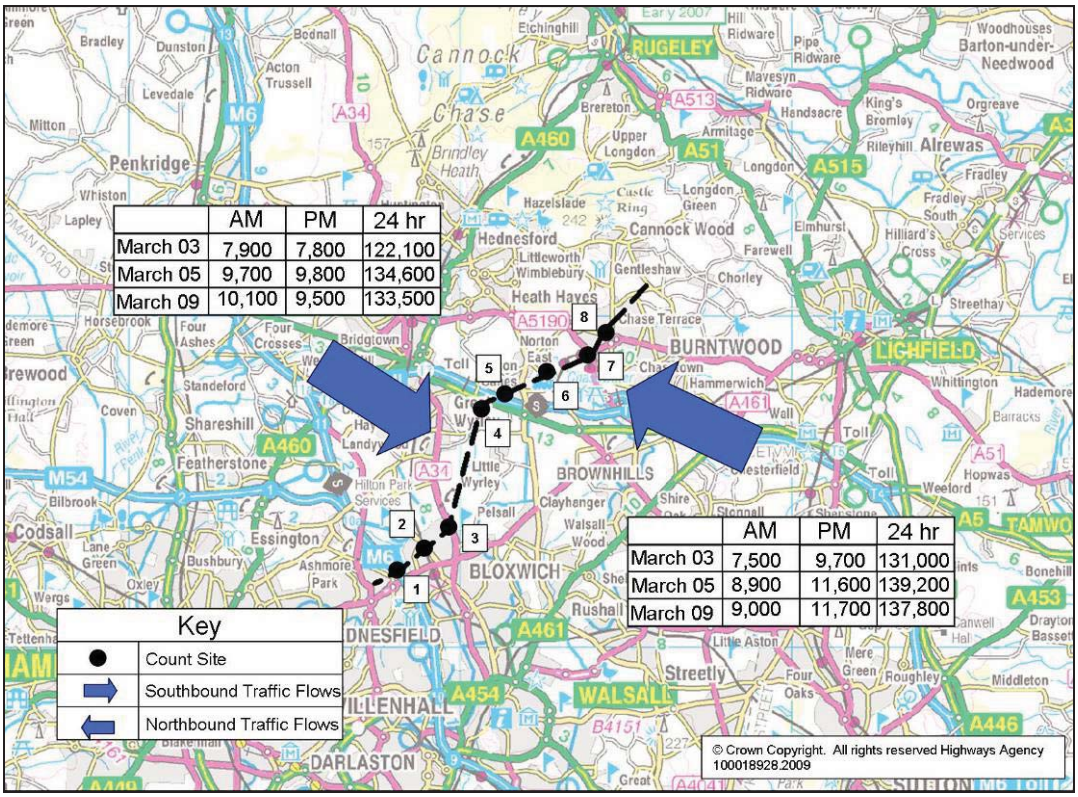
6.12 Looking in greater detail at the distribution of the flows over the routes within screenline 3 (included in Appendix A.4) and how this has changed, we can draw the following conclusions:

- The most significant change has been on the A5, with average two way AWTs up by more than 6,000 vehicles a day, likely to be in part due to the Weeford – Fazeley improvements scheme which opened in October 2005;
- Since 2005 there has been significant reassignment of traffic from the M6 Toll onto other routes across the screenline. This is apparent from the reduction of M6 Toll traffic by 7,600 vehicles (two way) and sizeable increases on the A38 (increases of 5,400 per day), and the A5 (increases of 6,700 per day) although as previously mentioned, some of this increase is likely to have been generated by the A5 Weeford – Fazeley improvements scheme;
- It is also likely that some reassignment from the A51 to A5 has also taken place, with a reduction of more than 3,000 vehicles per day since 2005;
- There has also been an apparent shift in the directional distribution of traffic on the M6. Between 2005 and 2009, northbound flows on the M6 have reduced slightly, but in the southbound direction flows have increased significantly – by around 5,200 vehicles per day (approximately 8%). This indicates that the parallel section of the M6 has become a more attractive route for vehicles heading south towards Birmingham.

Screenline 4 – east of the Northern tie-in of M6 Toll

6.13 Screenline 4 is located to the south of Cannock and intersects the M6, B4210, A34, M6 Toll, A5, B4154, A5190 (Burntwood Bypass) and the A5190 Cannock Road. The screenline is shown in Figure 6.4.

Figure 6.4 – Before and After Weekday Traffic Flows across Screenline 4



6.14 Figure 6.4 shows that:

- Across screenline 4 there has been an increase in total traffic in the peaks and over the 24 hour period in both directions between March 2003 and March 2009;

- In terms of the average 24 hour weekday flows (AWTs), the increases have been 9% (11,400 vehicles) in the south-easterly direction, and 5% (6,800 vehicles) in the north-easterly direction between 2003 and 2009; and
- There appears to have been a slight reduction in the total traffic crossing the screenline between 2005 and 2009.

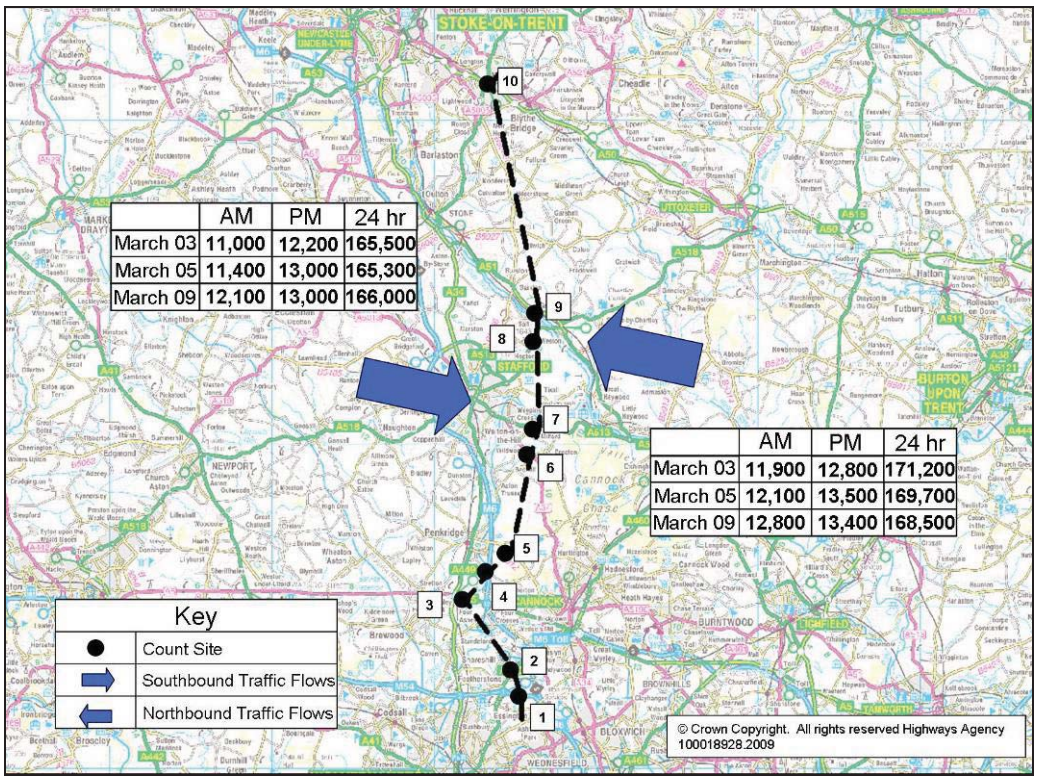
6.15 Looking in greater detail at the composition of the flows within screenline 4 (included in Appendix A.4) and how this has changed, we can draw the following conclusions:

- Where the screenline intersects the M6 Toll, two way flows have reduced by around 8,000 between 2005 and 2009. Over the same period, on the M6 two way flows have increased by around 4,500 showing some reassignment has taken place back on to the M6. However, this does not equate to the total reduction in flows on the M6 Toll; and
- There has been an increase of almost 5,000 vehicles (two way) on the A5190 at Burntwood, which would seem to explain the remainder of the reassignment. However traffic flow reductions on the A34 and B4154 explain the slight reduction overall across the screenline between 2005 and 2009.

Screenline 5 – west of the northern tie-in of the M6 Toll

6.16 Screenline 5 is the longest of the screenlines, and runs parallel to the M6 between Stoke on Trent and Birmingham. This screenline intersects the M54, A460, A5, M6, B5012, A34, A513, the A51, and the A50. This is shown in Figure 6.5.

Figure 6.5 - Before and After Weekday Traffic Flows across Screenline 5



6.17 Figure 6.5 shows that:

- Screenline five surprisingly showed more traffic (some 6,000 more vehicles) in the westbound direction, than in the south eastbound direction in 2003. This suggests that some traffic was opting to use minor urban roads in the southbound direction, hence not being picked up by the screenline. Upon closer inspection, this directional difference across the

screenline is more distinct on the AWT than on the Average Daily Total (ADT), which suggests it is due to commuter traffic;

- Interestingly, this directional difference has reduced since the M6 Toll opened, and to a greater extent in 2009. This is a positive trend, as it suggests some traffic has been attracted to use the motorway in both directions leading to a reduction in rat-running on the minor urban roads; and
- Overall, traffic over the screenline has remained fairly consistent across all years in the south-eastern direction, and reduced slightly in the northern direction (1.5%), with little change since 2005.

6.18 Looking in greater detail at the composition of the flows within screenline 5 (included in Appendix A.4) and how this has changed, we can draw the following conclusions:

- The discrepancy in directional flows across the screenline appears to be derived from the A50 and M54. Where the screenline intersects these routes, more commuter traffic is witnessed in the north-west direction than in the south-east direction. This is a trend in commuter traffic which has been observed historically at these locations, as reported by the Highways Agency Midlands Traffic Monitoring Commission over previous years; and
- Between 2005 and 2009, there appears to have been some reassignment occurring between the M6 (at J12 – J13) which has witnessed a reduction of around 4% on the two way AWT, onto the A460, A34, A513, A518 and A50, which have all shown increases.

Key Findings: Strategic Screenlines

Reassignment from M6 Toll

- The one year after study identified that traffic using the M6 Toll had reassigned from the parallel section of the M6 and a range of other roads in the corridor as far north as the A50;
- Analysis of strategic screenlines in this section confirms the findings presented earlier in the report that there has been significant reassignment of traffic from the M6 Toll on to the M6 and other routes since 2005;
- Despite the current economic climate having a considerable impact on the majority of the trunk road and motorway network around the region, it has been possible to identify where this traffic is likely to have reassigned to within the strategic network;
- On the parallel M6, more specifically between J10 – J10a, AWT flows have increased by approximately 4,500 vehicles. This is against a reduction on the M6 Toll of around 8,000 vehicles a day. Some of the remainder of the reassignment can be seen on the A5190 on screenline 4 (parallel to M6 Toll T5 – T6);
- The A446 (parallel to the M6 Toll between T2 and T3 has witnessed an increase along screenline 2, and so has the A38 (parallel to the M6 Toll between T3 and T4) and the A5 on screenline 3; and
- The A5 Weeford to Fazeley improvements scheme also appear to have contributed to some strategic reassignment of traffic between the A51 and A5.

Other Strategic Changes

- The M6 J12 – J13 which is north of the M6 Toll tie-in, has witnessed a reduction of around 4% in average weekday traffic since 2005, and the A460 and A34 have witnessed increases, suggesting traffic may be diverting to these routes to avoid this busy section of the M6;
- There also appears to have been changes in the proportion of traffic flows split by direction within the region, which indicates some shifts in the pattern of commuter traffic heading towards and away from Birmingham; and
- Screenlines 3 and 5 show that before the M6 Toll opened there was a disparity between the directional flows across the screenline, with more traffic observed northbound. This suggests that some southbound traffic was using minor urban roads and not being picked up by the screenline. By March 2009, there was no longer any difference or only a very slight difference between the two directions, suggesting a possible reduction in rat-running particularly for commuter traffic heading eastbound into the conurbation.

7. Classified Data

Introduction

7.1 In order to determine the proportions of light and heavy vehicles using the M6 Toll, M6 and other strategic routes, classified automatic count data where available has been used. This data categorises vehicles into bins which are defined by length.

7.2 Historically, the 5.2m length division was chosen to represent the split between 'light' and 'heavy' vehicles, whereby all vehicles under or equal to 5.2m are considered as 'light', and all vehicles over 5.2m are considered as 'heavy'. This division was employed at sites belonging to NTCC (National Traffic Control Centre), MIDAS (Motorway Incident Detection and Signalling), and DBFO (Design Build Finance & Operate) as well as standalone TAME (Traffic Appraisal Modelling and Economics) sites operated by the HA.

7.3 As a result of a review into the appropriateness of the 5.2m division for representing the heavy/light vehicle categories, in 2008, it was agreed that a 6.6m division more accurately represented the division between 'light' and 'heavy' vehicles.

7.4 However, for the purposes of this study, as some of the before and after data (up to the end of 2007) does not have the 6.6m division and is in the older configuration of 5.2m, the 'before' and 'after' comparisons presented in this section of the report will only refer to 'heavy' vehicles as those over 5.2m. Some observations regarding the implications of changing the length measurement from 5.2m to 6.6m are however made towards the end of the section.

7.5 As March data was not always available for some sites and for some years, where suitable, an estimate for March has been calculated using seasonal variation factors derived from neutral data taken from the same site for other months and years.

Heavy Goods Vehicles on the M6 Toll

7.6 Unfortunately, no classified count data is available for the M6 Toll in 2004, however Table 7.1 below presents traffic flows split into light and heavy categories for the M6 Toll for March 2005 (to represent one year after opening) and March 2009 to represent five years after opening. Flows provided are for an average weekday (Monday to Friday) excluding Easter, and have been factored to allow for background traffic growth as shown in Table 3.1 of Section 3.

Table 7.1 – Numbers of Light and Heavy Vehicles on the M6 Toll (Mondays to Fridays)

	Mar '05 (Factored to 2009)			Mar '09			Diff. '05 – '09		% Diff. '05 – '09	
M6 Toll Section	**Lights[1]**	**Heavies**	**HGV%**	**Lights**	**Heavies**	**HGV%**	**Lights**	**Heavies**	**Lights**	**Heavies**
Northbound										
M6 J3a – M42 Merge	12,100	2,600	17.6	10,700	3,000	22.1	**-1,400**	**450**	**-11.8**	**17.2**
T1 – T2	22,600	2,300	9.2	-	-	-	**-**	**-**	**-**	**-**
T2 – T3	22,600	2,300	9.2	-	-	-	**-**	**-**	**-**	**-**
T3 – T4	18,800	1,600	7.7	15,300	1,700	9.9	**-3,500**	**100**	**-18.7**	**6.6**
T4 – T5	18,600	1,700	8.3	15,000	1,900	11.3	**-3,500**	**230**	**-18.9**	**13.5**
T5 – T6	20,300	1,500	6.9	16,600	1,800	9.8	**-3,700**	**290**	**-18.3**	**19.5**
T6 – T7	-	-	-	16,200	1,500	8.6	**-**	**-**	**-**	**-**
T7 – T8	-	-	-	15,200	1,400	8.5	**-**	**-**	**-**	**-**
T8 – M6 North	16,000	1,300	7.3	13,000	1,300	8.9	**-2,900**	**10**	**-18.3**	**0.9**
Southbound										
M6 J3a – M42 Merge	-	-	-	9,900	2,900	22.6	**-**	**-**	**-**	**-**
T1 – T2	18,700	1,500	7.6	15,400	1,600	9.4	**-3,300**	**70**	**-17.4**	**4.8**
T2 – T3	19,400	1,600	7.5	16,100	1,700	9.5	**-3,300**	**130**	**-17.2**	**8.1**
T3 – T4	19,400	2,000	9.2	-	-	-	**-**	**-**	**-**	**-**
T4 – T5	16,300	2,000	10.8	14,100	2,100	12.9	**-2,200**	**110**	**-13.4**	**5.3**
T5 – T6	17,700	2,100	10.4	15,300	2,200	12.7	**-2,400**	**160**	**-13.4**	**7.6**
T6 – T7	21,000	1,600	7.2	17,300	1,700	8.9	**-3,700**	**70**	**-17.6**	**4.4**
T7 – T8	19,400	1,500	7.2	16,300	1,600	9.0	**-3,000**	**120**	**-15.5**	**7.8**
T8 – M6 North	17,200	1,400	7.4	14,000	1,400	9.2	**-3,200**	**50**	**-18.6**	**3.3**

[1] >1000 rounded to nearest 100, <500 rounded to nearest 10. Difference and all %s based on unrounded figures

7.7 It can be seen from Table 7.1 that:

- On all sections of the M6 Toll where classified data was available for both years (2005 and 2009), the number of HGVs on an average weekday has increased. The most significant increases have been northbound between T5 – T6 and the M6 J3a – M42 merge, with around a 20% and 17% increase, respectively. In terms of numbers of HGVs, that is an increase of approximately 290 and 450, respectively;
- The section of the M6 Toll between T8 and the M6 northbound has changed the least with only a 1% increase;
- The number of light vehicles has reduced on most sections by around 17-18%, with a smaller reduction of 12% on the M6 J3a – M42 merge. That is a reduction of around 3,000 light vehicles per day;
- In 2005, the proportion of HGVs of all traffic was between 7 and 11% for all sections, with the exception of the M6 J3a – M42 merge which was comprised of 18% HGVs. Five years after the opening, in 2009, most sections carry between 9 and 13% HGVs with a 22-23% proportion of HGVs on the M6 J3a – M42 merge;
- It can therefore be concluded, that not only have the proportions of HGVs on the M6 Toll increased over the last four years, with this being against the backdrop of light vehicles reducing; but the absolute numbers of HGVs have also increased by between 3 and 20% at the majority M6 Toll links; and
- As these figures take account of national growth factors for HGVs and light vehicles as provided in the Transport Statistics Bulletin: Traffic in Great Britain, it can be concluded that the growth witnessed in HGV traffic on the M6 Toll goes against the nationally observed trends of fewer HGVs during this period. However, it should be reiterated that the national changes in HGVs included in the Transport Statistics Bulletin are provisional for the fourth quarter 2008 and 2009.

Heavy Goods Vehicles on the M6 and other Key Routes

7.8 The same information regarding proportions of light and heavy vehicles along sections of the M6 and other key strategic routes where classified count data was available is also provided below in Table 7.2. In addition to this, 2003 data is provided in order to enable comparison of vehicle proportions before and after the M6 Toll opened.

Table 7.2 – Numbers of Light and Heavy Vehicles on the M6 and other Key Routes (Mondays to Fridays)

	Before Mar '03 (Factored to 2009)			OYA Mar '05 (Factored to 2009)			Diff OYA '03 – '05		% Diff OYA		FYA Mar '09			Diff. FYA '03 – '09		% Diff. FYA	
Location	**Lights[1]**	**Heavies**	**% HGV**	**Lights**	**Heavies**	**% HGV**	**Lights**	**Heavies**	**Lights**	**Heavies**	**Lights**	**Heavies**	**% HGV**	**Lights**	**Heavies**	**Lights**	**Heavies**
M6																	
J3 – J3a	80,100	30,300	27.5	88,200	35,100	28.5	**8,200**	**4,800**	**10.2**	**15.8**	92,700	33,200	26.4	**12,700**	**2,900**	**15.8**	**9.5**
J4a – J5	123,200	39,600	24.3	99,400	39,200	28.3	**-23,900**	**-440**	**-19.4**	**-1.1**	-	-	-	**-**	**-**	**-**	**-**
J5 – J6 (NB only)	51,700	11,600	18.3	45,600	11,700	20.3	**-6,100**	**60**	**-11.8**	**0.5**	49,300	13,700	21.8	**-2,400**	**2,100**	**-4.7**	**18.5**
J9 – J10 (SB only)	61,200	18,300	23.0	55,300	18,200	24.7	**-6,000**	**-130**	**-9.7**	**-0.7**	59,600	19,900	25.0	**-1,600**	**1,600**	**-2.7**	**8.6**
J10a – J11	73,800	29,200	28.4	60,900	30,300	33.2	**-12,900**	**1,000**	**-17.4**	**3.5**	68,400	30,500	30.8	**-5,400**	**1,300**	**-7.3**	**4.4**
Other Routes																	
A446 (A38 – A4091)	17,300	3,900	18.3	14,300	3,700	20.3	**-3,000**	**-240**	**-17.4**	**-6.1**	-	-	-	**-**	**-**	**-**	**-**
A5 (East of A38)	11,300	4,300	27.6	13,000	4,200	24.6	**1,700**	**-50**	**15.4**	**-1.2**	19,500	4,400	18.5	**8,200**	**140**	**73.0**	**3.3**
A38 (A5 – A453)	29,300	7,300	20.0	24,500	6,200	20.3	**-4,800**	**-1,100**	**-16.3**	**-14.8**	29,000	7,500	20.5	**-290**	**160**	**-1.0**	**2.1**
A5 (A452 – A461)	18,800	6,300	25.1	12,600	5,200	29.3	**-6,200**	**-1,100**	**-32.9**	**-17.0**	16,900	5,800	25.5	**-1,900**	**-510**	**-10.0**	**-8.0**
M54 J1 – M6 J10a	35,400	9,300	20.8	33,300	10,100	23.3	**-2,100**	**820**	**-6.1**	**8.8**	35,400	9,300	20.8	**-70**	**-60**	**-0.2**	**-0.6**
A50 East of A520	54,300	13,500	19.9	48,800	13,000	21.0	**-5,500**	**-500**	**-10.1**	**-3.7**	54,900	12,800	18.9	**580**	**-730**	**1.1**	**-5.4**

[1] >1000 rounded to nearest 100, <500 rounded to nearest 10. Difference and all %s based on unrounded figures

7.9 Table 7.2 takes account of background traffic growth which has been applied to the 2003 and 2005 flows to enable comparison with the five years after 2009 data. This has been applied accordingly for light and heavy vehicles on motorways and for all vehicles on the 'A' Roads. From the analysis presented in Table 7.2, the following observations can be made:

- On all sections of the M6 where data was available for comparison, the number of HGVs has increased since March 2003. For the parallel sections of the M6, this has also equated to a slightly higher percentage of the overall total flow than that observed in 2003, because the number of light vehicles has reduced;
- In 2005, as the number of light vehicles on the parallel M6 sections had reduced due to traffic rerouting to the M6 toll, but the number of HGVs had remained broadly the same, this had resulted in a higher percentage of HGVs of the overall total than had been observed in 2003. Data from 2009 shows for the parallel M6 sections that the number of light vehicles and the number of HGVs have increased since 2005;
- J3 – J3a of the M6, which is to the south of the M6 Toll southern tie-in is the only section of those compared, where both the numbers of light vehicles and the number of heavy vehicles have increased on 2003 levels. However, as the number of light vehicles has increased more noticeably, the overall proportion of heavy vehicles has remained broadly the same at around 26 – 27%;
- On the other significant routes, the A5 east of the A38 has witnessed the most significant increase in total vehicles due to the new dual carriageway between Weeford and Fazeley (known as the Weeford to Fazeley improvements), but has only seen a small increase of 3% in HGVs. This is against a 73% increase in light vehicles. Therefore, the overall proportion of HGVs has reduced from 28% to 19% between 2003 and 2009;
- On the A38 (between the A5 and the A453) the number of HGVs is only 2% higher in March 2009 than in March 2003, however this is a significant difference to the 'one year after' results in 2005 which had shown a 15% reduction in HGVs. This indicates that the number of HGVs using this route has been increased since 2005, to levels similar to pre- M6 Toll opening levels;
- On the A5 at Brownhills, the number of HGVs is still 8% lower than in 2003, however the number has increased since 2005, when a 17% reduction was observed. This again illustrates that HGV levels have increased since 2005 closer to pre- M6 Toll opening levels, however the difference in light vehicles seems to be more significant; and
- In March 2009, on the M54, both light vehicle and HGV numbers were very close to those in 2003, however on the A50, HGVs are 5% lower than in 2003. This is a continuation of the reduction witnessed in 2005 on that route.

Comparison of the 5.2m and 6.6m length division

7.10 As mentioned earlier in this section, as part of a review undertaken by the Highways Agency, the 5.2m division has subsequently been superseded by 6.6m as representative of the split between light and heavy vehicles. For simplicity, and because some of the 'before' data did not have the 6.6m category included, 'before' and 'after' comparisons included previously have only referred to the 5.2m classification. However, it may be useful to provide some brief observations regarding the implications of the change between 5.2m and 6.6m setting for classification of light and heavy vehicles.

7.11 Work undertaken by the Highways Agency into the different vehicle categories that fall within these length categories has indicated that:

- 5.2m – 6.6m length category is likely to contain a few larger cars, light goods vehicles and a proportion of OGV1 (Other Goods Vehicles) between 3.5 and 7.5 tonnes (heavier vans); and

- 6.6m and above length category will include HGVs over 7.5 tonnes (a mixture of OGV1 and OGV2) and bus and coaches.

7.12 Findings presented in this section of the report should be treated with some caution, and are only given as an indication of the likely vehicle composition on the M6 and M6 Toll. It should also be borne in mind that data presented has also been derived from a number of different sources, including NTCC, MIDAS and standalone Highways Agency TAME loops.

7.13 The categorisation of vehicles into length bins as used in the traffic count data, in no way correlates with the tolling price schedule on the M6 Toll, which determines a vehicle's classification by the number of wheels, number of axles and its height at the first axle.

7.14 Table 7.3 shows the numbers and percentage of heavy vehicles on two sections of the M6 Toll and two sections of the parallel M6 in 2009 when using both the 5.2m and 6.6m divisions.

Table 7.3 – March 2009 Comparison of 5.2m and 6.6m Division as Heavy/Light split

	5.2m			6.6m		
Location	Lights	Heavies	% Heavies	Lights	Heavies	% Heavies
M6 Toll T3 – T4 Northbound	15,300	1,700	9.9%	16,000	1,000	5.9%
M6 Toll T8 – M6 Northbound	13,000	1,300	8.9%	13,400	920	6.4%
M6 J5 – J6 Northbound	49,300	13,700	21.8%	52,500	10,500	16.7%
M6 J9 – J10 Southbound	59,600	19,900	25.0%	64,200	15,300	19.2%

Note: >1000 rounded to nearest 100, <500 rounded to nearest 10. Difference and all %s based on unrounded figures

7.15 Broken down more simply, the composition of the vehicles on selected sections of the M6 Toll and M6 in March 2009 is shown in Table 7.4.

Table 7.4 – March 2009 Vehicle composition/proportions on M6 Toll and M6

Location	< 5.2m	5.2m – 6.6m	> 6.6m
M6 Toll T3 – T4 Northbound	90.1%	4.0%	5.9%
M6 Toll T8 – M6 Northbound	91.1%	2.5%	6.4%
M6 J5 – J6 Northbound	78.2%	5.1%	16.7%
M6 J9 – J10 Southbound	75%	5.8%	19.2%

7.16 It can be seen that changing the length division from 5.2m to 6.6m has made a notable difference to the numbers of vehicles categorised as 'heavy'. Tables 7.3 and 7.4 tell us the following regarding vehicle composition on the M6 Toll and the M6 at the selected sections provided:

- The M6 Toll has a relatively even distribution of vehicles between 5.2m – 6.6m and vehicles over 6.6m in length, and added together this equates to about 10% of the overall total; and
- On the M6 however, not only is there a larger percentage over 5.2m, but there is also a significantly larger proportion over 6.6m.

7.17 For one of the M6 sections it has been possible to extract the equivalent information for 2003 and 2005 to see if there have been any long term changes in vehicle composition. A summary of the findings is provided in Table 7.5.

Table 7.5 – Vehicle Composition/proportions 2003 - 2009

		< 5.2m		5.2m – 6.6m		> 6.6m	
	Year	No.	%	No.	%	No.	%
M6 J9 – J10 Southbound[1]	2003[1]	59,300	75.5%	2,900	3.7%	16,300	20.8%
	2005	55,700	73.6%	3,200	4.2%	16,800	22.2%
	2009	59,600	75%	4,600	5.8%	15,300	19.2%

[1] 2003 and 2005 figures are unfactored

Note: >1000 rounded to nearest 100, <500 rounded to nearest 10. Difference and all %s based on unrounded figures

7.18 It can be seen from Table 7.5, that the numbers of vehicles and the percentage of vehicles counted in the 5.2m – 6.6m length category has increased since 2003, whereas the number of vehicles counted in the over 6.6m category has reduced slightly.

7.19 According to Transport Statistics Great Britain: 2009 edition[3], which contains statistics on traffic growth based on nationally observed figures, growth in the number of light vans was approximately 8% between 2003 and 2005, 12% between 2005 and 2008, and 22% between 2003 and 2008. If we assume that vehicles in the 5.2m – 6.6m category are primarily light vans, it can be seen from Table 7.5, that growth in the numbers of these vehicles on the M6 between J9 – J10 has been in excess of the nationally observed figures.

7.20 The nationally observed change in heavy goods vehicles has been approximately a 2% increase between 2003 and 2005, however the provisional figures for the year 2008 show only a 1% increase since 2003. If we assume the vehicles over 6.6m in length equate to OGV1's and OGV2's and look at Table 7.5, we can see that the numbers of vehicles in this category did increase in 2005 and has reduced quite noticeably in 2009, which would seem to match the national trend. However, it would appear that the reduction shown in vehicles over 6.6m between 2005 and 2009 has been greater than the nationally observed trend.

7.21 It can also be concluded, that the increase in 'heavies' shown in Table 7.2 therefore, is derived primarily from an increase of vehicles in the 5.2m – 6.6m length category, likely to consist primarily of light vans, and not the OGV1 and OGV2 categories.

7.22 It should be noted however there is still a relatively small proportion of the total vehicles on this section of the M6 falling within the 5.2m – 6.6m category, compared to those over 6.6m in length which constitutes almost 20% of the total flow. When compared to the M6 Toll, we can see that there is a much more equal distribution between the two categories – 5.2m-6.6m and greater than 6.6m.

7.23 It has not been possible to include a similar comparison for the M6 Toll over time, as it appears historically for those count sites on the M6 toll, a 7m category has been used for previous years.

Speed Data

7.24 Speed data from the NTCC count sites on the M6 Toll is not available. Speed data for the M6 is available from standalone Highways Agency count sites for a very limited number of locations since 2008, however without equivalent data for the same sections before the M6 Toll opened, it is not possible to make meaningful comparisons, and therefore this data has not been included in this report.

[3] The statistics relating to growth in the last quarter 2008 are provisional only.

Key Findings: Classified Data

Vehicles >5.2m on M6 Toll

- The proportions of vehicles over 5.2m in length using the M6 Toll have increased from around 7 – 11% one year after to 9 – 13% on most sections. However, this is partly due to the reductions in light vehicles using the toll road;
- The absolute number of vehicles over 5.2m in length has also increased on the M6 Toll between 2005 and 2009. The most significant increases have been observed northbound between T5 and T6, and between the M6 J3a and M42 merge, around 20%, and 17%, respectively (equating to around 290, and 450 additional vehicles over 5.2m per day);
- Overall, the findings seem to indicate that the increase in 'heavies' on the M6 Toll is not consistent with nationally observed trends of fewer HGVs on motorways.

Vehicles >5.2m on M6 and other Routes

- For the parallel sections of the M6, 2009 data indicates that the number of vehicles both above and below 5.2m in length has increased since 2005. Whilst the number of vehicles below 5.2m in length has not quite reached those observed in 2003, the number of vehicles over 5.2m is now slightly higher than in 2003;
- Therefore, on the parallel sections of the M6, the *proportion* of 'heavies' has also slightly increased between 2003 and 2009;
- On the A38 (between the A5 and A453) and the A5 between the A452 and A461 which are parallel to the M6 Toll, following and initial reduction, there have been increases in the numbers of vehicles over 5.2m in length since 2005 and numbers are now closer to those in 2003. This indicates that there has been an increase since 2005; and
- On the A50 the number of vehicles over 5.2m in length has continued to reduce slightly since 2005, in terms of numbers and proportions of the total flow.

Analysis of the 6.6m length division and vehicle composition

- There is a much more even distribution of vehicles in the 5.2m, and 5.2m – 6.6m categories on the M6 Toll than on the M6. On the M6, the majority of vehicles over 5.2m are also over 6.6m. This indicates that the 'heavies' on the M6 are comprised primarily of the larger OGV1 and OGV2 category; and on the M6 Toll there is more of a general mix of light goods vehicles and OGV1s and OGV2s;
- On a parallel section of the M6 where data was available for detailed analysis, there has been a noticeable increase since 2003 in the number of vehicles between 5.2m and 6.6m in length. If taken as an indicator of the number of light vans, it could be argued that this is in excess of the growth in light van numbers observed nationally;
- Likewise, the reduction in vehicles over 6.6m since 2005, which if taken as an indicator of OGV1s and OGV2s, seems to be more significant than the nationally observed reduction for vehicles of that type, since 2005; and
- The increase in 'heavies' or vehicles over 5.2m in length on the M6 can therefore be concluded as deriving primarily from vehicles in the 5.2m – 6.6m length category (light vans) and not OGV1s and OGV2s.

8. Journey Times

Introduction

8.1 As well as traffic volume changes, an important effect of the M6 Toll is the impact on journey times, particularly on the M6 through the West Midlands conurbation. One of the key objectives of the M6 Toll was to tackle the congestion problems regularly experienced by traffic on the M6 around Birmingham.

8.2 This section of the report summarises journey times on the M6 before, shortly after, and five years after the opening of the M6 Toll, and on the M6 Toll itself shortly after and five years after opening.

8.3 Unlike the wealth of traffic volume data, the availability of data on journey times is much more limited. Following investigations into potential data sources, it was determined that valid, reliable data on journey times could be obtained for the M6 and the M6 Toll from:

- ANPR (Automatic Number Plate Recognition camera) data on all lanes collected by the police in 2003, 2004 and 2009 and supplied in an encrypted format for the purposes of this study;
- ANPR data collected in lane 2 only, by the NTCC (National Traffic Control Centre) in 2005 and 2009.

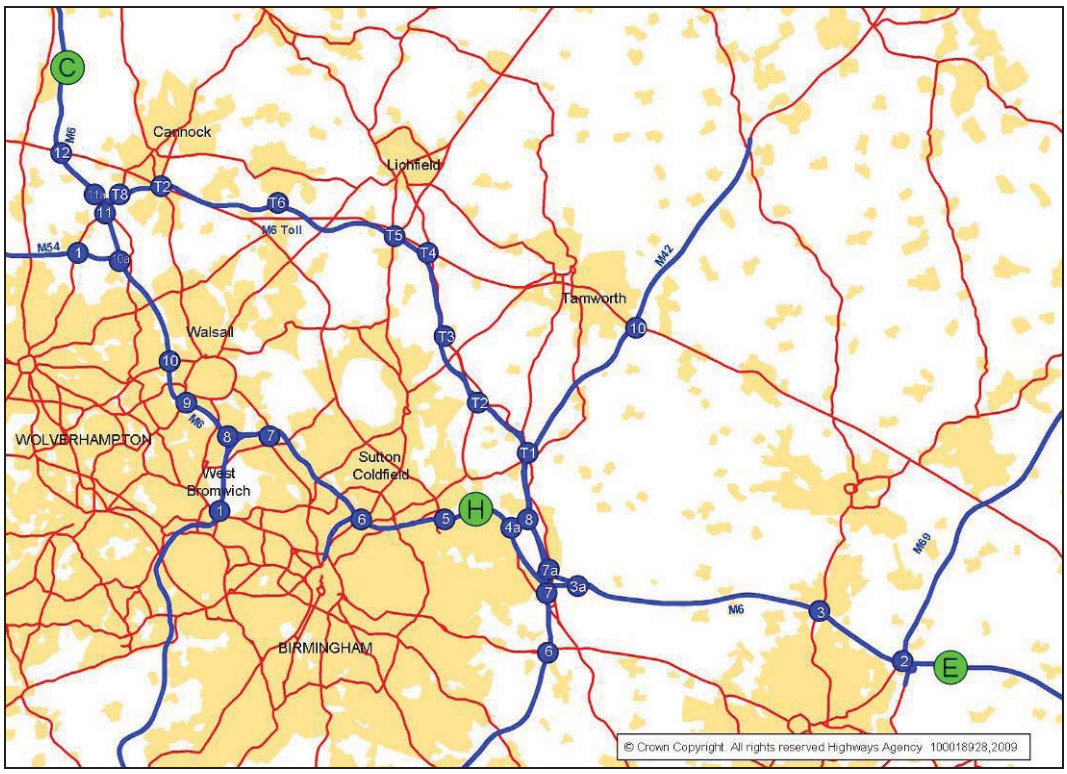
8.4 Data from the Highways Agency's JTDB (Journey Time Database) has not been used in this study because coverage of the route was not of sufficient quality or availability.

Automatic Number Plate Recognition (ANPR)

8.5 ANPR cameras are at numerous locations around the Midlands motorway box. This study has used encrypted data from 3 of these cameras on the M6, located at Coventry J1 – J2 (Camera E), Birmingham J4a – J5 (Camera H), and Cannock J12 – J13 (Camera C).

8.6 These are shown geographically in Figure 8.1 below:

Figure 8.1 – ANPR Camera Locations, C, H and E



Methodology

8.7 Journey times have been calculated for vehicles making journeys between cameras **E** and **C**, and **C** and **E** by matching number plates observed at these cameras. The route which passes through cameras **E**, **H** and **C**, and **C**, **H** and **E** (where the number plate is also recognised at camera **H**) is the route of the M6 northbound and southbound through the West Midlands. The distance using this route between cameras **C** and **E** is 68.5 km (42.5 miles).

8.8 In the absence of a camera on the M6 Toll, the route where vehicles are observed at cameras **C** and **E**, but not at camera **H** has been used as a proxy for the route along the M6 Toll, which is 69.5 km (43 miles) in length.

8.9 Where journeys take an excessively long amount of time compared to other vehicles at the same time of day, these have been excluded from the analysis, along with any other data mismatches. This method enables faster journeys using the M6 Toll to be distinguished from those using the M6 only. Further detailed notes on the methodology used in the calculation of the journey times from the ANPR data, are included in Appendix A of this report.

Pick-up Rates

8.10 By using traffic flows observed on the M6, an indicative pick-up rate can be calculated for the proportion of vehicle plates recognised against the total number of vehicles passing the camera points. For the analysis presented in this section, this has been estimated to be:

- June 2003 – Northbound: 51%;
- June 2003 – Southbound: 56%;
- March 2004 – Northbound: 37%;
- March 2004 – Southbound: 52%;
- March 2009 – Northbound: 92%; and
- March 2009 – Southbound: 73%

Period of Analysis

8.11 For this analysis, the following periods of data were used:

- M6 Before data: **June 2003**;
- Shortly after opening data: **March 2004**; and
- Five Years After (FYA) data: **March 2009**.

8.12 ANPR data from the cameras in 2005 which would have provided ‘one year after’ journey times was not of sufficient quality, and has therefore not been used.

Analysis of Average Journey Times from the ANPR data

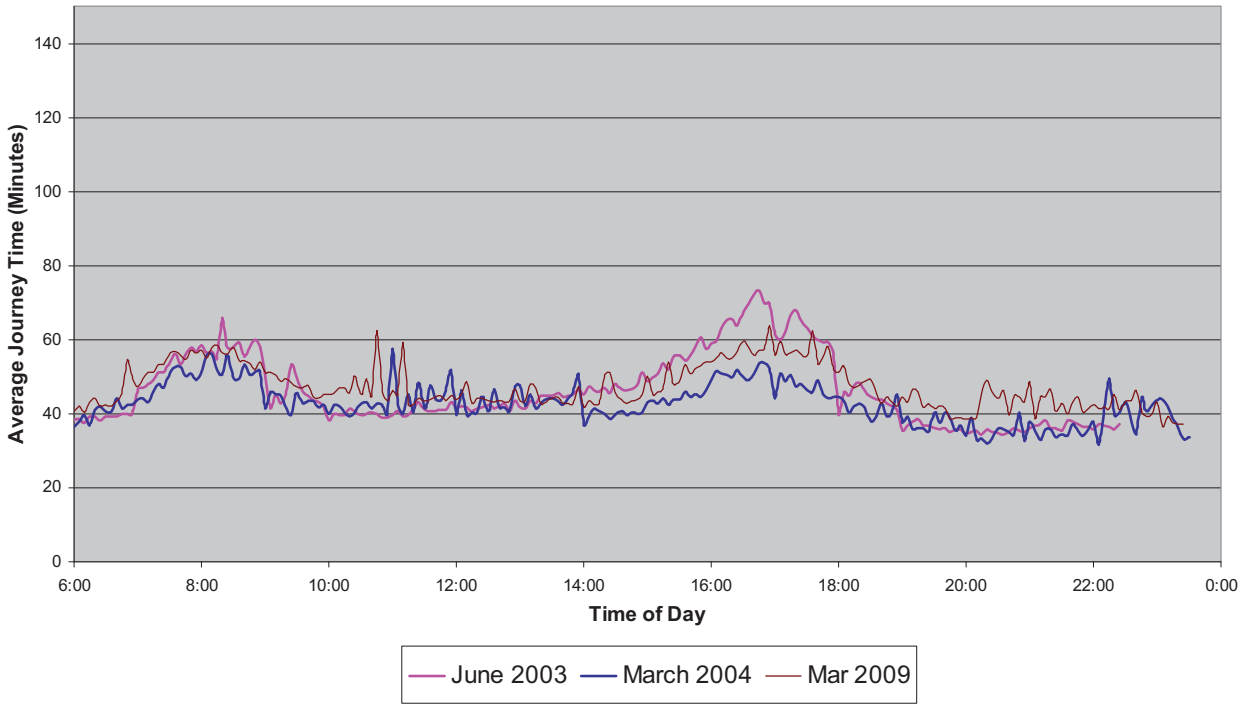
8.13 Throughout this section, average journey times are illustrated graphically throughout the day. The most interesting results are provided for Mondays, midweek days (Tuesdays – Thursdays), Fridays, and Sundays by direction, for both the M6 and the M6 Toll routes.

8.14 The horizontal (x) axis on the graphs show the starting times of the journeys i.e. the time that the vehicle number plate was identified at the first camera (either **C**, or **E**). Journeys between midnight and 06:00 are omitted as there are too few vehicles travelling at this time and little congestion. The vertical (y) axis shows the average time in minutes for the vehicle to make the total journey to the last camera (either **C**, or **E**).

M6 Northbound

8.15 Figure 8.2 shows the variation in average journey times on an average midweek day (Tuesday – Thursday) on the M6 northbound, for June 2003 (before), March 2004 (shortly after the opening of the M6 Toll) and March 2009 (five years after the opening of the M6 Toll).

Figure 8.2 – Midweek (Tues – Thur) Journey Times: M6 Northbound

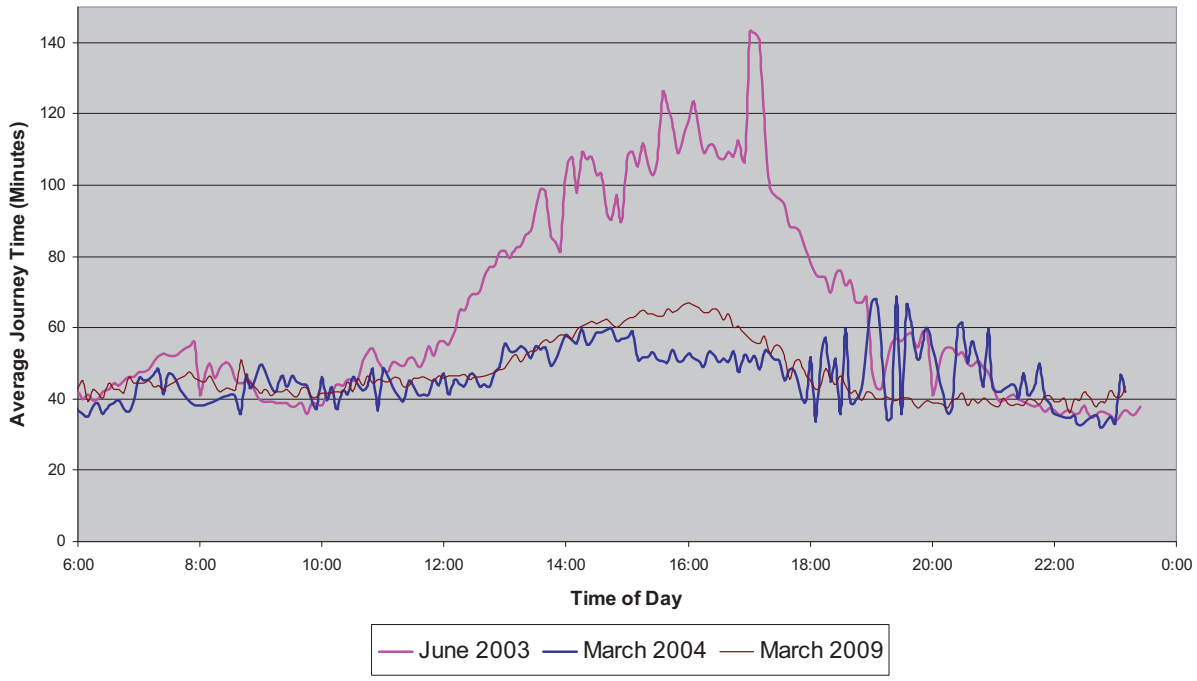


8.16 The following observations can be made:

- There are clearly peaks and troughs in the variation of journey times, which coincide with the morning and evening peak periods, and this is a consistent pattern for all three data-sets;
- Before the M6 Toll opened, northbound journeys on the M6 took up to 70 minutes in the PM peak, and over 60 minutes in the AM peak, and this was at least 20 minutes longer than the journey times experienced in the inter-peak period;
- Shortly after the opening of the M6 Toll, journey times in both peaks, but particularly the PM peaks had been significantly reduced to approximately 50 minutes, only 10 minutes longer than the inter-peak period. The inter-peak period journey times had changed very little, and the morning peak periods had witnessed a slight journey time improvement; and
- Five years after the M6 Toll opened, it can be seen that in the PM peak periods, journeys are longer than in 2004, but have not yet reached the journey times experienced before the M6 Toll opened. The inter-peak and the AM peak periods are roughly the same as they were before the M6 Toll opened, showing a slight increase since 2004.

8.17 Figure 8.3 shows the same information for average journey times on the M6 northbound on Fridays.

Figure 8.3 – Friday Journey Times: M6 Northbound



8.18 The following observations can be made regarding average journey times on the M6 northbound:

- From the 2003 data, it can be seen that before the M6 Toll opened, the M6 northbound on Fridays featured some of the worst traffic congestion, with journeys taking anything up to 2 hours or more to complete the 68.5km journey. These longer journeys were not just limited to the PM peak, but extended through most of the afternoon, indicating that the pattern not only relates to commuter traffic, but also longer distance traffic movements on the motorway network;
- Interestingly, the morning peaks only exhibited a slight increase in journey times compared to the inter-peak, with journeys between 45 – 50 minutes, at least an hour or more shorter than the PM peak times;
- In 2004, shortly after the M6 Toll had opened, Figure 8.3 shows that journey times throughout the day had evened out significantly compared to the 'before' situation. Slight increases in journey times were still experienced in the afternoons, however to a much lesser extent, with maximum journey times at around 60 minutes, a full hour shorter than in 2003; and
- Five years after the M6 Toll opened on the M6 northbound journey times in March 2009 are longer than in 2004, but shorter than 2003 journeys. This is the case for the AM and PM peak periods. Although we can see a slight worsening in the length of journeys since the one year after situation, it is clear that significant journey time benefits are still being gained particularly between the hours of 12:00 and 18:00.

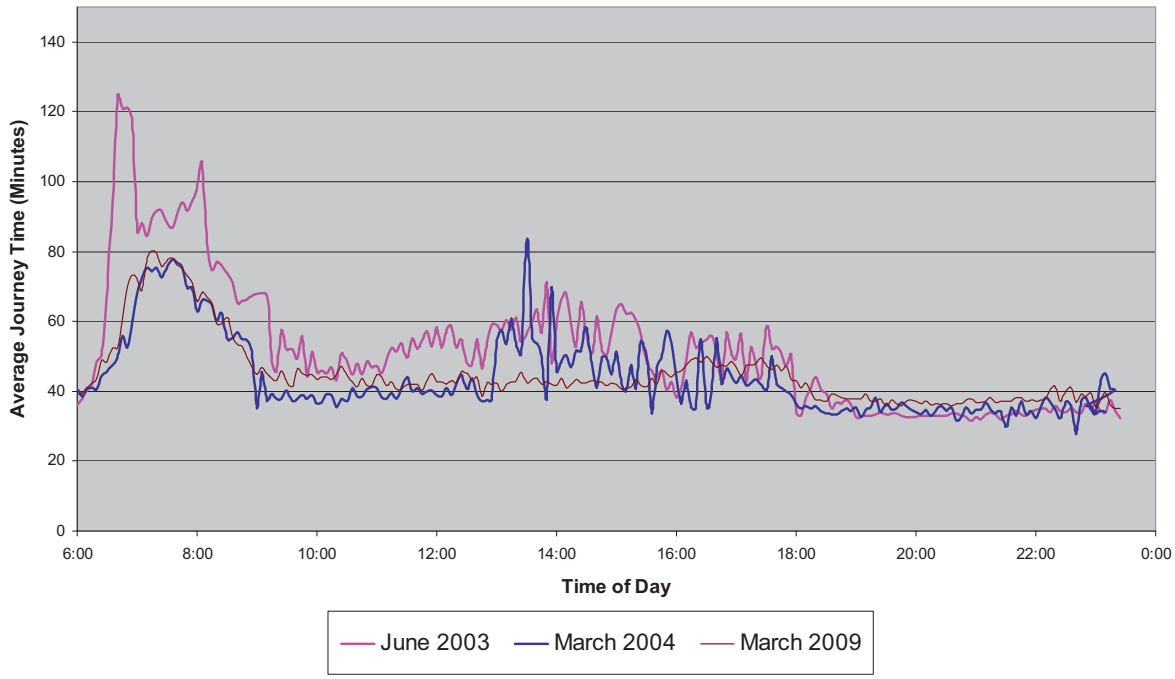
8.19 Average journey time profiles have also been created from the ANPR data for Saturdays and Sundays. In the interests of providing only significant findings in this section of the report, a full set of graphs for Mondays, Tuesdays – Thursdays, Fridays, Saturdays and Sundays are provided in Appendix A of this report.

8.20 Average Saturdays and Sundays have not exhibited much variation in journeys times either before or since the M6 Toll opened, with journeys taking just under 40 minutes for all times of the day. Journey times exhibit slightly more variation on Saturdays than on Sundays, and journey times appear to be very marginally longer than they were in 2003.

M6 Southbound

8.21 Figure 8.4 shows average journey times on Mondays for the M6 southbound, for June 2003 (before), March 2004 (shortly after the opening of the M6 Toll) and March 2009 (five years after the opening of the M6 Toll).

Figure 8.4 – Monday Journey Times: M6 Southbound

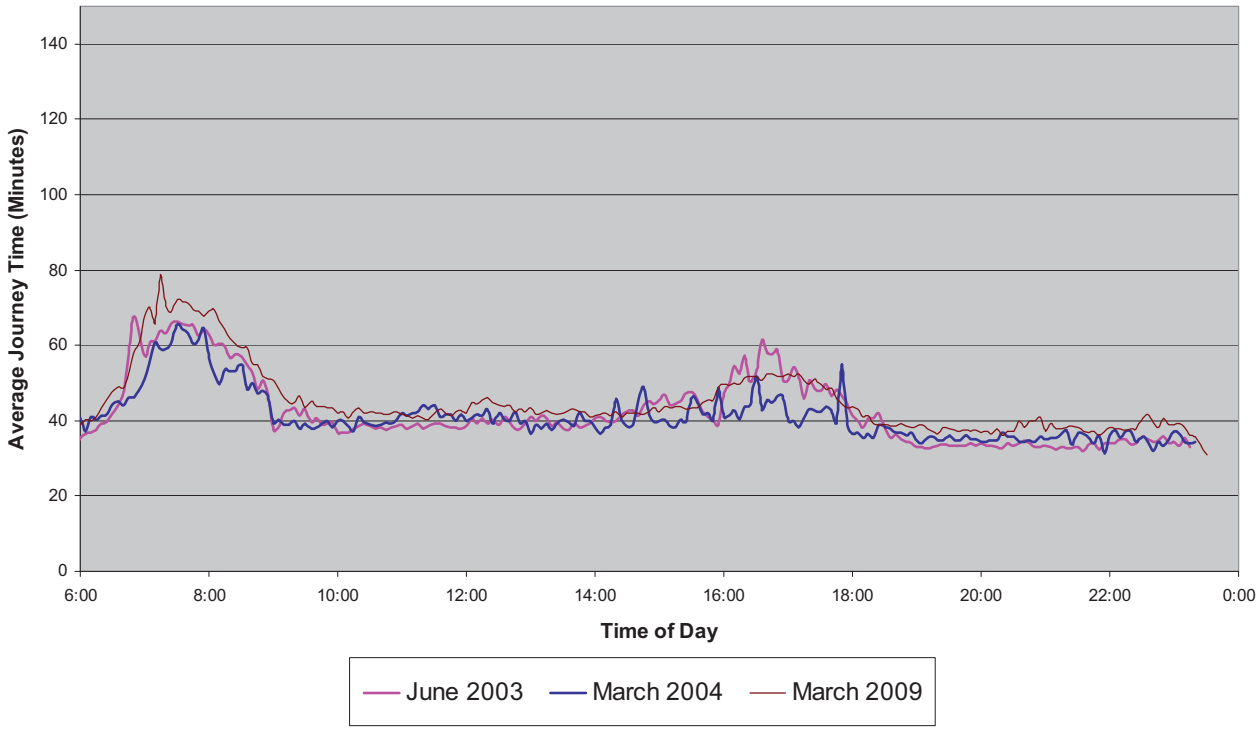


8.22 In relation to average journey times on Mondays on the M6 southbound, the following observations can be made:

- It can be seen for all 3 data-sets that journey times experience a peak in the AM which is not matched in the PM peak hours. In 2003 morning peaks experienced journeys of up to 2 hours, compared to around an hour in the PM peak. The distinctive spikes of the profile for 2003, indicate that there was considerable variation throughout all times of the day;
- In 2004, shortly after the opening of the M6 Toll, journey time benefits were significant (up to 60 minutes) in the AM peak, and less noticeable in the PM peak, although the inter-peak period did experience time savings of around 10 minutes. Journey times throughout the day however still exhibited a spiky profile indicating that the length of journeys varied considerably; and
- Five years on, March 2009 journey time data has shown that journey times in the AM peak have remained very consistent with those observed in 2004. However, the remainder of the data is far less variable and shows journey times at just over 40 minutes for the rest of the day, with a 5 – 10 minute increase in the PM peak hours.

8.23 Figure 8.5 shows the same information for midweek days (Tuesdays to Thursdays) for the M6 southbound.

Figure 8.5 – Tuesday to Thursday Journey Times: M6 Southbound

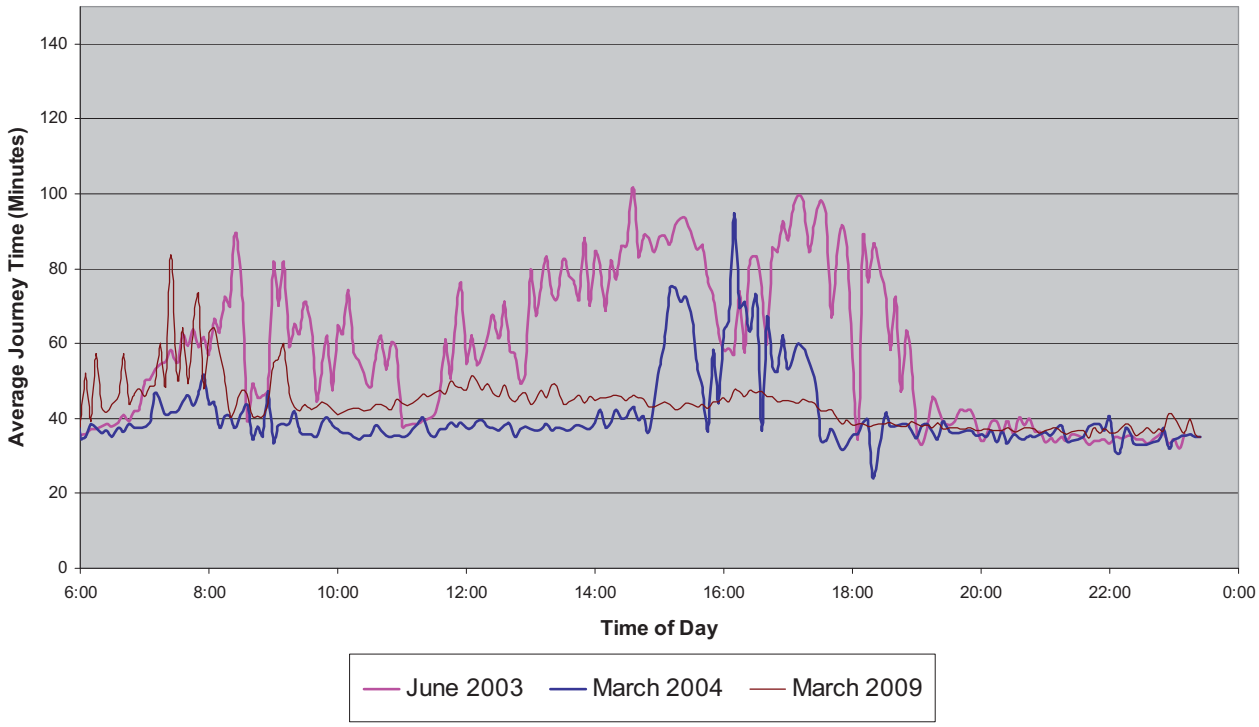


8.24 The following observations can be made:

- On midweek days, as with the northbound flows, there are distinctive increases in journey times during the peak periods, with the most significant increase being in the AM peak period, at over 60 minutes;
- In 2004, shortly after the M6 Toll had opened, there was a clear benefits to journeys in the PM peak of around 5 – 10 minutes, but less of a time saving in the AM peak; and
- Five years on, journeys in the AM peak are actually longer than they were in 2003 before the M6 Toll opened. In the inter-peaks they are also slightly longer, but in the PM peaks they are between 2003 and 2004 levels, at around 50 minutes.

8.25 Figure 8.6 shows the same information for Fridays, southbound on the M6.

Figure 8.6 – Friday Journey Times: M6 Southbound

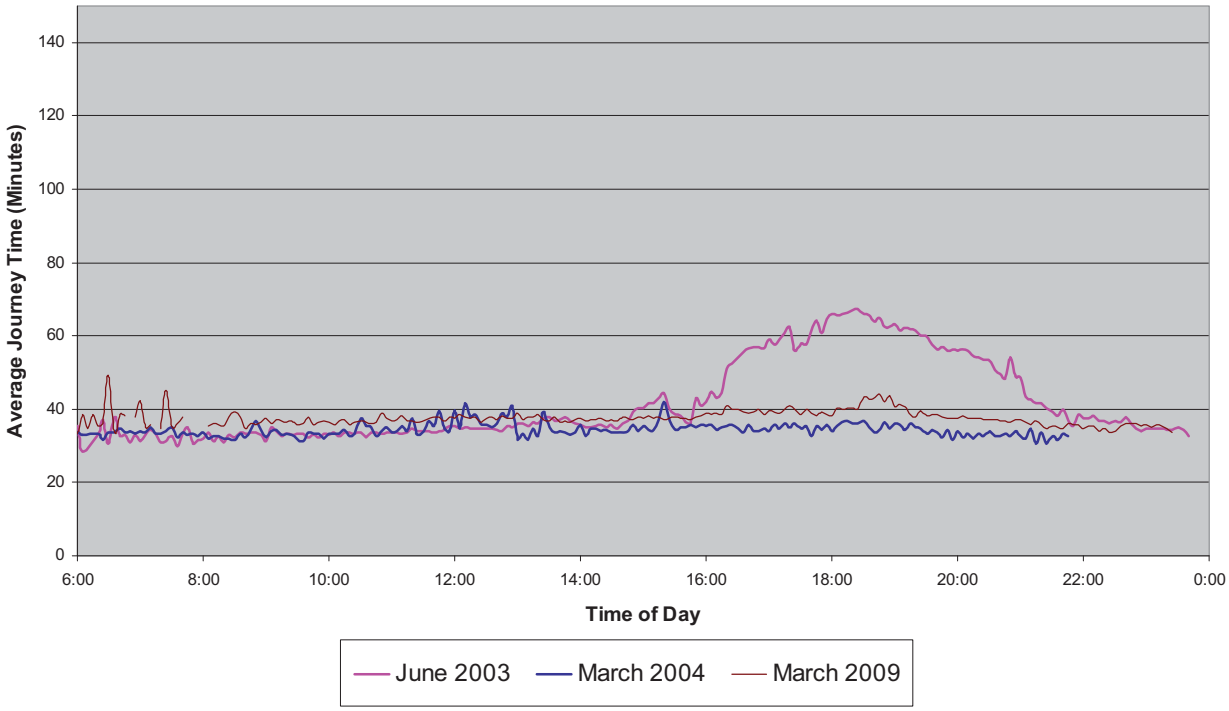


8.26 The following observations can be made:

- As with the northbound, southbound Friday journeys in 2003 experienced significant congestion. Delays appear to have extended through most hours of the day, not just the peak hours, with some journeys taking around an hour and a half;
- In March 2004 after the M6 Toll had opened, the extended peak period had disappeared and delays limited to a two hour peak period between 15:00-17:00;
- Five years after the opening of the M6 Toll, the profile of average journey times has changed notably. There is now no distinctive increase in journey times in the PM peak hours, however there is now an increase in journey times in the AM peak which starts earlier than the AM peak observed in 2003; and
- For the majority of the day, southbound journey times on the M6 are greatly improved on times observed in 2003, however they appear to have increased slightly on 2004.

8.27 Figure 8.7 shows average journey times on Sundays for the M6 southbound, for June 2003 (before), March 2004 (shortly after the opening of the M6 Toll) and March 2009 (five years after the opening of the M6 Toll).

Figure 8.7 – Sunday Journey Times: M6 Southbound



8.28 Figure 8.7 shows that:

- In June 2003, southbound journeys on the M6 on Sundays demonstrated congestion in the afternoon and evening between the hours of 16:00 – 21:00. Journeys during this time took on average 60 minutes rather than the 35 – 40 minutes observed during other hours of the day. This pattern can be attributed to weekend traffic returning on the M6 southbound towards London, further supported by the evidence of delays to Friday journeys in the evenings on the northbound carriageway;
- In 2004, these delays had been eradicated after the opening of the M6 Toll. Average journey times exhibited a largely flat profile throughout the day, indicating that significant journey time benefits had been gained and congestion largely alleviated, with all journeys taking around 35 – 40 minutes regardless of time of day; and
- Five years on, the profile of average journey times has remained largely flat, again indicating reliability, however journeys appear to be taking slightly longer than in 2004.

Journey Times on the M6 Toll

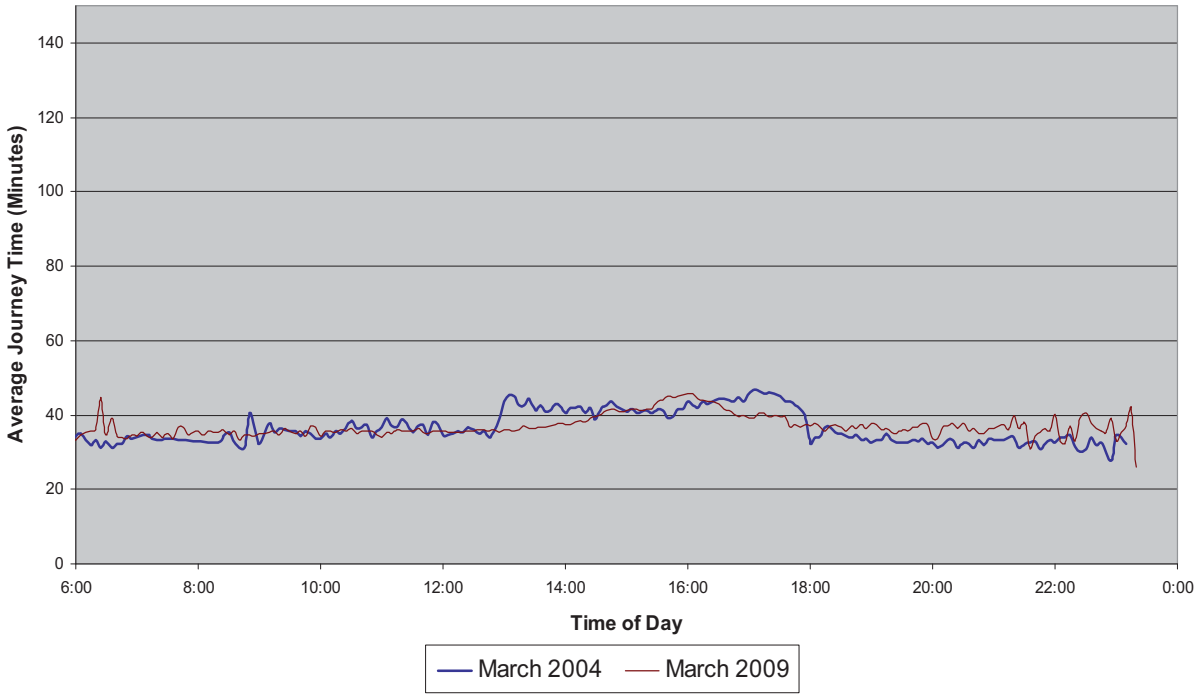
8.29 In comparison, average journey times on the M6 Toll generally exhibit a flat profile throughout all times of the day, indicating free flowing traffic and no delays. Generally, journey times between Camera E and Camera C and the vice versa using the M6 Toll have been between 35 and 40 minutes. In 2009, southbound journeys appear to have taken very slightly longer than they did in 2004 on Fridays, Saturdays and Sundays, and for most journeys across all days in the northbound direction.

8.30 A full set of graphs illustrating average journey times on the M6 Toll are provided in Appendix A, however points of interest are included below.

M6 Toll Northbound

8.31 Figure 8.8 shows average journey times on Fridays for the M6 Toll northbound, for March 2004 (shortly after the opening of the M6 Toll) and March 2009 (five years after the opening of the M6 Toll).

Figure 8.8 – Friday Journey Times: M6 Toll Northbound

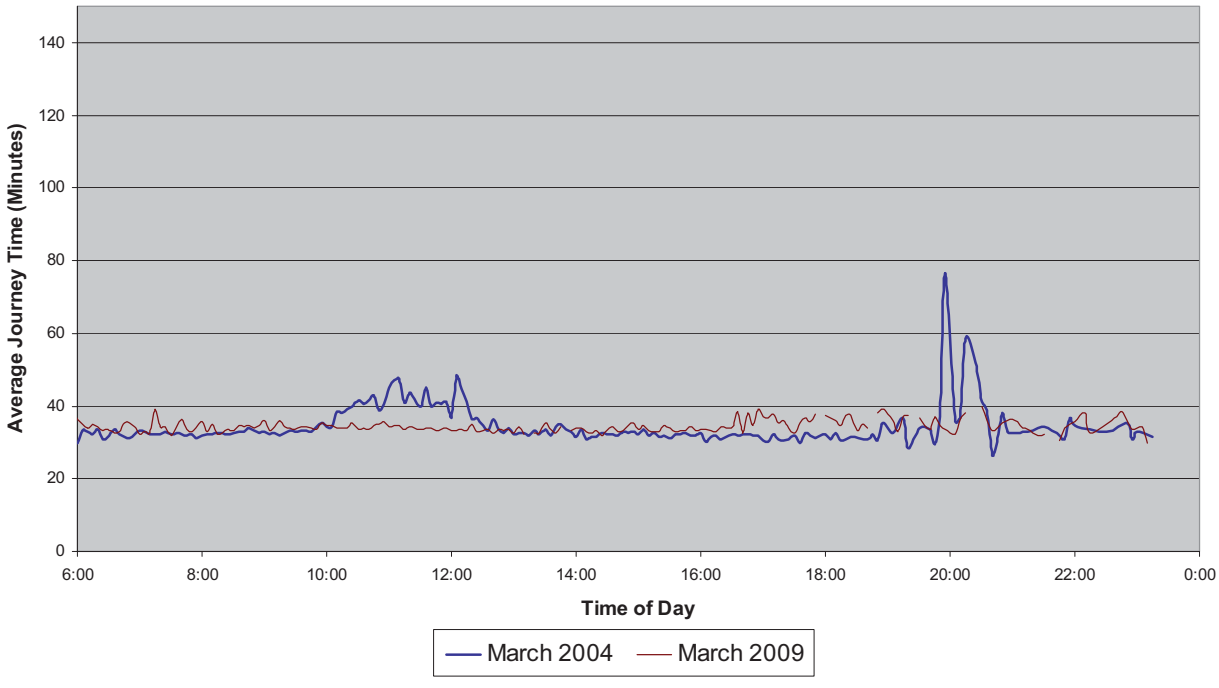


8.32 It can be seen from Figure 8.8 that:

- In 2004 there was a period between 13:00 and 18:00 where journeys took on average 10 minutes longer (approximately 45 minutes rather than 35 minutes);
- In 2009, five years after the M6 Toll opened, the peak period in terms of journey times appears to be limited to around 16:00, with the remaining hours more consistent at around 35 minutes.

8.33 Figure 8.9 shows the same information for northbound journeys on the M6 Toll on Saturdays.

Figure 8.9 – Saturday Journey Times: M6 Toll Northbound



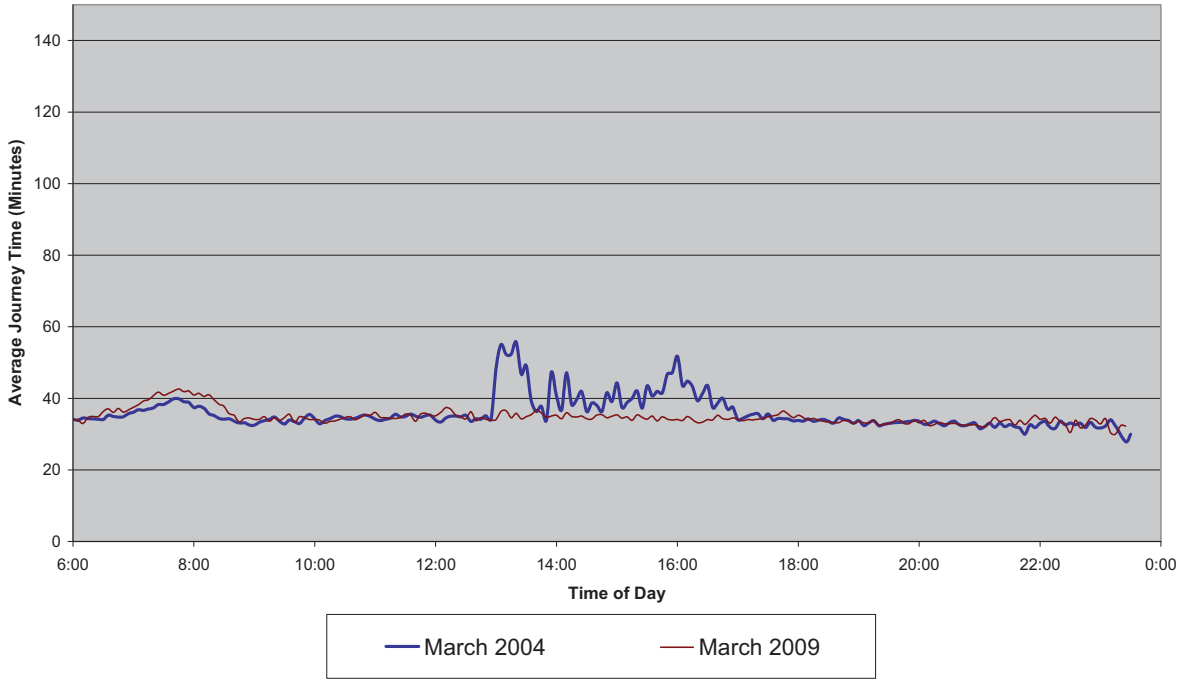
8.34 It can be seen from Figure 8.9 that:

- Shortly after the opening of the M6 Toll, there was some variation in times for northbound journeys on Saturdays, this occurred between 10:00 and 12:00, (and there appears to have been an anomaly with the 2004 data, exhibited by the incongruous spike in the evening); and
- Five years on, journey times are much more consistent throughout all times of the day.

M6 Toll Southbound

8.35 Figure 8.10 shows average journey times on Mondays for the M6 Toll southbound, for March 2004 (shortly after the opening of the M6 Toll) and March 2009 (five years after the opening of the M6 Toll).

Figure 8.10 – Monday Journey Times: M6 Toll Southbound

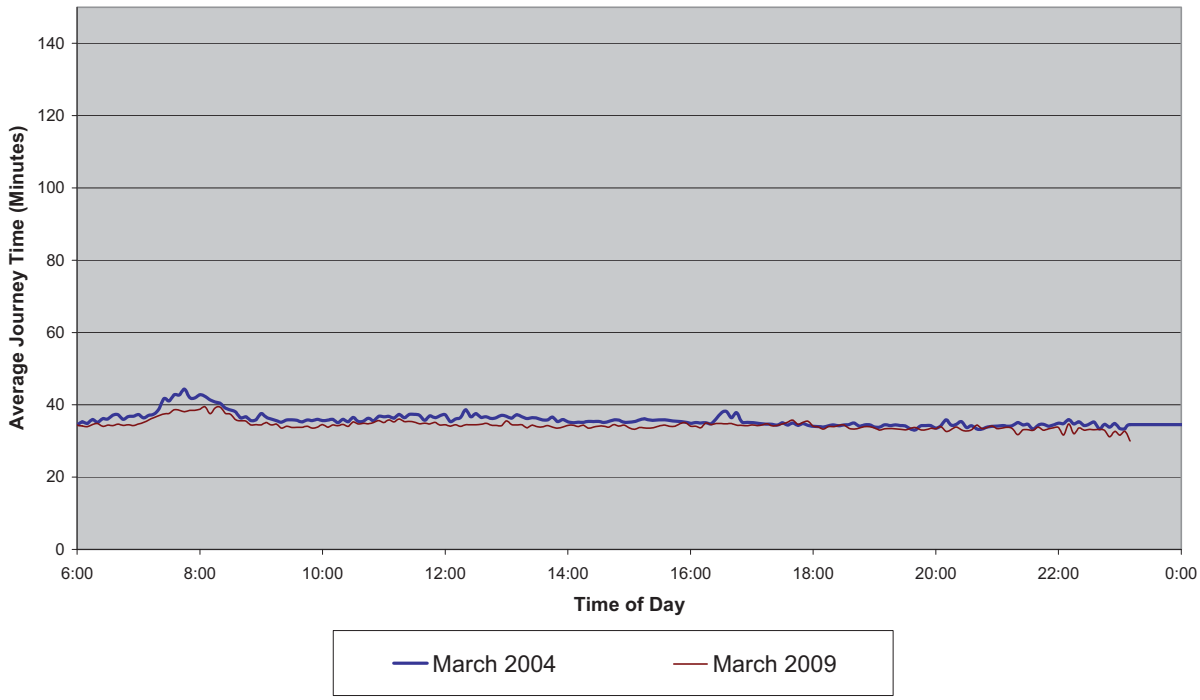


8.36 The following can be observed from Figure 8.10:

- In March 2004 average southbound journey times on Mondays exhibited a very slight increase in the morning peak, and a more distinctive profile in the afternoons, which is consistent with southbound journeys on the M6 at the same time (shown in Figure 8.4); and
- Five years after the opening of the Toll, journey times are consistent throughout the day at around 36-37 minutes, with the exception of a 4 – 5 minute increase in the AM peak at around 08:00. Given the predominantly flat profile at other times, it is likely that this delay is due to congestion on the M6 between J2 and J3a.

8.37 The same information is shown in Figure 8.11 for midweek days (Tuesdays – Thursdays).

Figure 8.11 – Tuesday to Thursday Journey Times: M6 Toll Southbound



8.38 It can be seen that:

- In 2004 southbound midweek journey times on the M6 Toll showed a slight increase of around 10 minutes at 08:00 which is consistent with Monday journeys at the same time. There was also a very slight peak in journey times between 16:00 and 17:00 in the PM; and
- Five years on, this variation in times has been largely smoothed out, with only a very slight increase in journey times still experienced in the AM peak.

Comparing the M6 and M6 Toll average journey time profiles Five Years After

8.39 The following observations have been drawn by comparing the average journey time profiles for the M6 and M6 Toll:

- Journey times on all days, in both directions on the M6 vary more considerably than journeys using the M6 Toll, showing there is better journey time reliability for vehicles using the toll road;
- On Saturdays and Sundays, when journey times vary the least on the M6 and a flat journey time profile is exhibited, journeys appear to be taking around 5 minutes longer on the M6;
- Both directions on the M6 exhibit delays to journeys on Mondays to Fridays consistent with the daily trends of weekday peak traffic flow. The M6 Toll generally does not;
- Both the M6 and M6 Toll routes exhibit delays to northbound journeys in the Friday PM, which can be associated with weekend traffic heading north. It should be noted, that these delays experienced by the M6 Toll route traffic probably occur on the section of the route on the M6 rather than on the toll road; and
- Southbound journeys on the M6 on Sunday evening exhibit delays associated with weekend traffic making their return journeys. On the M6 Toll however these journeys are not delayed.

Journeys Times Derived from NTCC ANPR cameras

8.40 The average journey times shown previously in this section were derived from ANPR data provided in an encrypted format by West Midlands Police for the purpose of this study only.

8.41 As an alternative source of journey times and to help verify the data already presented, data has also been derived from the ANPR cameras operated by NTCC (National Traffic Control Centre) for the purpose of real-time monitoring on the motorway and trunk road network. This data, which comes from cameras at various points around the motorway network has then been adjusted and merged to give estimated journey times between sections of motorway.

8.42 Summing up the journey times over the sections by hour is clearly not a true measurement of journeys made by individual vehicles over the whole route by hour, but it does provide a reasonable proxy. It has therefore been possible to calculate average times through the day for journeys between M6 J2 and M6 J12 via the M6 and the M6 Toll. The following periods of data have been analysed:

- 1st March – 21st March 2005 – M6 only; and
- 1st March – 21st March 2009 – M6 and M6 Toll.

8.43 Earlier data and 2005 data for the M6 Toll, was not available. These dates in March were chosen in order to avoid the Easter Bank Holiday period which occurred in late March during 2005.

8.44 The cameras are located in the middle lanes only, and therefore the results show journey times for vehicles in that lane only. The data on which this analysis is based has not been validated by the NTCC as their primary use for the cameras is real-time monitoring and not referencing historical journey times.

8.45 Although it is not possible with this data to make a comparison of 'before' and 'after' journey times on the M6, the information presented here does however aim to:

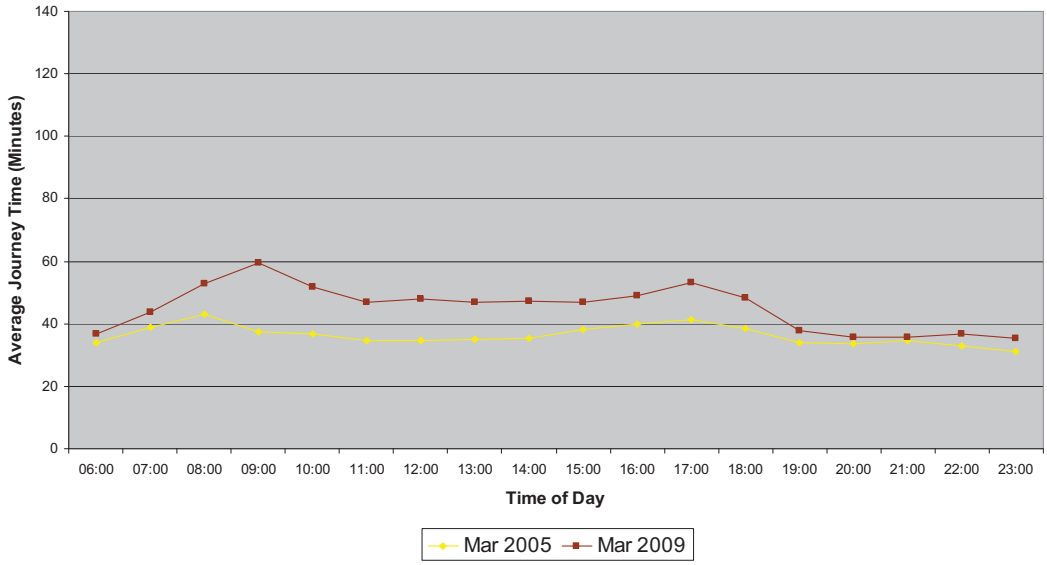
- Present data from an alternative source independent from the police ANPR data presented earlier in this Section;
- Give an indication of any important changes in journey time patterns between 2005 and 2009 on the M6; and
- Give an indication of current operating conditions on both the M6 and M6 Toll.

8.46 It should also be noted that this ANPR data is based on fewer journeys, only relates to the middle lane, and the length of the route at 62km via the M6 Toll and 61km via the M6 is slightly shorter than that covered by the ANPR data presented previously (69.5km via the M6 Toll and 68.5km via the M6),

M6 Northbound (NTCC data)

8.47 Figure 8.12 shows average midweek journey times between the hours of 06:00 and midnight for the M6 northbound in March 2005 and March 2009.

Figure 8.12 – Tuesday – Thursday Journey Times (NTCC data): M6 Northbound

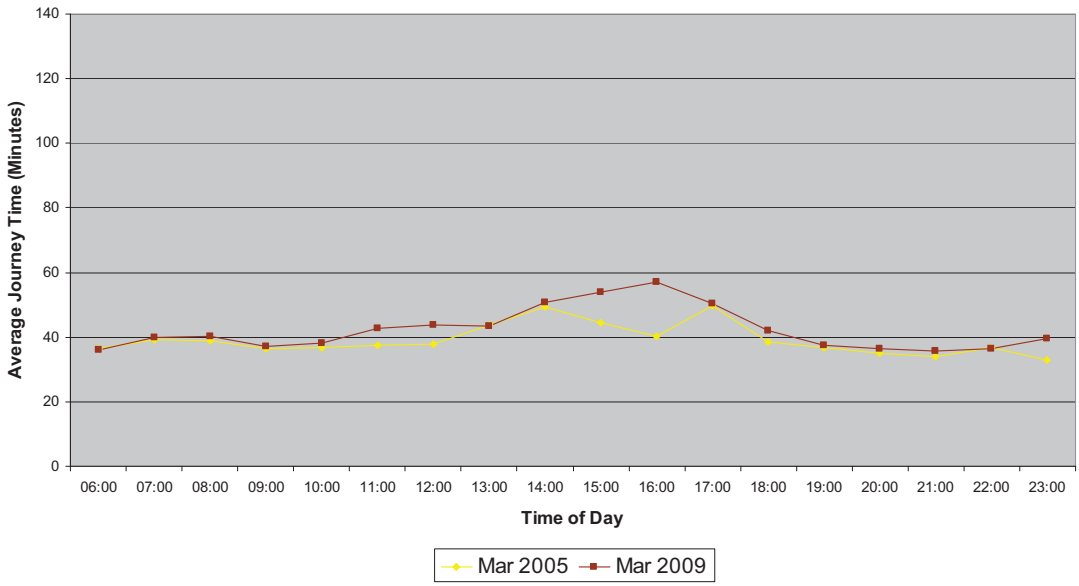


8.48 Figure 8.12 tells us the following:

- The profile of average journey times is consistent with the police ANPR data-set presented earlier (Figure 8.2) for the same group of days and the same route; and
- The data shows a worsening of journey times since 2005.

8.49 Figure 8.13 shows the same information for average Fridays, northbound on the M6.

Figure 8.13 – Friday Journey Times (NTCC data): M6 Northbound



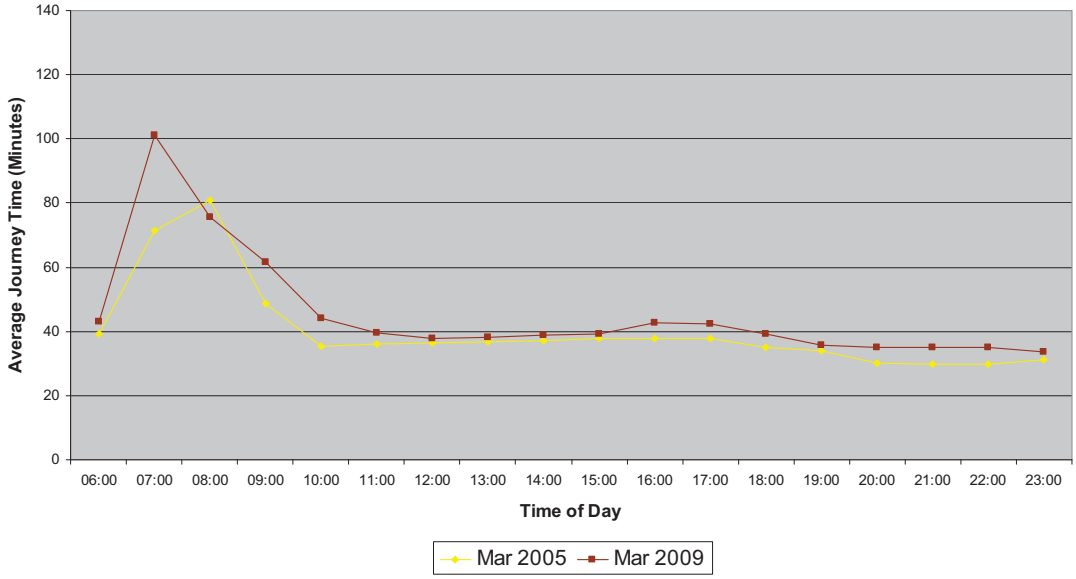
8.50 The following observations can be made from Figure 8.13:

- The profile of average journey times in 2009 is consistent with the ANPR data-set presented earlier (Figure 8.3) for the same day of the week and the same route; and
- Once again, journey times appear to have increased during the middle of the day since 2005, however the increase is less noticeable than it has been on midweek days.

M6 Southbound (NTCC data)

8.51 Southbound average journey times on the M6 on Mondays are shown in Figure 8.14 below.

Figure 8.14 – Monday Journey Times (NTCC data): M6 Southbound

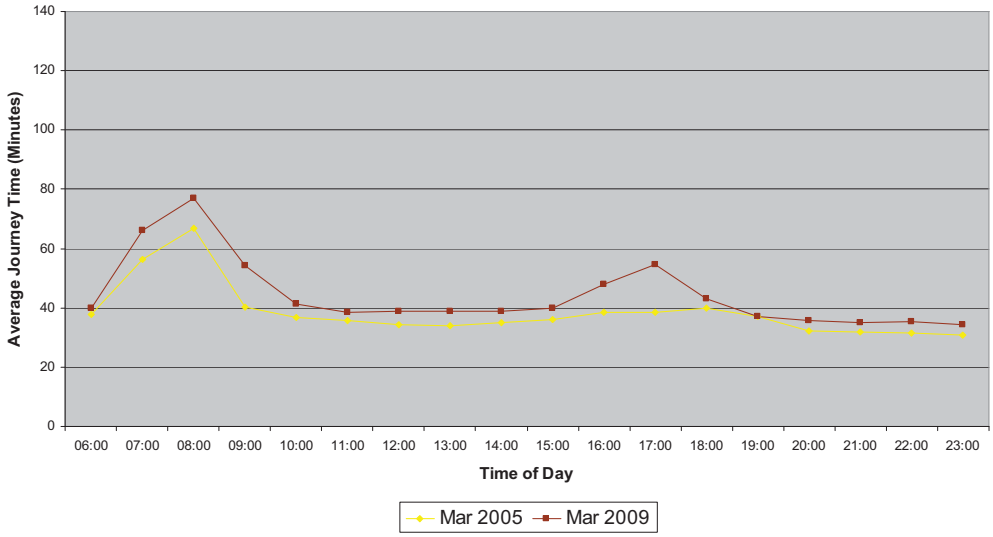


8.52 The following points can be made from Figure 8.14:

- It can be seen that southbound traffic on Monday mornings in the southbound direction on the M6 experiences significant congestion. This is consistent with the journey times presented earlier in Figure 8.4;
- The length of the delays is currently shorter however than before the M6 Toll opened (shown earlier in Figure 8.3), when journeys took up to 2 hours; and
- Throughout the remainder of the day, journeys times are marginally longer in 2009 than they were in 2005.

8.53 Figure 8.15 presents the equivalent information for Tuesdays – Thursdays southbound on the M6.

Figure 8.15 – Tuesday – Thursday Journey Times (NTCC data): M6 Southbound

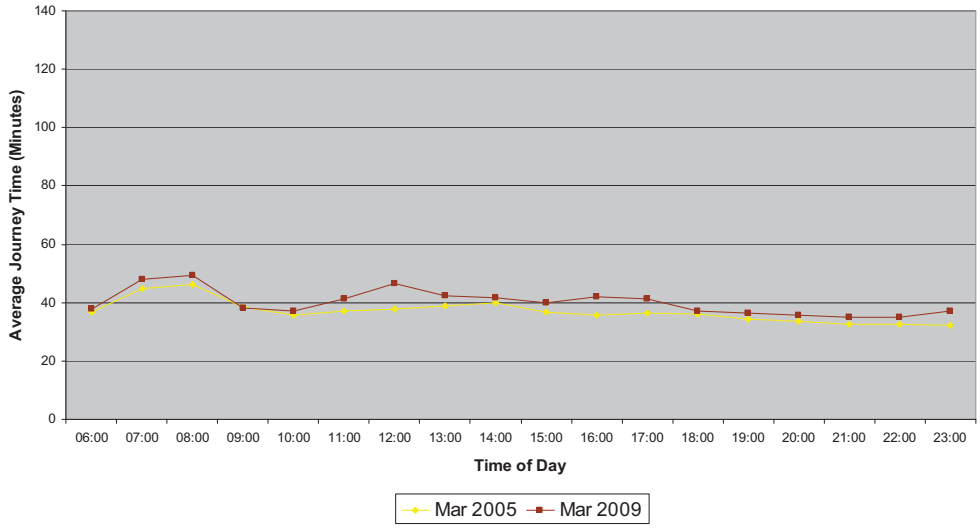


8.54 It can be seen that:

- There are distinctive delays in average journey times during the morning and afternoon peaks. This substantiates the data presented earlier in Figure 8.5; and
- It can also be seen from Figure 8.15, that these delays have become more pronounced since 2005 and in particular in the PM peaks.

8.55 Figure 8.16 illustrates the average journey times on Fridays on the M6 southbound.

Figure 8.16 – Friday Journey Times (NTCC data): M6 Southbound



8.56 With regards to average southbound journey times on Fridays on the M6, the following observations have been made:

- The significant delays which had been experienced by these journeys back in 2003 (shown in Figure 8.6) have largely been eradicated, and this is the case for both 2005 and 2009 data; and
- As with other days of the week, there appears to have been a very slight increase in journey times across much of the day, compared to 2005.

8.57 The NTCC ANPR data presented here appears to corroborate the findings presented earlier which were based on the ANPR data supplied by West Midlands Police.

M6 Toll (NTCC data)

8.58 Data for the M6 Toll in March 2009 is also available from the NTCC ANPR data. Unlike the ANPR data from the police, this data does include data derived from cameras located on the M6 Toll,

8.59 This data shows a flat profile for almost all time periods and days, with a journey time of just under 40 minutes. This indicates that journeys using this route are reliable. The exceptions to this are Monday mornings southbound, and Tuesdays – Thursdays southbound, which are most probably due to congestion on the M6 sections. These are shown in Figures 8.17 and 8.18.

Figure 8.17 – Monday Journey Times (NTCC data): M6 Toll Southbound

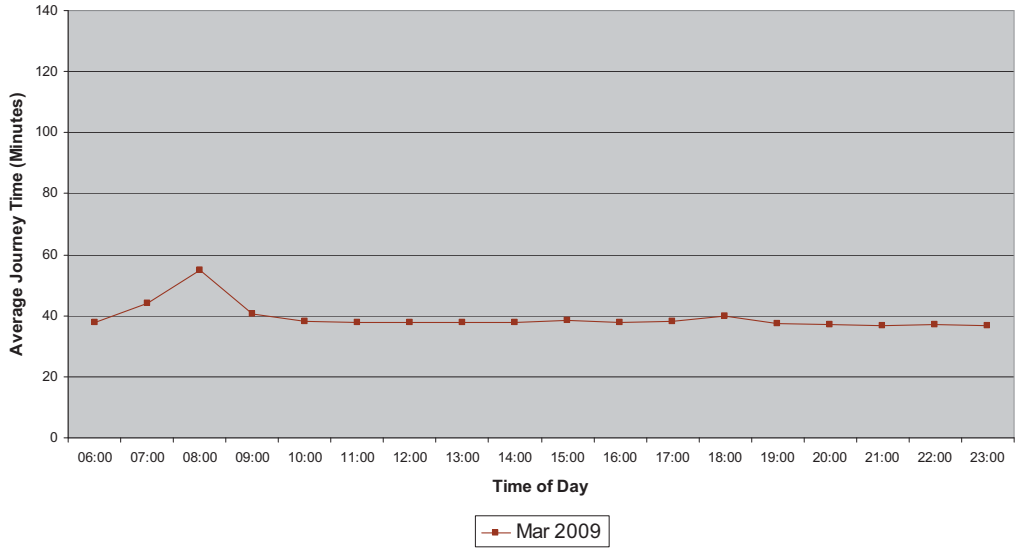
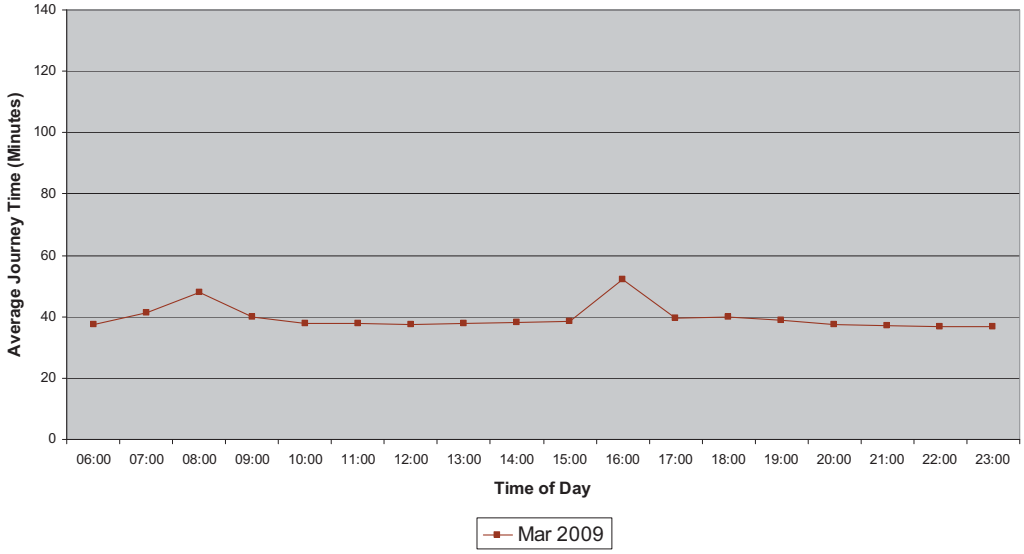


Figure 8.18 – Tuesday – Thursday Journey Times (NTCC data): M6 Toll Southbound



8.60 A full set of journey time profiles for both the M6 and M6 Toll are provided in Appendix A.

Summary of Journey Times

8.61 To summarise, this section of the report has presented data from two sources independent of each other, and show consistent results. We can therefore be confident that the changes in journey times shown, and the 2009 profiles are a fair reflection of the current operating conditions on the M6 and M6 Toll.

8.62 We must also be aware that the general increases in journey times on the M6 since 2004 and 2005 have coincided with an increase in traffic flows, as shown earlier in this section.

8.63 It is worth noting however, that although almost every section of the M6 parallel to the M6 toll appears to be carrying the same or very close to the same amount of traffic observed in 2003, it would appear that primarily, journey delays although having increased slightly since 2004, have not returned to previous (2003) levels, and this is most apparent on Fridays in both directions, Mondays in the southbound direction, and Sundays in the southbound direction.

Key Findings: Journey Times

Changes to Journey Times on the M6

- Journeys in most time periods and in both directions are shorter and more consistent than they were before the M6 Toll opened in 2003, indicating greater reliability, and with the biggest time savings not surprisingly, being in the peaks. However, March 2009 data indicates that there has been a noticeable increase in journey times compared to those observed in 2004 shortly after the M6 Toll opened;
- Historically, the longest journey times, and most variable times on the M6 occurred on Fridays, in both directions, but more particularly in the northbound direction from noon onwards. In 2003, journeys could take anything up to 1hour and 40 minutes longer on a Friday afternoon and evening than they would earlier in the day and on other days of the week. In 2009, these journeys are reduced dramatically to around 60 minutes which is around 20 minutes longer than the times observed earlier in the day;
- Before the M6 Toll opened, journey times on the M6 exhibited an increase of around 20 minutes on Sunday afternoon/evenings in the Southbound direction. This increase was attributed to the additional volume of weekend traffic returning southwards. After the M6 Toll opened, these delays were eradicated and Sunday journey times have since exhibited a flat profile of around 35 – 40 minutes; and
- Despite traffic levels being almost equal to pre-M6 Toll flows, it appear that delays have not returned to previous levels, although they have increased since 2004.

Journey Times using the M6 Toll

- Journey times on the route using the M6 Toll generally show little variation across all times of day and days of the week, with journeys taking around 35 – 40 minutes;
- In both directions and on most days, there has been a very marginal increase in journey times in March 2009 compared to March 2004, however the slight peaks exhibited in the 2004 data (on Fridays northbound in the PM, Saturdays northbound in the AM, and Mondays in both peaks) have been eradicated, with a much smoother profile shown on all days; and
- On average, journey times on midweek days, in the inter-peak periods are between 5 and 10 minutes shorter on the M6 Toll than on the M6, and journeys on Saturdays and Sundays are around 5 minutes shorter than on the M6.

9. Safety

Introduction

9.1 This section aims to provide an overview of the effects of the M6 Toll upon road safety trends on the major roads in the area in the five years after the road opening. This follows on from an initial study of the impacts undertaken as part of the one year after study.

9.2 The objectives of this safety study are to examine:

- Compare accident numbers on key routes before the M6 Toll was constructed with those in the five years after it opened;
- Assess how the initial findings into accident trends reported in the one year after have continued in the following period; and
- Compare accident rates on the M6 Toll and on the other key links assessed with the national average by road type. Comparing rates allows comparisons which take into account varying traffic volumes over the time period including traffic growth.

Data Collection

9.3 Accident analysis is based on records of Personal Injury Accidents (PIAs) which are in the first place collected by police forces. The data is then collated by local authorities, MAC agents on behalf of the Highways Agency and the HA's Regional Intelligence Unit.

9.4 For the purpose of the OYA study, PIA data was obtained and analysed for the periods:

- Three year period before the start of construction (April 1998 – March 2001); and
- Five years post opening (2004 – 2008).

9.5 Although data for the construction period was also obtained, this was not included in the analysis as this part of the network would have experienced atypical traffic behaviour during this period. It should also be noted that the post opening period has seen extensive roadworks on sections of the M6 J5 – J6 and J7 – J8 during 2004 as shown in Table 2.1.

9.6 At the time this study was undertaken in mid 2009, the most recent accident data obtained for 2008 had not yet been validated by the DfT. Thus it may be subject to change, although it is not anticipated that this would be significant in terms of the analysis of the quantity of accident numbers presented in this report and thus it is considered to be sufficiently robust for use in this context.

9.7 This section analyses the numbers of accidents and accident rates:

- On the M6 Toll in its first five years; and
- On the M6 and other key routes in the surrounding network:
  - Over the same period; and
  - Compared to the three years before construction.

9.8 The aims are to analyse:

- Impacts on accident numbers and casualties on the key routes;
- Accident rates before and after compared to the national average in the time period; and
- Impact on accident severity.

Accident numbers

9.9 The total number of accidents on the M6 Toll and sections of the M6 parallel to the toll road are shown in Table 9.1. Part of the M6 Toll scheme construction included major changes to the M42 J7 – J9 to incorporate a shared section between the main tolled part of the M6 Toll and the southern tie-in with the M6 at J3A. For the purpose of this analysis, this shared section has been considered separately from the M6 Toll north of T1.

Table 9.1 – Annual Accident Numbers: M6 Toll and parallel M6 route

Route	Annual Average number of accidents			
	Three Years before Construct -ion	Five Years Post Opening	Difference	% Diff
M6 Toll (T1 – M6 J11A)	n/a	18	18	n/a
M6 parallel section (J3A – J12)	257	172	-85	-33%
M42 (J7 – J9)	16	28	12	73%
New Shared section of M42 (J7 – J9), and M6 Toll (M6 J3A – M42 J8, and M42 J8 – M6 Toll T1)				
Total accidents on two routes : M6, M6 Toll & M42 shared section	273	218	-55	-20%

9.10 The main points shown here are:

- Accidents numbers on the parallel section of the M6 have reduced by a third;
- On average there have been 18 accident per year on the main M6 Toll and an extra 12 accidents on the new shared section; however
- Taking the motorway corridor as a whole, the total number of accidents on the motorway routes between M6 J3a and M6 J12 has reduced by 55 accidents annually (20%).

Table 9.2 – Annual Accident Numbers: other routes

Route	Annual Average number of accidents			
	Three years Before Construct -ion	Five years Post Opening	Difference	% Diff
M6 south of M6 Toll diverge (J3a to merge with M1 J19)	107	111	5	4%
M6 north of M6 Toll diverge (J12 to J15)	148	122	-26	-21%
A5 parallel to M6 Toll/M6 (A38 to M6 J12, excl junction)	72	59	-12	-21%
A38 parallel to M6 Toll (A5 to A446)	28	20	-7	-36%
A446 parallel to M42/M6 Toll (M6 J4 to A38)	44	23	-20	-87%

9.11 With regard to the other key routes, the key points on the changes in the accident numbers shown in Table 9.2 are:

- A roads in the corridor have all shown reductions in the accident rate; and
- On the M6 beyond the M6 Toll tie-ins, the trends are less clear with a large reduction in accidents to the north whilst the southern section has shown a small increase.

9.12 The overall accident rates for the combined alternative routes in the main corridor are summarised in Table 9.3.

Table 9.3 – Annual Accident Numbers: Corridor Totals

Route	Annual Average number of accidents			
	Three Years Before Construct -ion	Five Years Post Opening	Difference	% Diff
Motorway routes (M6 Toll / M42 shared section / parallel M6)	273	218	-55	-20%
Parallel A roads (A5, A38, A446)	143	103	-40	-28%
Total accidents in corridor	416	321	-95	-23%

9.13 This clearly shows that:

- Motorways and trunk roads in the M6 Toll corridor have shown reductions in the number of accidents occurring annually; and
- Overall in the corridor, there is an annual average saving of 95 accidents, a reduction of 23% compared to the number before.

Accident severity

9.14 PIAs are categorised by the severity of the worst injured casualty as Fatal, Serous or Slight. The proportions of the accidents in each category in the before and after periods is shown in Table 9.4.

Table 9.4 – Accident Severity proportions

Route	Three Years Before			Five Years After		
	Fatal	Serious	Slight	Fatal	Serious	Slight
M6 Toll (T1 – M6 J11A)	n/a	n/a	n/a	1%	16%	83%
M6 parallel section (J3A – J12)	1%	7%	92%	1%	8%	91%
Shared section of M42 / M6 Toll	8%	24%	67%	0%	12%	88%
A5 parallel to M6 Toll/M6 (A38 to M6 J12, excl junction)	1%	6%	93%	1%	6%	93%
A38 parallel to M6 Toll (A5 to A446)	5%	6%	89%	4%	12%	84%
A446 parallel to M42/M6 Toll (M6 J4 to A38)	1%	22%	77%	2%	16%	82%
Total Motorway and A road corridor	2%	9%	89%	1%	9%	90%
M6 south of M6 Toll diverge (J3a to merge with M1 J19)	1%	12%	87%	2%	10%	89%
M6 north of M6 Toll diverge (J12 to J15)	1%	8%	91%	1%	3%	97%

9.15 The main points of interest with regard to accident severity before and after the M6 Toll opened are:

- In general, there is little change in the proportions of accidents by severity between the before and after periods. This shows that the reductions in accident numbers has been spread across the severity categories; and
- Severity of accidents on the M6 Toll is in line with other motorways.

Accident Rates

9.16 A safety assessment should also examine the impacts ignoring changes in the volumes of traffic. This is achieved using the measure of 'Personal Injury Accidents per Million Vehicle-Kilometres' (PIA/mvkm). There are important aspects of the analysis of accident rates by distance travelled by vehicles on the route:

- Comparison of rates in the before and after periods excluding the impact of traffic volume changes;
- Comparison with a national average by the type of road; and
- Comparison with a national average reduction in accidents by the type of road.

9.17 The A446 is omitted from this table as there is insufficient traffic volume data covering the whole route to allow a rate to be calculated.

9.18 The personal injury accident rates per million vehicle kilometres in the before and after periods are shown in Table 9.5. The national average accident rates are also given by road type. Two rates are given for the A5 because the route includes a mixture of different types from urban dual carriageway to rural single carriageway.

Table 9.5 – Accident rates per million vehicle kilometres travelled (PIA/mvkm)

Route	Observed Accident rate			National average rate by road type		
	Before (1998 – 2001)	After (2004 – 2008)	%	2000	2006	%
M6 Toll (T1 – M6 J11A)	n/a	0.038	n/a	n/a	0.099	n/a
M6 parallel section (J3A – J12)	0.137	0.100	-27%	0.098	0.099	1%
M42 / M6 Toll shared section	0.086	0.106	24%	0.098	0.099	1%
M6 south of M6 Toll diverge (J3a to merge with M1 J19)	0.089	0.081	-10%	0.098	0.099	1%
M6 north of M6 Toll diverge (J12 to J15)	0.118	0.088	-25%	0.098	0.099	1%
A5 parallel to M6 Toll/M6 (A38 to M6 J12, excl junction)	0.340	0.284	-17%	0.226 – 1.004	0.148 – 0.911	-9% / -15%
A38 parallel to M6 Toll (A5 to A446)	0.265	0.217	-18%	0.174	0.148	-15%

9.19 The main points shown here are:

- Clearly as shown in section 3, in the period since the opening of the M6 Toll, traffic on the parallel section of the M6 has been reduced for much of the post–opening period, so a reduction in accident numbers would be expected, but the important point shown by the data here is that the accident rate for this traffic has also reduced. This has meant that the route now has an accident rate which has improved from being worse than average to being at the average rate expected for a motorway;
- The excellent safety record on the M6 Toll is shown by its accident rate being less than half that of an average motorway and that of the parallel M6;
- The section of the M42 shared with the southern end of the M6 toll leading to the southern tie-in with the M6 has shown an increase in the accident rate compared to the previous rate on this section. This increase can be explained by the change in the layout of this section of motorway to a much more complex one as a result of the addition of the M6 Toll tie-in. It should be note that during the five years of post opening data included here; there were additional works to improve the layout, partially in response to safety concerns, so it is expected that in more recent years, the accident rate will have improved; and
- The A5 and A38 roads where parallel to the M6 and M6 Toll, have shown reductions in accident rates but this reduction is in line with the expected reduction for these types of roads.

Statistical tests of significant of findings

9.20 In order to ascertain whether the changes in the accident rates observed before and after the scheme was opened were statistically significant as opposed to random fluctuation, a Chi-square statistical test has been undertaken based on the numbers of accidents over the three years before and five years after and the observed traffic volumes.

9.21 The Chi-square test compares the observed number of accidents in the before and after periods with the expected number of accidents if there was no change in the accident rate by traffic volume. The test result then establishes whether the difference between observed and expected

accidents is significant or likely to have occurred by chance. A 95% confidence level has been used. This means that saying the change is statistically significant means a 95% probability that the change in accident rates is real and not just as a result of chance alone.

9.22 The summary of the results of the tests are given in Table 9.6.

Table 9.6 – Statistical Significance tests on Accident Rate Changes

Route	Observed change in Rate	Is Change Statistically Significant?
Parallel section of M6 (J3A to J12)	Reduction	Yes
M42 (J7 – J9) New Shared section of M42 / M6 Toll	Increase	No
Total of motorway corridor (M6 Toll, parallel M6, & M42 shared section)	Reduction	Yes
M6 south of southern tie-in (J3a – M1 interchange)	Reduction	No
M6 north of northern tie-in (J12 – J15)	Reduction	Yes
A5 (A38 to M6 J12, excl jct)	Reduction	Yes
A38 (A5 to A446)	Reduction	No
Route	**Rate compared to National Average**	**Is Difference Statistically Significant?**
M6 Toll (T1 – M6 J11A)	Better than average	Yes

9.23 The important points arising from this summary of the statistical tests are that:

- There are real significant reductions on the accident rate on:
  - The parallel section of the M6 alone;
  - The motorway corridor comprising the M6 Toll, the shared section with the M42 and the parallel section of the M6;
  - The M6 north of the M6 Toll tie in up to J15; and
  - A5 parallel to M6 Toll.
- The increased accident rate on the M42 shared section, which was much altered from its previous layout, is not statistically significant.

9.24 The statistics do not directly establish the cause of the reduction in accident rates but clearly for these routes examined here, the opening of the M6 Toll is the biggest change to the road network in this time period. Therefore it is reasonable to conclude that the change in accident rates on the routes studied is a direct impact of the opening of the toll road.

Casualties

Number of Casualties

9.25 The numbers of casualties injured in the accidents detailed above is given in the table below.

Table 9.7 - Average number of Casualties

Route	Annual Average number of Casualties			
	Three Years before Construct-ion	Five Years Post Opening	Difference	% Diff
M6 Toll (T1 – M6 J11A)	n/a	33	n/a	n/a
M6 parallel section (J3A – J12)	399	262	-137	-34%
M42 (J7 – J9)	27			
New Shared section of M42 (J7 – J9), and M6 Toll (M6 J3A – M42 J8, and M42 J8 – M6 Toll T1)		40	13	47%
A5 parallel to M6 Toll/M6 (A38 to M6 J12, excl junction)	95	83	-11	-12%
A38 parallel to M6 Toll (A5 to A446)	36	29	-7	-20%
A446 parallel to M42/M6 Toll (M6 J4 to A38)	57	30	-27	-47%
Total casualties in corridor (M6 Toll / M42 shared section / parallel M6, A5, A38, A446)	614	478	-136	-22%
M6 south of M6 Toll diverge (J3a to merge with M1 J19)	168	173	5	3%
M6 north of M6 Toll diverge (J12 to J15)	227	215	-12	-5%

9.26 As expected, the changes in casualty numbers reflect the changes in accidents numbers shown earlier. The key points shown in the table are:

- The section of the M6 parallel to the toll road has seen a reduction in casualties of a third.
- The change in total casualties in the corridor has reduced by an average of 136 per year, a reduction of 22%.

Severity – Killed and Seriously Injured Casualties

9.27 Data on the numbers of casualties seriously injured and killed is summarised in Table 9.8 for the key routes.

Table 9.8 – Annual Average Number of Casualties Killed or Seriously Injured (KSI)

Routes	Before	After	Diff	Statistically significant change in KSI rate per mvkm?
Motorway routes (M6 Toll / M42 shared section / parallel M6)	40	33	-7	Yes
M6 south of southern tie-in (J3a – M1 interchange)	28	24	-4	Yes
M6 north of northern tie-in (J12 – J15)	21	10	-10	Yes

9.28 This table shows that:

- Absolute numbers of casualties killed or seriously injured on the motorway corridor reduced by an average of 7 per year in the five years after the opening of the M6 Toll;
- There were also reductions in the numbers of KSI casualties on the M6 both north and south of the M6 Toll; and
- Taking into account traffic volumes, the rates of KSI casualties per million vehicle kilometres has shown a statistically significant reduction.

9.29 As shown previously, the total number of all casualties has reduced in the five years after opening. The table below shows the proportions of KSI casualties.

Table 9.9 – KSI as a Proportion of all Casualties

Route	Before	After
Motorway routes (M6 Toll / M42 shared section / parallel M6)	9%	11%
M6 south of southern tie-in (J3a – M1 interchange)	16%	14%
M6 north of northern tie-in (J12 – J15)	9%	5%

9.30 This table shows that:

- There was little change in the severity of the casualties injured.

Comparison with the Findings from One Year After Study

9.31 The one year after study of the M6 Toll identified a number of key findings with regard to the safety impacts. Now that five years' worth of accident data is available, there is sufficient data to establish the statistical significance of the initial conclusions on the safety impacts.

9.32 At the five year after stage it has been shown in this section that most of the initial findings on the beneficial safety impacts of the M6 toll have continued to hold true for the five years after period. These are summarised in Table 9.10.

Table 9.10 – Re-evaluation of One Year After Findings of the Safety Impacts

OYA finding	FYA finding	Statistical Significant finding at FYA?
There was a big drop in the annual number of accidents on the bypassed section of the M6 in the first year after the M6 Toll opened. The number was almost halved and the accident rate on this section changed from above to below the national average for a three-lane motorway;	Annual accident saving on parallel M6 is 85 (33%). Rate is at the national average.	Yes
In the first year after opening, the accident rate on the M6 Toll was half of that on the parallel section of the M6;	Accident rate on M6 Toll is less than half that of the parallel M6 and the national average	Yes
On the M6 north and south of the M6 Toll tie-ins, there were increases in the number of injury accidents;	M6 north has showed a reduction in the annual accident rate while the rate on the M6 south is little changed from that of before.	Yes – M6 North No significant difference on M6 South
A5 showed a reduction in both the number of accidents and the rate.	Annual number and rate of accidents continue to be better than before.	Yes

Key Findings: Safety

Changes to Accident Numbers

- In the first five years, there was an average of 18 accidents per year on the main tolled part of the M6 Toll and an additional 12 on the expanded shared section with the M42, but this is far outweighed by the reduction of 85 accidents on the parallel section of the M6;
- There is little change in the proportions of accidents by severity;
- Overall in the M6 / M6 toll corridor including parallel A roads, there is an annual saving of an average of 95 accidents, a reduction of 23% compared to the number before;
- Taking into account traffic volumes, there have been statistically significant reductions in the accident rates on:
    - The parallel section of the M6 alone;
    - The motorway corridor comprising the M6 Toll, the shared section with the M42 and the parallel section of the M6;
    - The M6 north of the M6 Toll tie in up to J15; and
    - A5 parallel to M6 Toll.

Changes to Casualties

- Findings regarding the changes in the numbers of casualties injured annually in the five years after opening are similar to those for accidents;
- The number of casualties injured per year in the motorway and A road corridor has reduced by 136 annually (22%);
- The numbers of casualties killed or seriously injured has reduced significantly on the motorway routes including the M6 Toll and parallel M6, and the M6 north and south of the tie-ins.

Re-evaluation of Accident Trends Observed at OYA

- The OYA study identified improved safety on the parallel section of the M6 and on the corridor as a whole. The FYA evaluation has shown these trends have continued and are statistically significant;
- The accident rate on the M6 Toll on the opening year was less than half the national average. The five years after data has showed that this trend has continued.