

10. Environment

Introduction

- 10.1 This section summarises the main points of the environmental evaluation. The main focus of the five years after evaluation is to revisit the findings of the one year after report, and evaluate changes and ongoing impacts, and is included in full in Appendix B.
- 10.2 It should be noted that the appraisal of the M6 Toll was undertaken in the early 1990s before the introduction of the NATA appraisal methodology in 1998. Thus the assessment of the impacts of the scheme detailed in the Environment Statement only covered the corridor of the route of new road and M42 shared section. The wider impacts such as those on the relieved section of the M6 were not considered.

Sources

- 10.3 The data collection process for the environment evaluation has consisted of three main stages:
- Obtaining and analysing data and documentation including the 1993 Environment Statement (ES) prepared for the toll road version of the scheme;
 - Site visits undertaken by a Landscape Architect and Transport Planner; and
 - Undertaking consultations with relevant local authorities on the route of the M6 Toll corridor.

Noise

- 10.4 The one year after report considered noise in some detail; it has been re-evaluated to take account of the 2009 traffic flow information.

Key Findings on Noise

- 10.5 The M6 Toll has introduced a source of noise along the route corridor as expected although as noted in the one year after report traffic on the M6 Toll was less than expected.
- 10.6 Although not included in the ES, a low noise surface was proposed and implemented as an additional measure by MEL to help reduce noise impacts.
- 10.7 Mitigation measures in the form of earth mounding and environmental barriers have been provided in line with the ES.
- 10.8 By July 2009, 6,975 Part 1 Claims had been successful and one of the main reasons given was noise. However, observed traffic flows in 2009 are still lower than forecast and it is considered that the local noise climate is better than expected for properties close to the road corridor.
- 10.9 Traffic information is not available to evaluate noise impacts as a result of the M6 Toll on adjacent roads.

Local Air Quality

- 10.10 The one year after report considered air quality in some detail, it has been re-evaluated to take account of the 2009 traffic flow information and available air quality monitoring data from the local authorities.

Key Findings on Air Quality

- 10.11 The M6 Toll has introduced a source of traffic into the route corridor and local air quality will have worsened although this may not be as much as expected based on observed traffic flows in 2009 which are less than forecast.

- 10.12 Local Authority air quality monitoring of the M6 Toll near Norton Canes indicates that levels of Nitrogen Dioxide, Sulphur Dioxide and PM10 do not exceed the UK air quality objectives and that there are no other known air quality issues associated directly with traffic on the M6 Toll itself.
- 10.13 However, there are likely to have been other air quality impacts across the whole of the region as traffic volumes have changed considerably. It is difficult to assess the extent to which these changes are due to the opening of M6 Toll. However 2 consultees have commented that the % of HGVs on the A5 has increased, rather than falling as predicted and easing local routes, and an AQMA (Air Quality Management Area) remains in place next to the A5. Another AQMA remains in place near Coleshill.

Greenhouse Gases

- 10.14 The assessment of greenhouse gas emissions was not an assessment requirement when the original ES was published in 1993 and was therefore not considered in the ES forecasts.
- 10.15 This FYA study has not undertaken an evaluation of the estimated carbon emissions resulting from the scheme because to do so in accord with the DfT's guidelines would require extensive coverage of speeds on the M6, M6 toll and the wider strategic roads network which have been impacted by this scheme. There is insufficient data on these roads to carry out this analysis.
- 10.16 A recent study undertaken by Staffordshire University for MEL⁴, estimated that for the year 2006-07, the vehicle emissions of the M6 Toll users only was 191,403 tonnes CO₂ which is 52,200 tonnes of Carbon. It also estimated that the equivalent figure for users of the parallel M6 was 996,520 tonnes CO₂ (272,000 tonnes Carbon). The M6 figure is much higher due to the greater traffic flows and much higher proportion of HGVs which produce higher emissions than light vehicles.
- 10.17 These findings have not been verified by this study.

Landscape

- 10.18 The one year after report recommended that the five years after study should review the establishment of the landscape mitigation measures and evaluate the impacts of lighting.

Key Findings on Landscape

- 10.19 Most areas of tree and shrub planting are establishing well, with plants exhibiting good, healthy growth. If the management operations recommended in the Landscape Management Plan are followed, there is no reason why the scheme landscape objectives should not be fulfilled. Figure 10.1 and Figure 10.2 show the development of planted areas near the Belfry.

⁴ *An Assessment of the Carbon Footprint of the M6 Toll motorway in the UK* J Fairburn, G Pugh, Institute for Environment, Sustainability and Regeneration, Staffordshire University (2008)



Figure 10.1 – Cutting with tree planting near the Belfry (1 Year After)



Figure 10.2 – Cutting with well established tree planting near the Belfry (5 Years After)

- 10.20 However, some areas of relatively poor tree/shrub establishment were apparent, notably on embankments close to overbridges and near to balancing ponds. Some specialised areas such as wet woodland, species-rich grassland and marginal pond planting have not developed as expected, possibly because of ineffective maintenance regimes.
- 10.21 The turquoise colour of the toll booth canopies was felt to stand out too much by a consultee, who considered that a darker green colour would have blended into the landscape more effectively and that further offsite planting could be undertaken in mitigation.
- 10.22 With regard to lighting it is considered that the downward directed lighting associated with the M6 Toll appeared to create less light spill than the lighting associated with existing junctions and roads in the vicinity of the M6 Toll, and the 'white' light was less intrusive than the 'orange' glow of low pressure sodium lighting. Lighting columns near T1 and T3 were considered to be very noticeable by a consultee.
- 10.23 In many locations it was very difficult to assess the additional impact of M6 Toll lighting due to the 'skyglow' of other lighting associated with the West Midlands conurbation and transport corridors and interchanges.

Heritage of Historic Resources

- 10.24 The one year after study concluded that it appeared that the archaeological remains were satisfactorily preserved by record, and that the only outstanding issue was that the results of the archaeological work on site had not been written up and published.
- 10.25 The County Archaeologists for Staffordshire and Warwickshire have now received the post-excavation analysis and published report from the archaeological sub-consultants to the project.
- 10.26 The published report states that important archaeological results had been produced, but that it is debateable that the archaeological potential of the area was fully realised, largely because of the longevity of the project and subsequent changes.

Biodiversity

- A.1.1 The ES predicted the following impacts:
- Impact on areas of wildlife importance e.g. by noise and lighting disturbance, road mortality, discharge into lakes, ponds, rivers and streams, airborne pollutants and changes in landscape;
 - In general the route line would follow existing road corridors and other areas of low conservation value. It was predicted that the most important sites likely to be affected were;
 - River Blythe, a nationally important river;
 - Hatherton Clay Pit, containing a protected species;
 - Chasewater Heaths SSSI, a nationally important heathland and canal basin;
 - A valuable wetland site, containing locally rare plants, adjacent to the River Blythe; and
 - Hatherton Reservoir, a large water body of local importance.
 - Overall there would be a net loss of conservation value associated with the construction and operation of the road scheme.
- 10.27 The one year after study suggested further evaluation at five years after when the five years post construction monitoring report would be available; as well as confirming effectiveness of the mitigation measures, this report was expected to report on the status of previously reported remedial measures.

Key Findings on Biodiversity

- 10.28 Concerns have been raised by one consultee (Birmingham City Council) who considers that the M6 Toll has isolated red deer at Brownhills that the M6 Toll is a barrier to otter movements, that the effect on the movement patterns of raptor birds was not properly considered in the ES.
- 10.29 A Wildlife Mitigation Audit was carried out by the consultant ecologists to MEL in December 2006 and January 2007. This included an inspection of all otter ledges and mammal pipes and a review of the wildlife fencing. The main issues identified during the audit were largely the same as those found in 2004:
- In a number of locations, the otter/badger resistant fencing required repair or modification to ensure it is effective;
 - Crossings of drainage ditches are not otter/badger resistant;
 - Pedestrian gates and access gates to balancing ponds, and entry barriers to toll plazas are not otter/badger resistant;
 - The environmental noise fencing does not have buried mesh at the base to prevent animals burrowing underneath;

- The entrances to a number of mammal underpasses appear to hold water;
- Otter ledges do not tie-in with the bank side profile; and
- 'Funnel' effect to entrance pipes is not always effective.

- 10.30 The one year after report states that the ecological consultants' recommendations for appropriate remedial measures were provided to MEL in the report dated February 2005. The report dated February 2006 noted that it is understood that these recommendations would be addressed during 2006 and that the most critical of these would be re-inspected once the remedial works were complete. The MEL ecological consultants noted in the 2007 report that many recommended remedial works are still outstanding.
- 10.31 As noted in the one year after report the M6 Toll five years post construction ecological monitoring report was due to be undertaken in 2008, and which would evaluate the ecological trends post construction and include more detailed recommendations for ongoing management of the ecological mitigation measures. This report has not been produced at the time of this evaluation, although specific reports on white clawed crayfish, great crested newts and translocated hedgerows have been completed.
- 10.32 The M6 Toll Ecological Monitoring 2008/09 Hedgerow Surveys states that ecological monitoring was initially intended to continue until 2013, but that the results of surveys to date suggest that overall the mitigation implemented along the scheme has been successful, and that the need to continue full monitoring will be discussed with the consultees.
- 10.33 Based on the 2008/09 Hedgerow Surveys, it would appear that few of the hedgerow translocation plants are in good health:
- At Laney Green, only 21% of trees/shrubs surveyed were in good health, and the remaining 79% are exhibiting some signs of dieback or are dead and
 - At Hall Walk/Green Lane, only 6% of trees/shrubs surveyed were in good health, with 59% dead and many of the remaining trees/shrubs (35%) in poor health.
- 10.34 The 2003-2008 White Clawed Crayfish Survey found that white clawed crayfish numbers had declined, in common with the overall UK numbers.
- 10.35 The 2008/2009 Great Crested Newt Surveys found that further mitigation measures are needed to meet the requirements of the great crested newt licence.
- 10.36 Monitoring by the ecological consultants to MEL is ongoing with reports provided to MEL, although it would appear that some of the recommendations and suggested remedial actions remain outstanding. The 2008 report has not been undertaken and was not available for review as part of this study.

Water Environment

- 10.37 The one year after report suggested further study as part of the five years after evaluation with regard to water quality.
- 10.38 The Environment Agency was contacted at the one year after stage and stated that it was unlikely to sample to ascertain chronic impact on water quality and at that time it was under the impression that post construction sampling would be carried out by the Highways Agency or its contractors.

Key Findings on Water Environment

- 10.39 Water mitigation measures including balancing ponds and pollution control facilities appear to have been provided in line with expectations as an integral part of the scheme and no consultation comments have been received which would indicate that the facilities are performing other than as intended.

- 10.40 Post construction monitoring was identified in the ES Section 2.13 Maintenance and Management and MEL has confirmed that routine maintenance of pollution control measures is undertaken together with reactive measures for spillage containment as necessary. Monitoring of water quality at sewage outfalls from the Toll Stations and MSA is carried out by the Environment Agency on behalf of MEL.

Key Findings: Environment

- Environmental impacts are considered to be generally as expected;
- Air quality – Based on lower observed traffic flows on the M6 Toll compared to ES forecasts, it is likely that air quality impacts are lower than expected. Traffic data is not available to evaluate the impact of the M6 Toll on adjacent local roads, but 3 consultees found issues with air quality on local roads because traffic had not decreased as expected;
- Noise – by July 2009, 6,975 Part 1 Claims had been successful and one of the main reasons given was noise. However, observed traffic flows in 2009 are still lower than forecast and it is considered likely that the local noise climate is better than expected for properties close to the road corridor. Although not included in the ES a low noise surface was proposed and implemented as an additional measure by MEL to help reduce noise impacts;
- Greenhouse gas emissions – Not considered in the ES and there is insufficient data to evaluate in this study;
- Landscape – Planting is largely establishing well, although there are some gaps / less well established areas and some specialised areas such as wet woodland, species-rich grassland and marginal pond planting have not developed as expected. 2 consultees considered that adequate maintenance had not been carried out. Lighting impacts have been reduced by the use of downward directed lighting;
- Biodiversity – limited up to date information available to fully evaluate although most impacts are likely to be as expected. Based on the information available some remedial and management works remain outstanding, particularly to otter fencing, and management of ecological ponds, establishment of wet woodland and species rich grassland. Further mitigation measures needed to meet requirements of great crested newt licence. The hedgerow translocation was largely unsuccessful, and the value of hedgerow translocation in future schemes should be assessed particularly where it is identified that suitable donor sites are not available;
- Heritage – Archaeology report has now been provided to the relevant County Archaeologists. Important archaeological findings were produced, but the archaeological potential of the area may not have been realised. The recording methodology was based on old data and ; and
- Water – Based on the information available it is likely that the impacts on the water are as expected.

11. Conclusions

Conclusions on Traffic

Conclusions on Traffic Volumes

11.1 Drawing upon findings presented in Sections 2 to Section 8 of this report, the following conclusions in relation to traffic can be made:

- Five years on, the M6 Toll continues to provide an alternative route to the M6 for motorists and has improved congestion and journey times on the M6;
- Traffic appears to have reduced in the last 2 years on the M6 Toll, and data suggests that the current economic climate is likely to be an important factor. However, this is only a partial explanation for the changes, as long term trends show that traffic on the M6 Toll was starting to decline in 2007 before the economic downturn was widely acknowledged;
- It could be argued that this reduction in M6 Toll flows in 2007 may be due to traffic returning to the M6, seeing it as a more desirable route with improved journey times after the M6 Toll opened, contributing to a kind of 'see-saw' effect between the two strategic routes;
- Recreational traffic on the M6 Toll appears to have been affected the most, with the number of vehicles on weekends reduced by some 30% compared to 2004 levels;
- Based on annual averages, much of the parallel section of the M6 is at or near to levels of traffic experienced before the M6 Toll opened, and has shown an increase in vehicles between 2007 and 2008. This is against widespread reductions across the Midlands motorway and strategic trunk road network; and
- This suggests some long distance traffic has rerouted back on to the M6 from the M6 Toll, and the economic climate has exacerbated this trend.

Conclusions from Strategic Screenlines

11.2 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. This study has drawn the following conclusions:

- Since 2005, there has been clear reassignment of traffic from the M6 Toll, back on to the M6 and other strategic routes within the West Midlands;
- Despite the current economic climate affecting the traffic in the region as it has elsewhere nationally, it has been possible to identify the routes where the most significant reassignment appears to have taken place; these are:
 - M6 (parallel to the M6 Toll)
 - A446;
 - A38;
 - A5;
 - And to a lesser extent, the A460, A34, A513, A518 and A50.

Conclusions on Journey Times

11.3 Drawing upon data derived from 2 independent sources, the following conclusions regarding journey times can be made:

- Journeys on the M6 have continued to benefit from considerable time savings of up to 80 minutes, and this is particularly the case in peak periods when previously some of the worst delays used to be experienced before the M6 Toll opened;
- The periods benefiting most significantly are Friday afternoons and evenings, Sunday evenings in the southbound direction, and Monday mornings in the southbound direction;
- In 2009, in most time periods, journey times are marginally longer than in 2004, however they have not returned to 2003 levels;
- The M6 Toll generally exhibits a flat profile of around 35 – 40 minutes at most times of day, and days of the week, indicating few delays; and
- During inter-peak times, and periods without delay, journeys between M6 J2 and M6 J12 via the M6 Toll are generally around 5 – 10 minutes shorter than using parallel the M6.

Conclusions on Vehicle Composition

- In relation to vehicle composition, available data has suggested that the absolute number and proportions of vehicles deemed as 'heavies' (over 5.2m in length) have increased on both the M6 and the M6 Toll compared to 2003 and 2004 levels, respectively;
- More detailed analysis indicates that the M6 Toll carries a more even distribution between light vans and OGV1/OGV2 categories, than the M6, where 'heavies' consist primarily of the OGV1/OGV2 categories; and
- Based on available data, the increase in 'heavies' on the M6 since 2005 seems to be primarily derived from vehicles between 5.2m and 6.6m in length, and therefore likely to be light vans, and not OGV1s and OGV2s.

Performance against Scheme Objectives

- 11.4 The evaluation of the scheme's specific objectives as reported in this study are summarised in Table 11.1.

Table 11.1 – Success against Scheme Objectives

Objective	Success	
To provide through traffic with an alternative to the M6.	Five years on, the M6 Toll continues to provide an alternative route for motorists to the M6 offering faster journey times and greater reliability.	✓
To relieve the M6.	Journey times have reduced compared to before the M6 Toll opened. Although they have increased slightly since 2005, they have remained shorter than before the M6 Toll opened.	✓
To improve journey time reliability.	More consistent journey times have continued to be exhibited on the M6 since the M6 Toll opened.	✓
To reduce traffic levels on less appropriate local routes.	Traffic on the A38, A5 and A50 has reduced compared to pre-M6 Toll opening levels; however flows have started to increase on these routes again.	✓
To improve transport links with towns to the north and east of the West Midlands.	Local transport links have undoubtedly improved due to the reduced journey times and increased reliability of journeys.	✓

Objective	Success	
To become an integral part of a continual motorway corridor along the backbone of the country.	The M6 Toll continues to provide an alternative route for motorists to the M6 along the northern part of the Birmingham Box which is included in the Trans-European Road Network. Freight between the Celtic nations and continental Europe, as well as from the West Midlands and other English regions, passes through it.	✓

Conclusions on Safety

Safety Trends at FYA compared to OYA findings

11.5 At the five years after stage there is clearly much more accident data. This has been used to confirm:

- The safety benefits observed one year after have been continued over the five years after period; and
- The Benefits observed on the key links are statistically significant.

Safety on the M6 Toll

11.6 Analysis of accident records for the M6 Toll has shown that the road has a good safety record. In particular:

- In the first five years, there was an average of 18 accidents per year on the main tolled part of the M6 Toll; and
- Accident rate per million vehicle kilometres is less than half the national average for a motorway which is the rate seen on the parallel M6.

Safety on the Parallel M6 and wider network

11.7 The main findings on the safety impacts have been:

- 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.
- 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%); and

- 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.

Conclusions on Environment

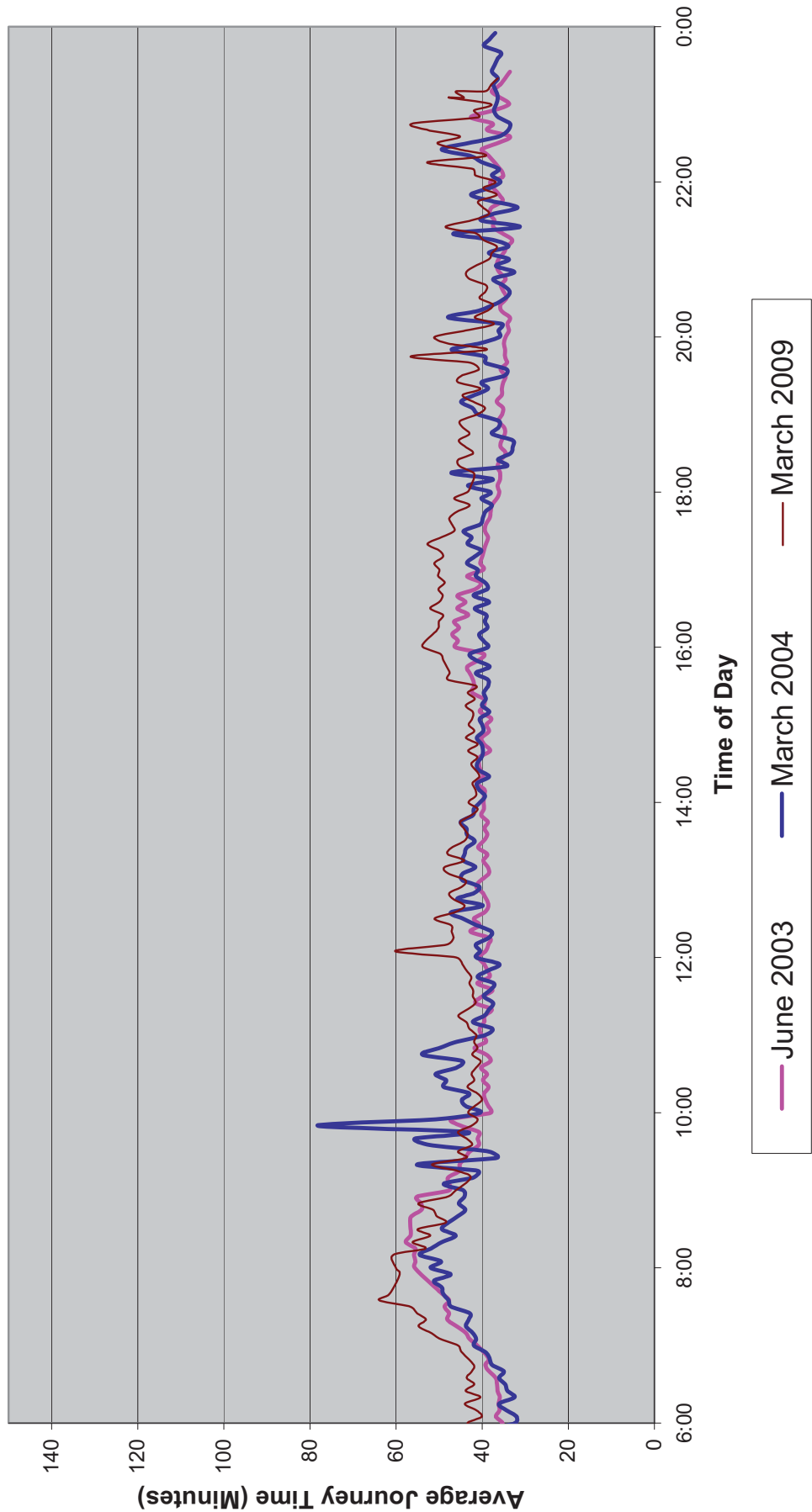
11.8 Environmental impacts are considered to be generally as expected, and the main impacts have been:

- **Noise and Local Air quality** – Based on lower observed traffic flows on the M6 Toll compared to ES forecasts, it is likely that local noise and air quality impacts are lower than expected. Traffic data is not available to evaluate the impact of the M6 Toll on adjacent local roads;
- **Greenhouse gas emissions** – Not considered in the ES;
- **Landscape** – Planting is largely establishing well, although there are some gaps / less well established areas and some specialised areas such as wet woodland, species-rich grassland and marginal pond planting have not developed as expected. Lighting impacts have been reduced by the use of downward directed lighting;
- **Biodiversity** – limited up-to-date information was available to fully evaluate although impacts are mostly as expected. Based on the information available, some remedial and management works appear to remain outstanding. Additional mitigation would be needed to meet requirements of the great crested newt licence. The value of hedgerow translocation in future schemes should be assessed;
- **Heritage** – Archaeology report has now been provided to the relevant County Archaeologists; and
- **Water** – Based on the information available it is likely that the impacts on the water environment are as expected.

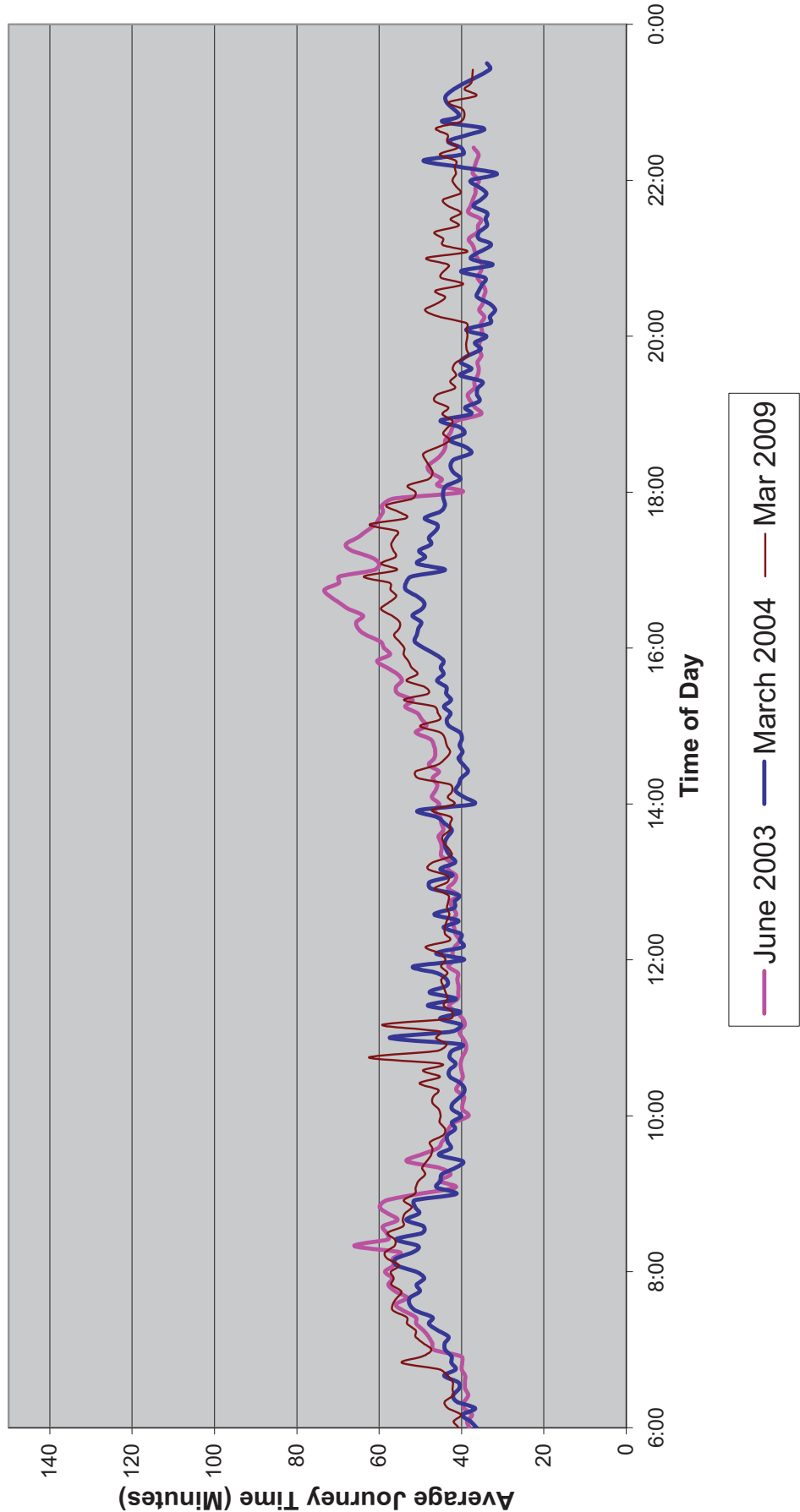
Appendix A

A.1 Average Journey Times (2003, 2004, 2009)

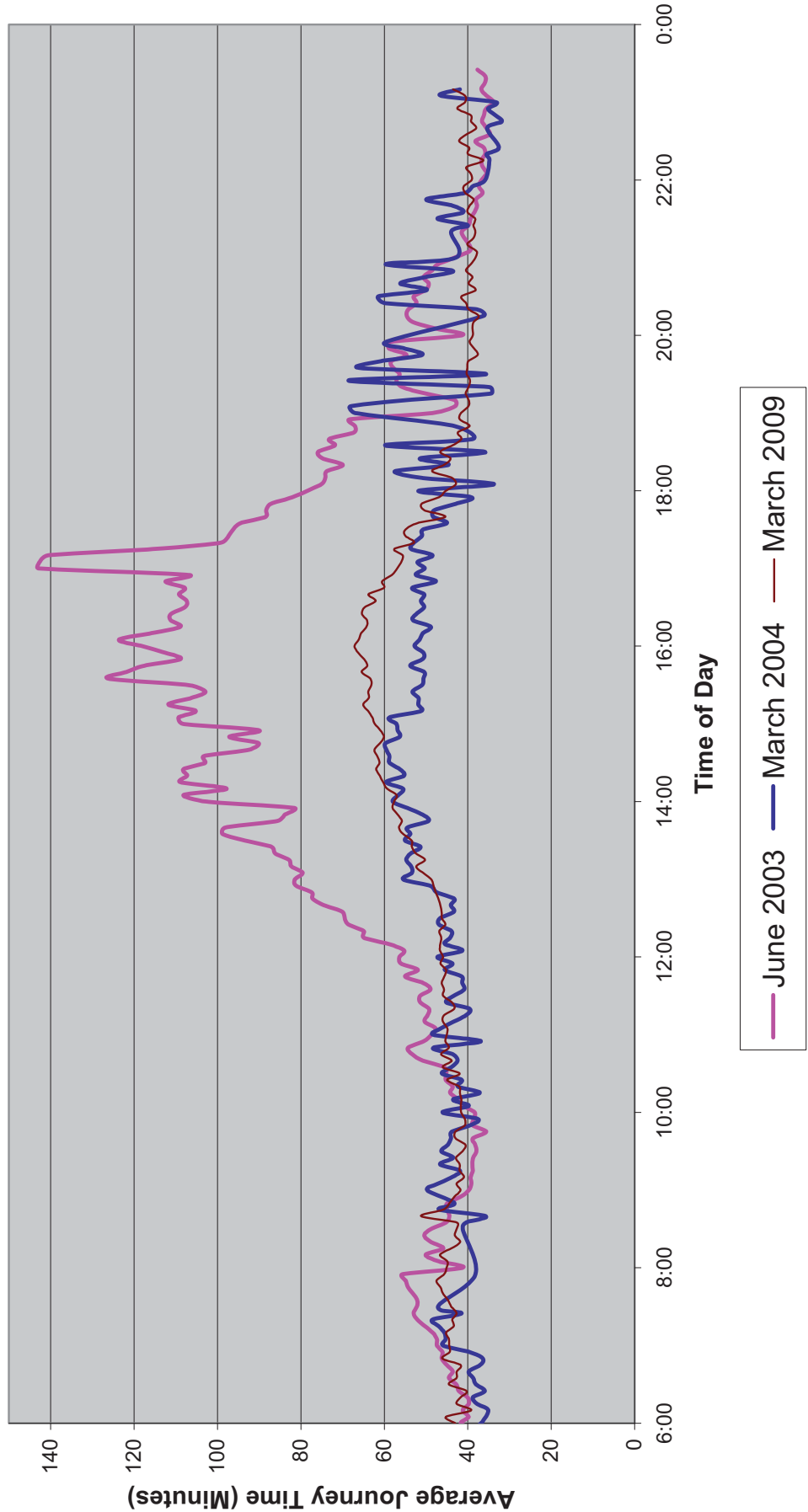
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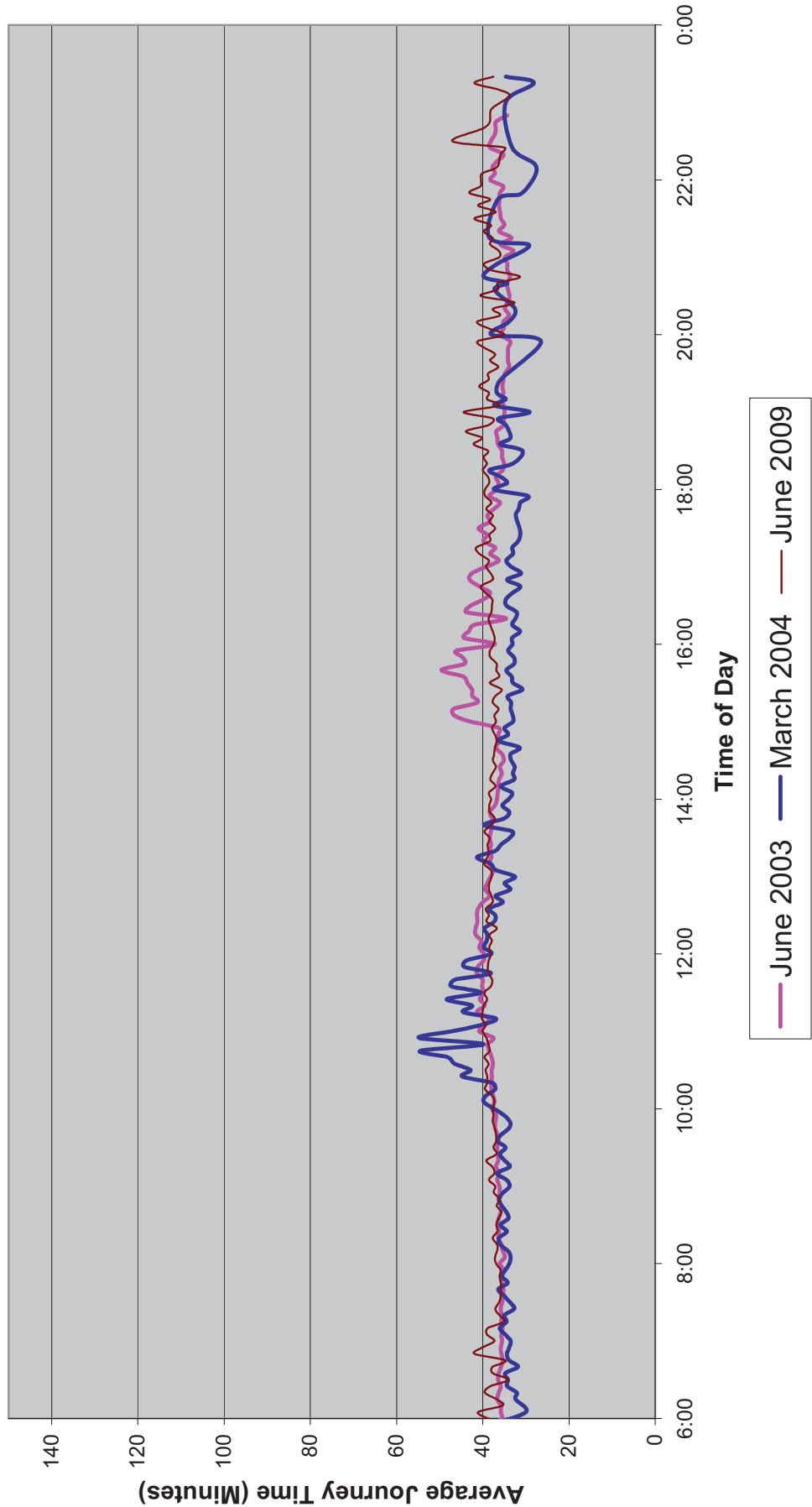
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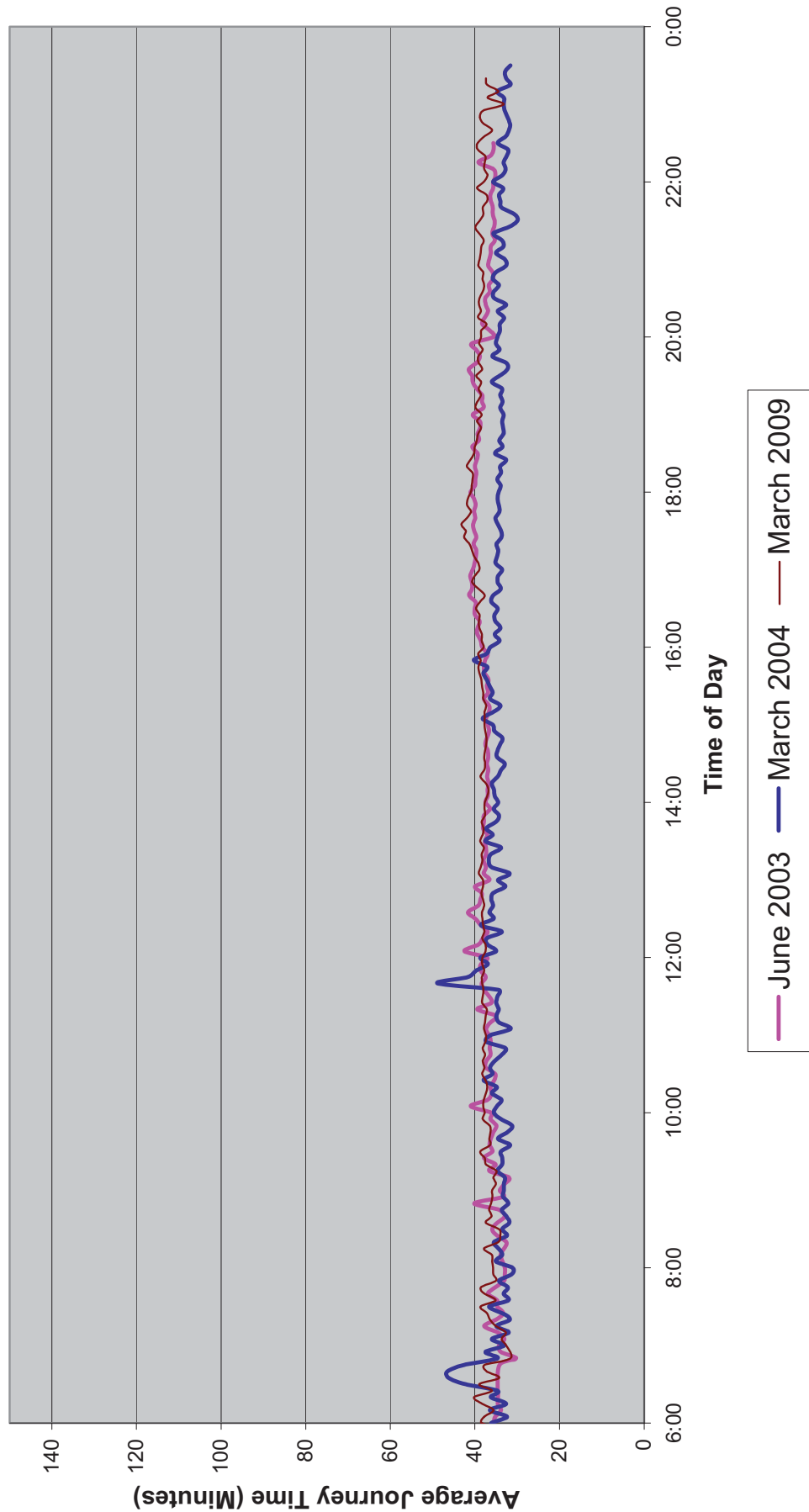
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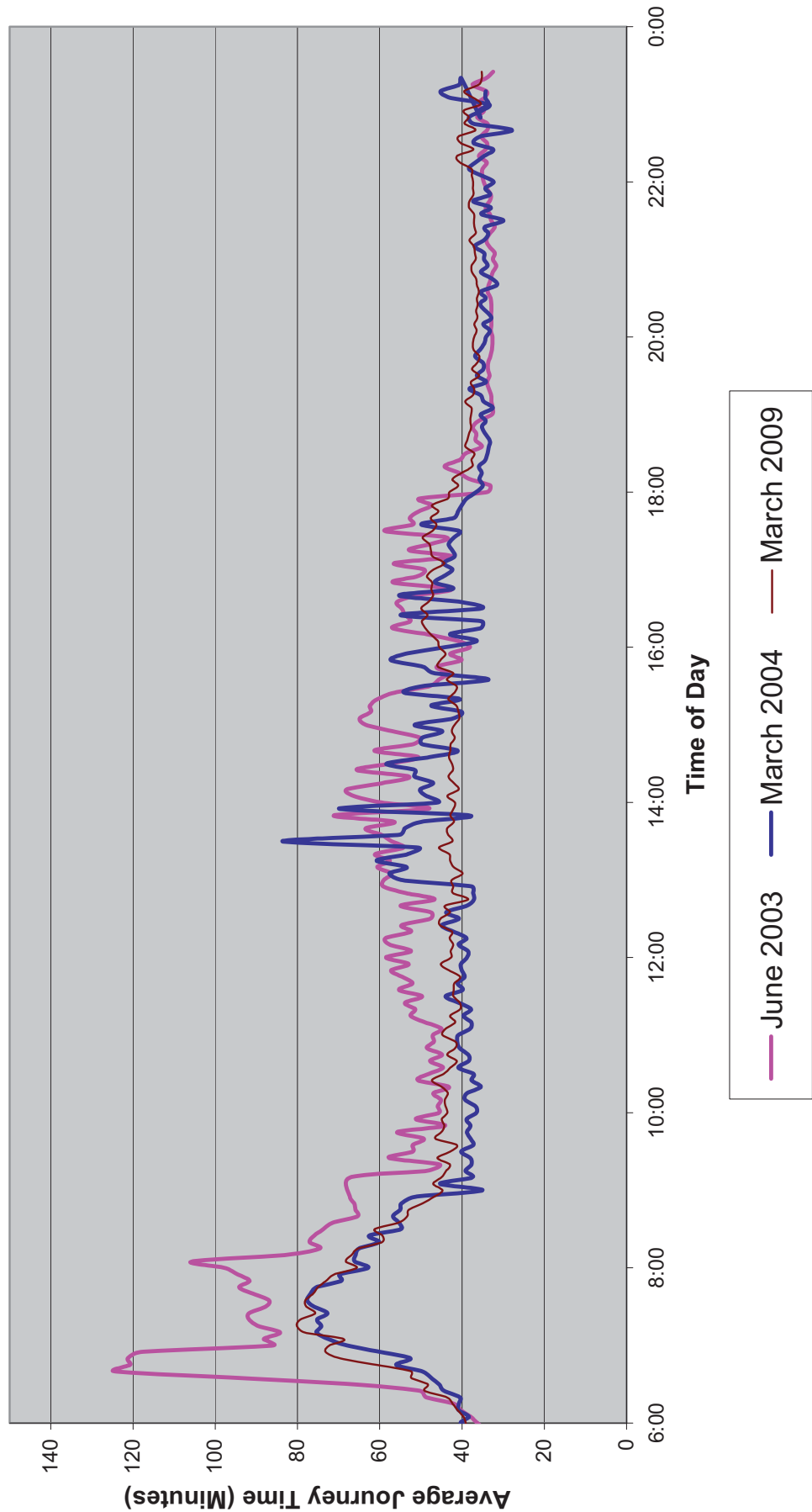
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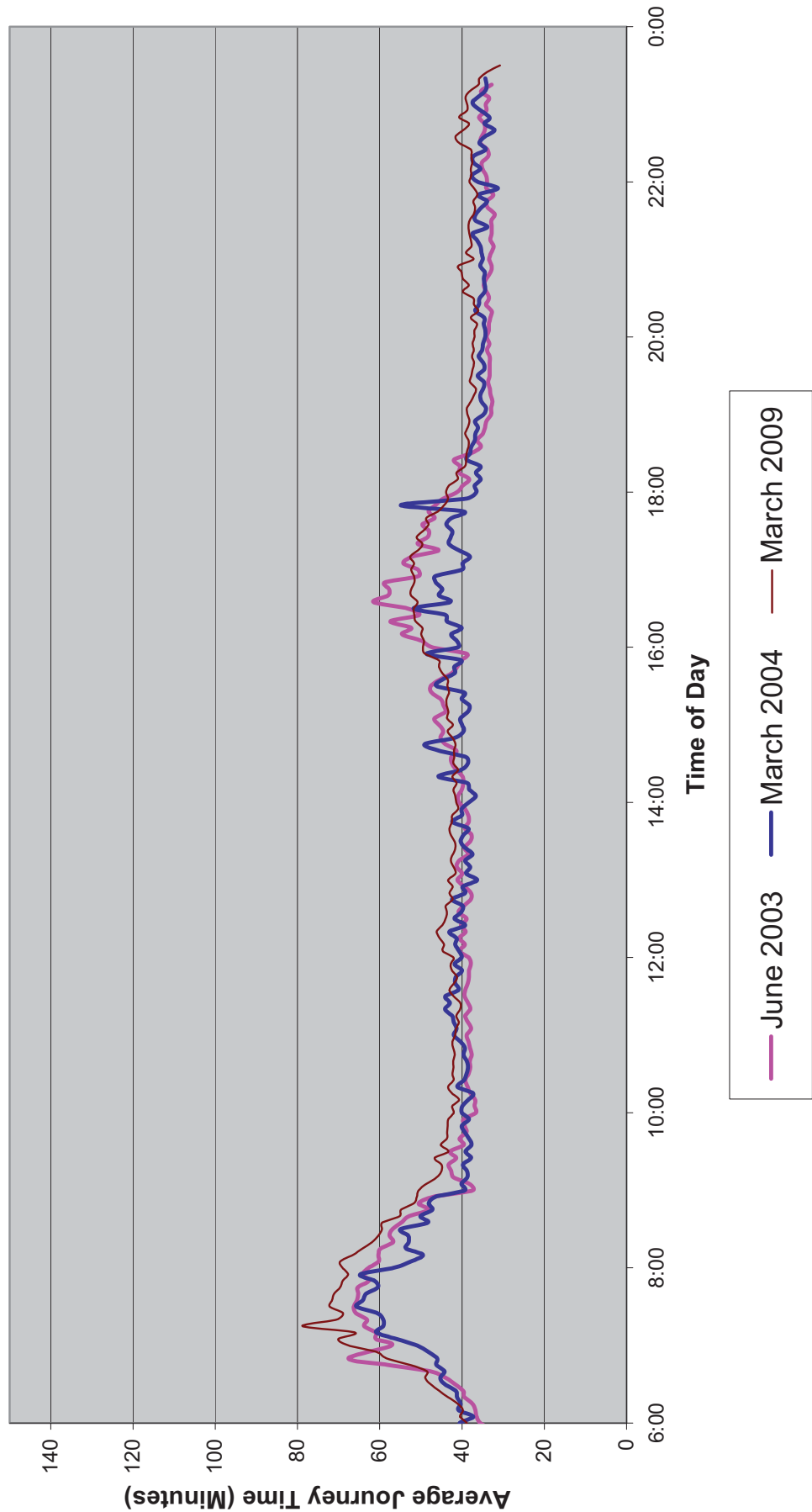
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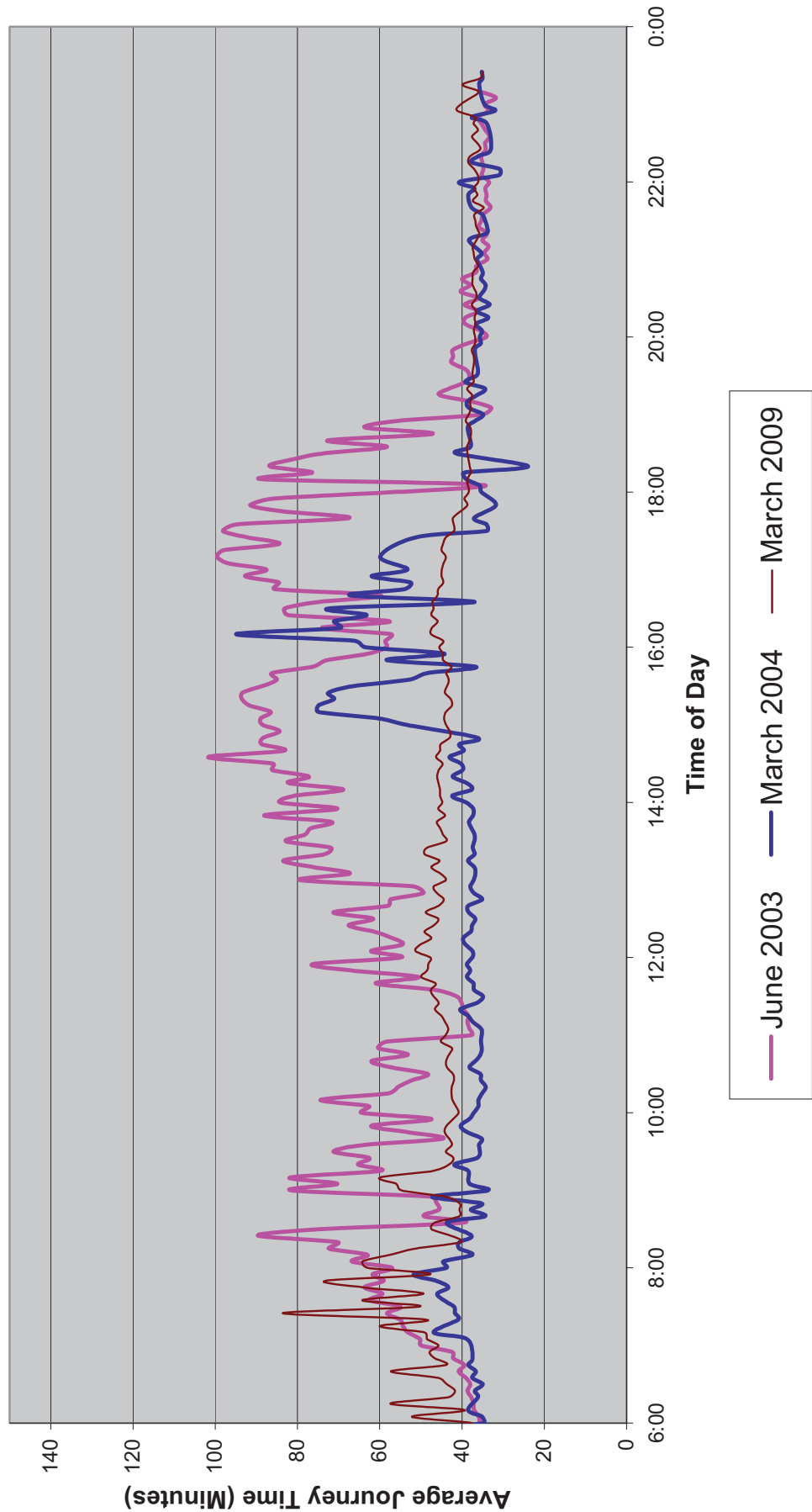
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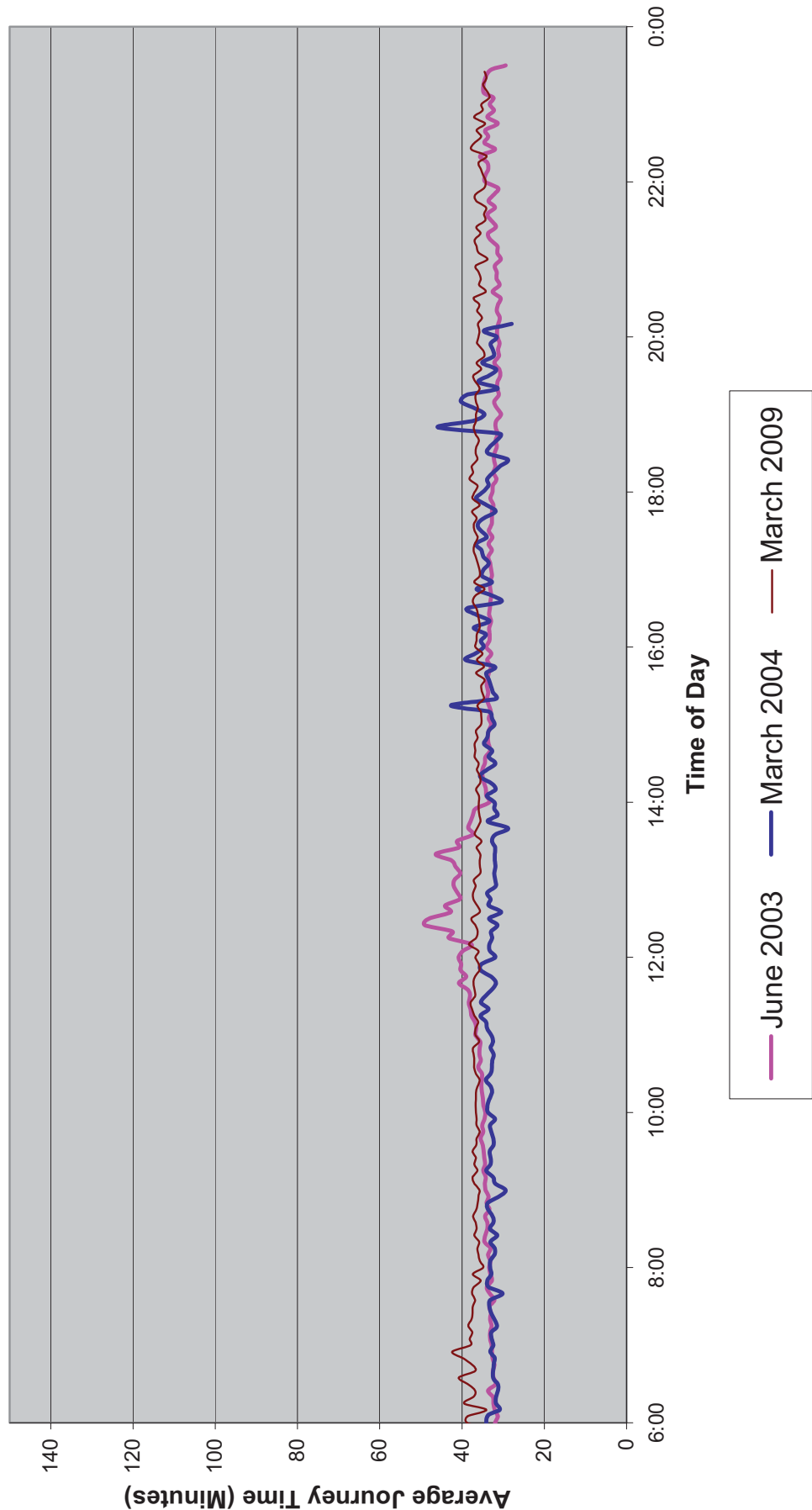
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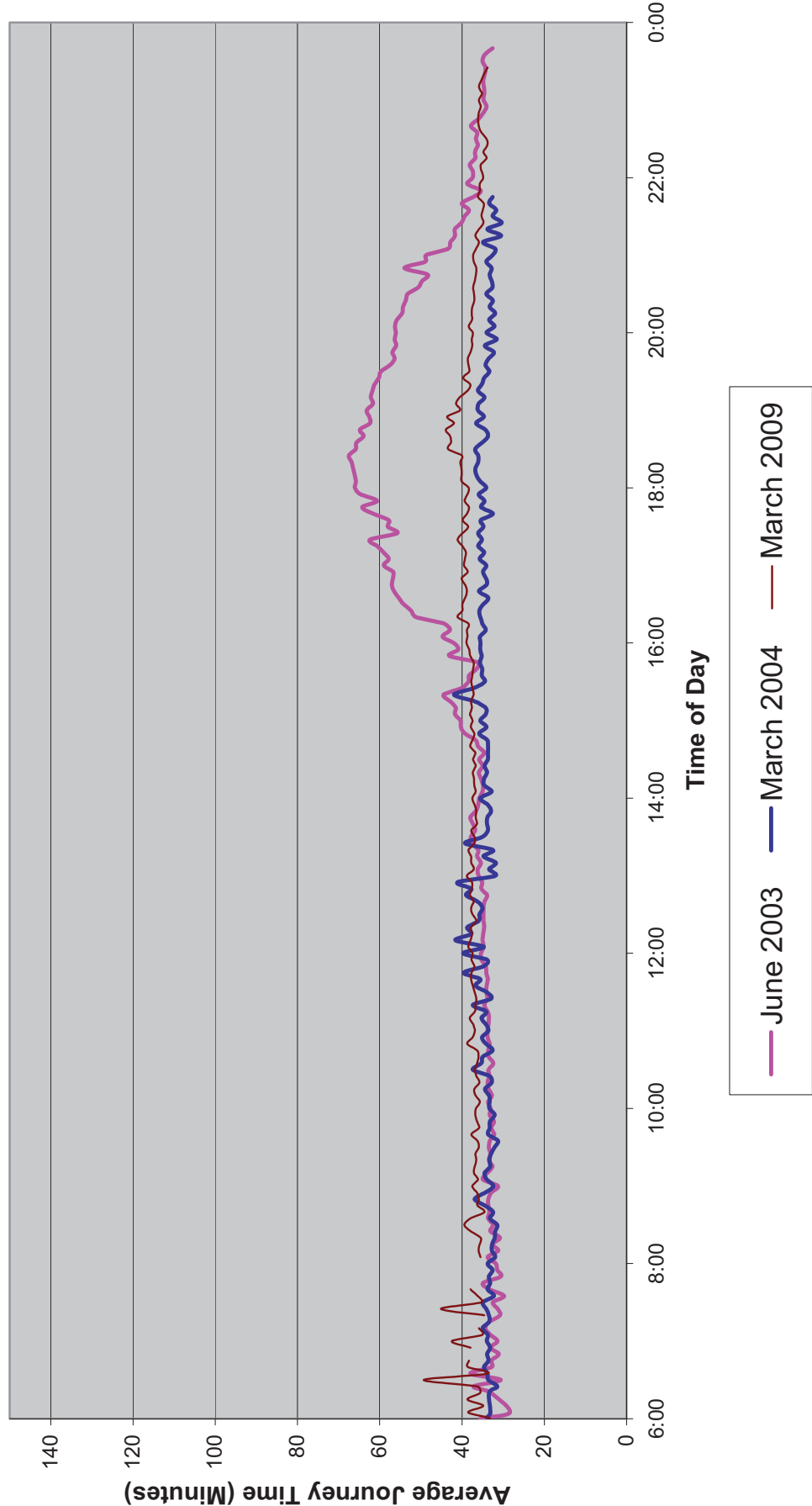
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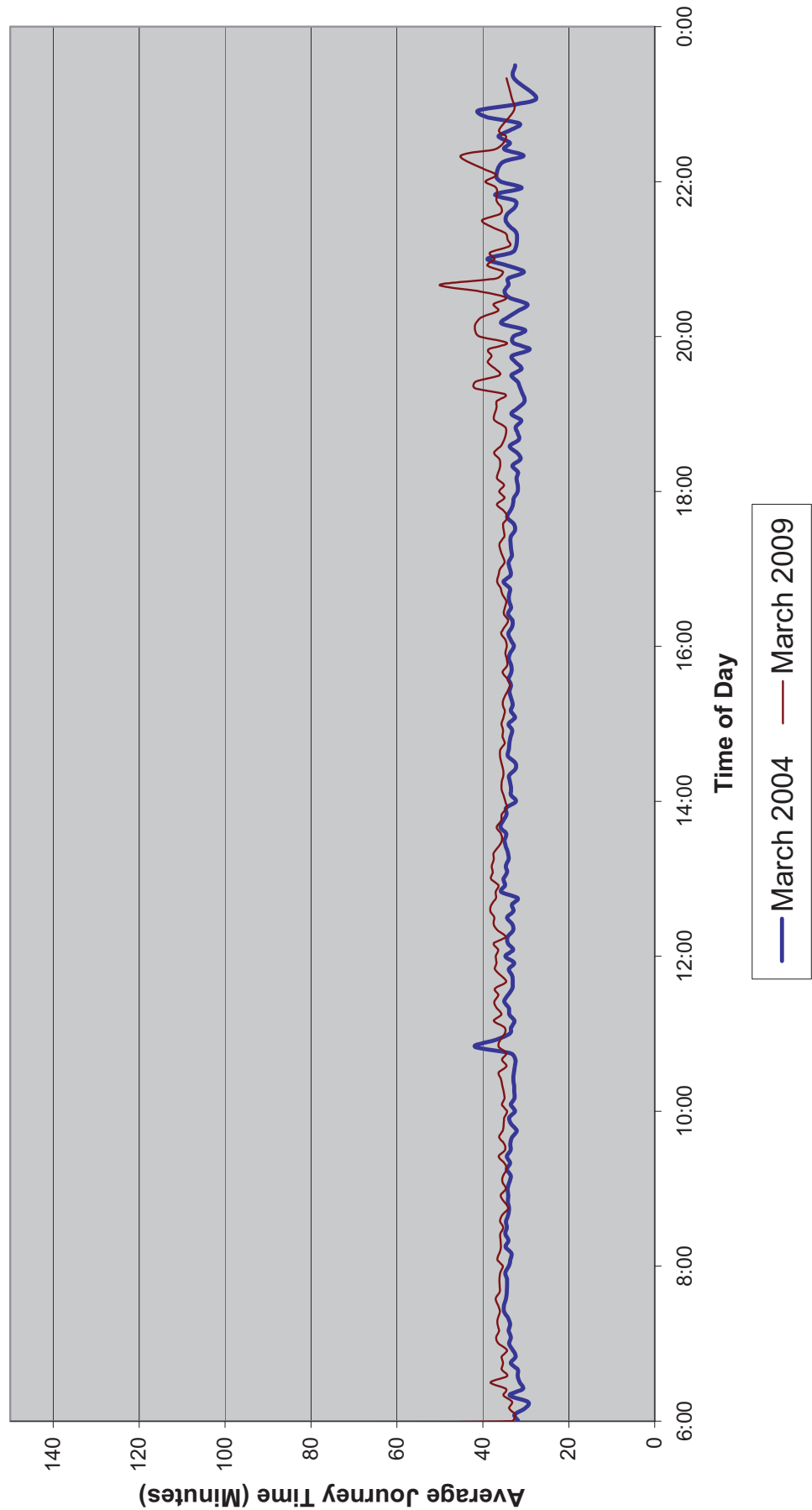
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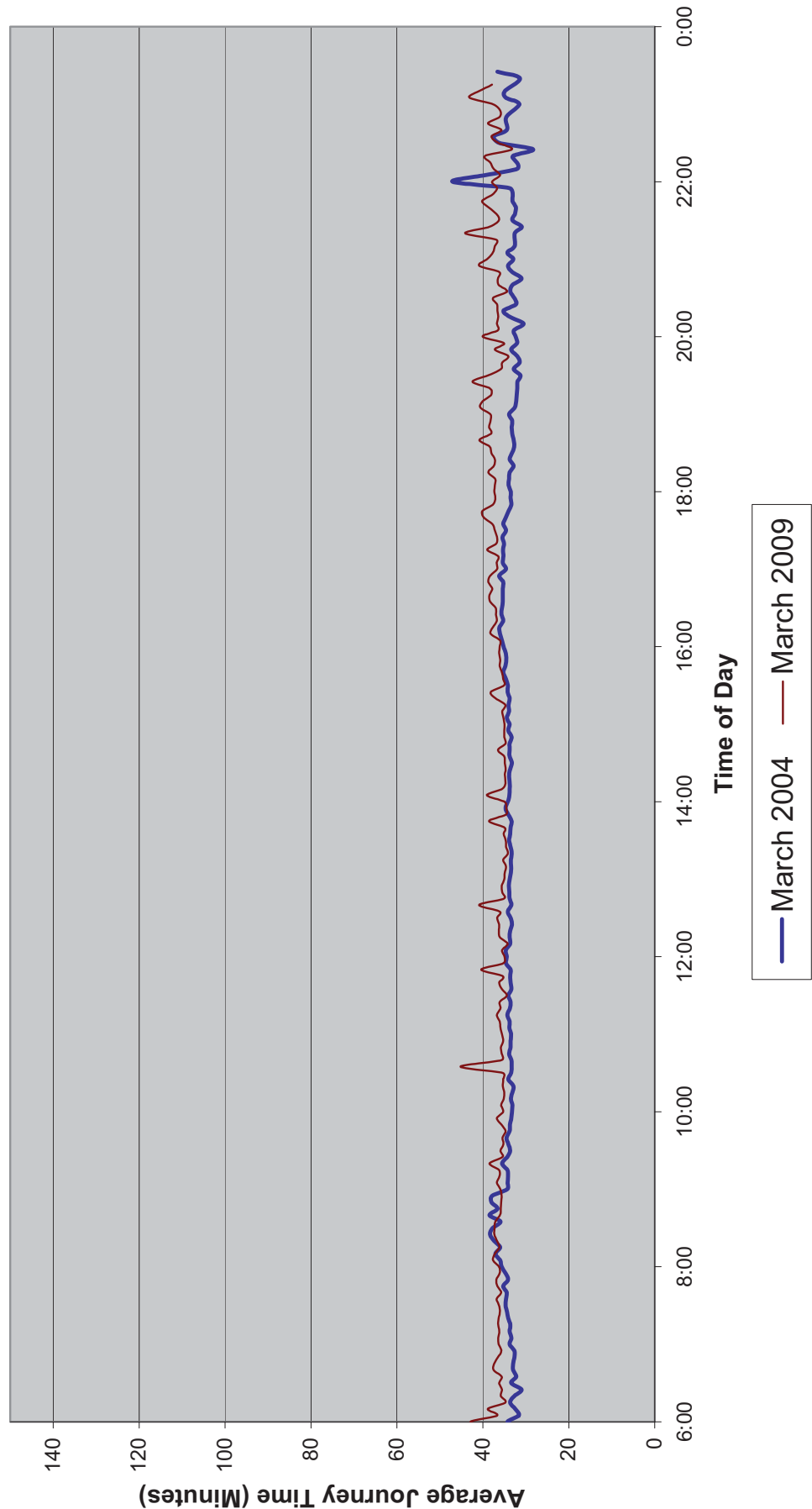
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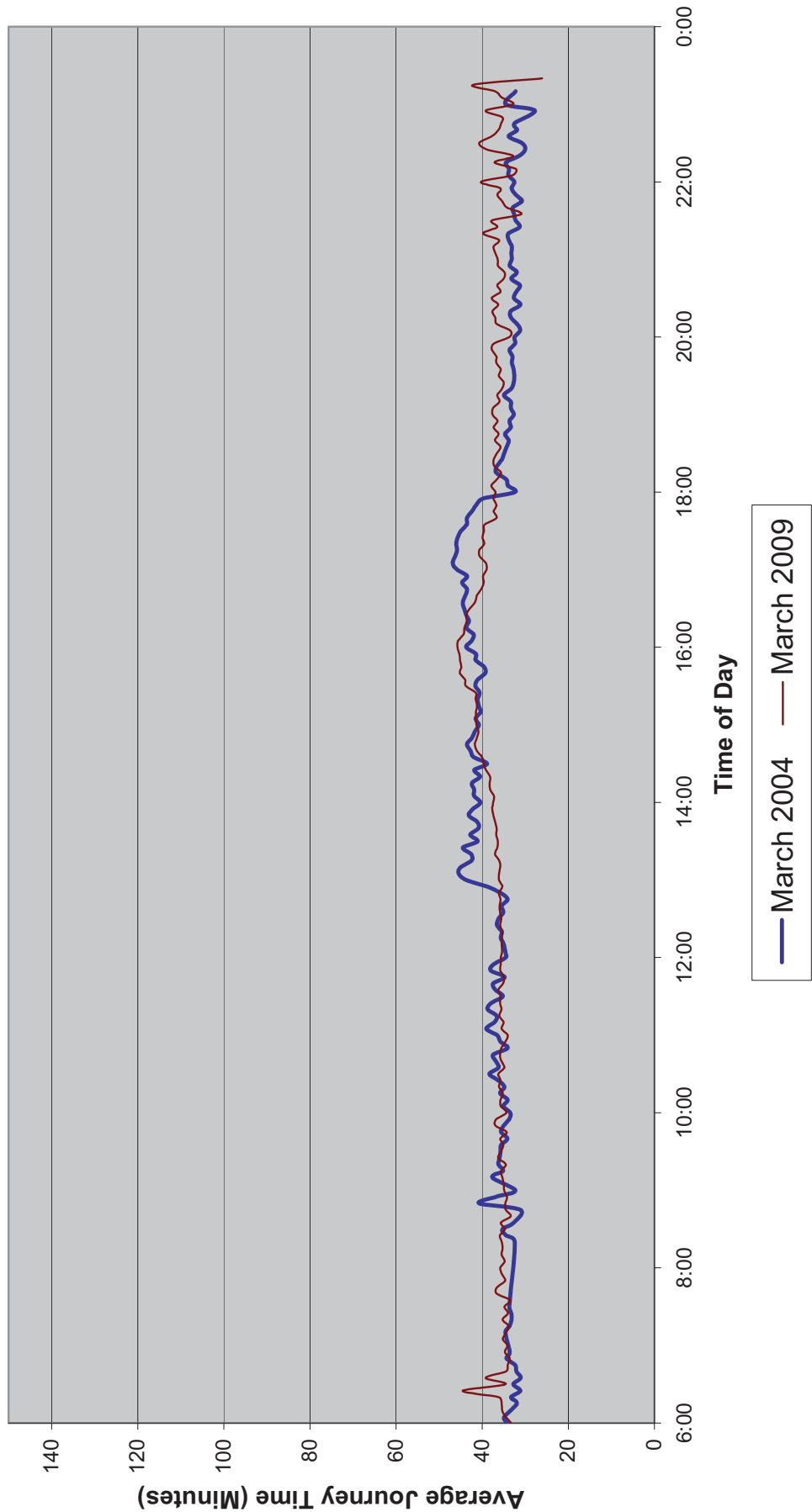
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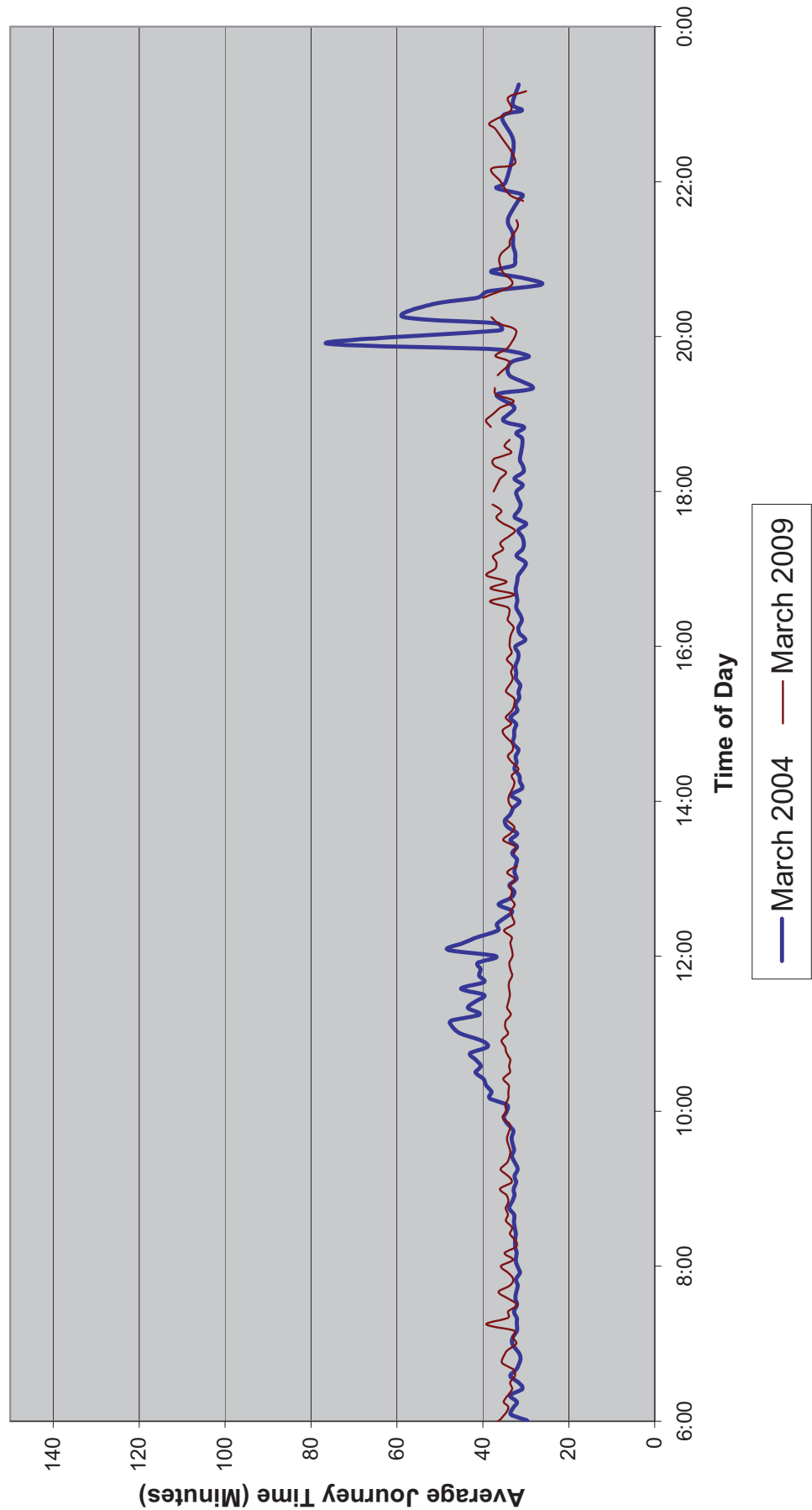
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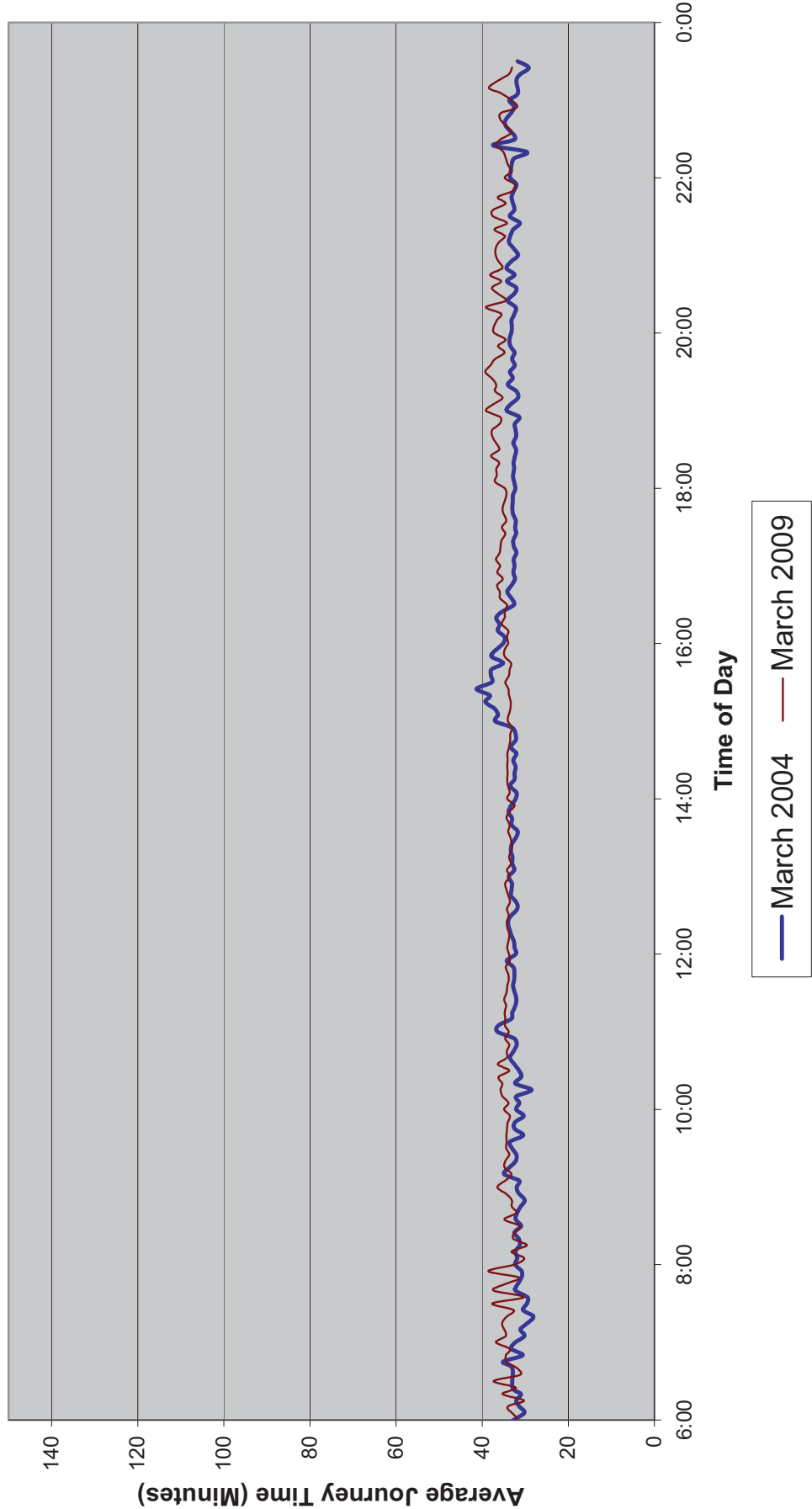
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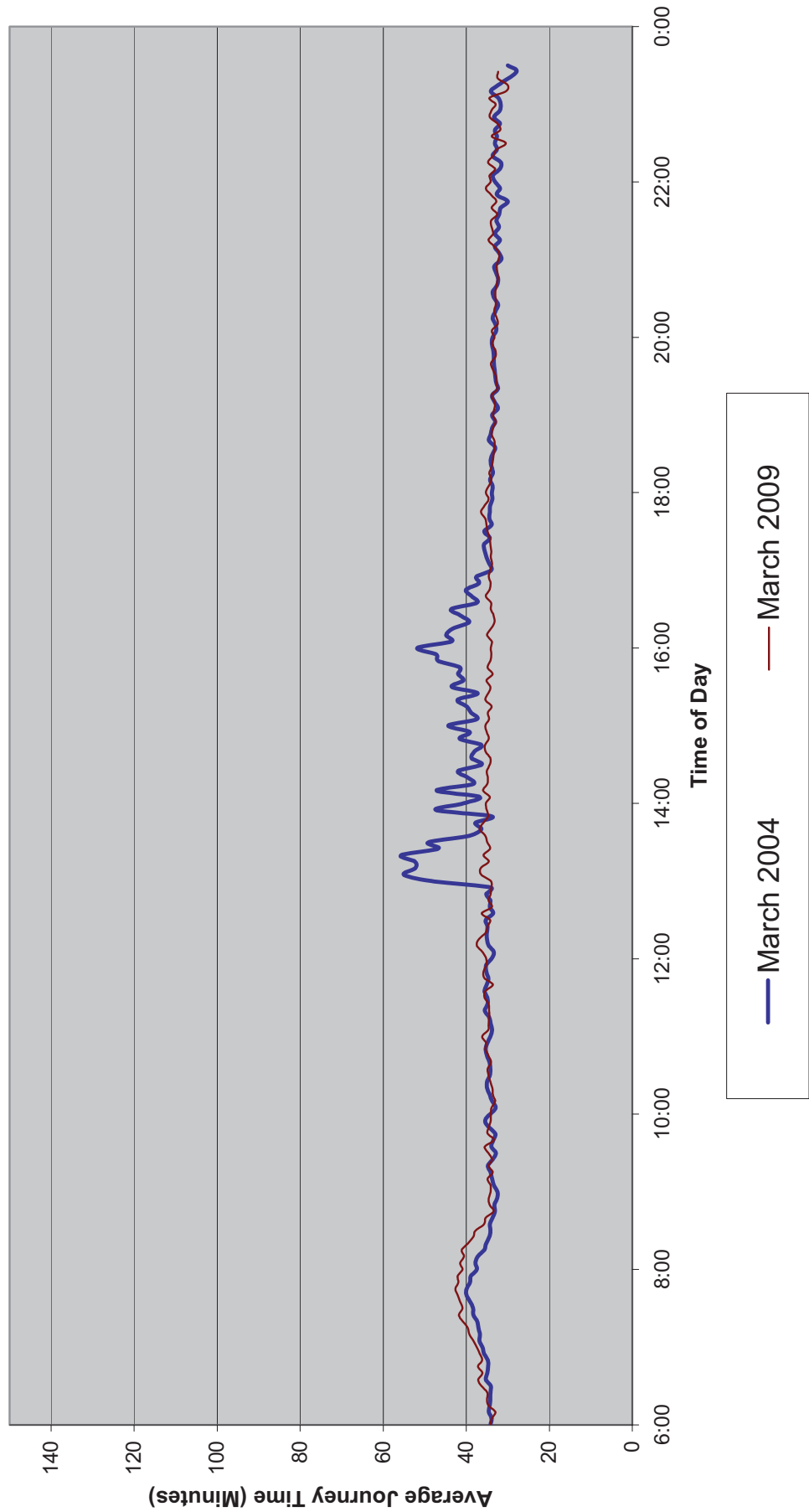
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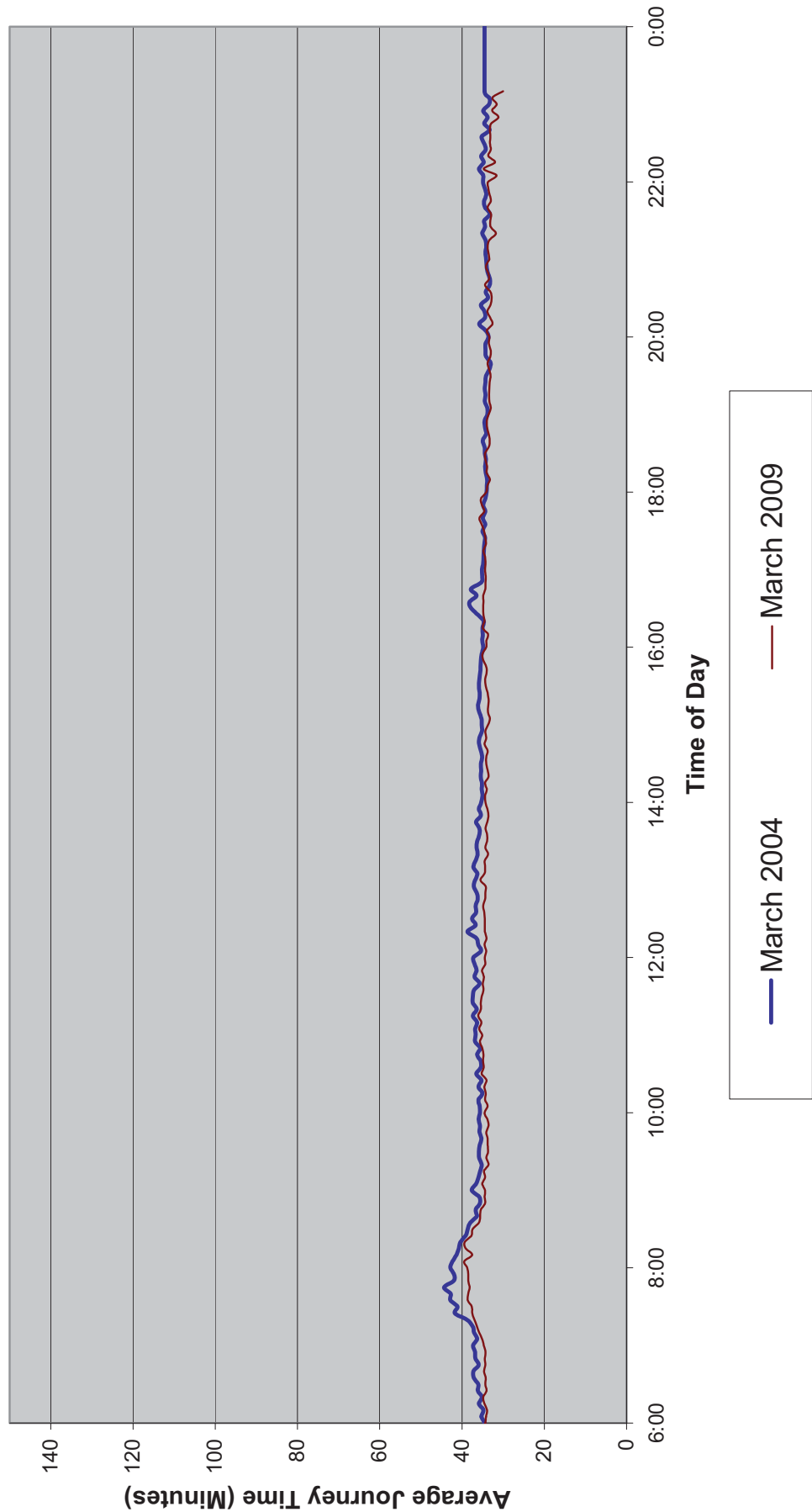
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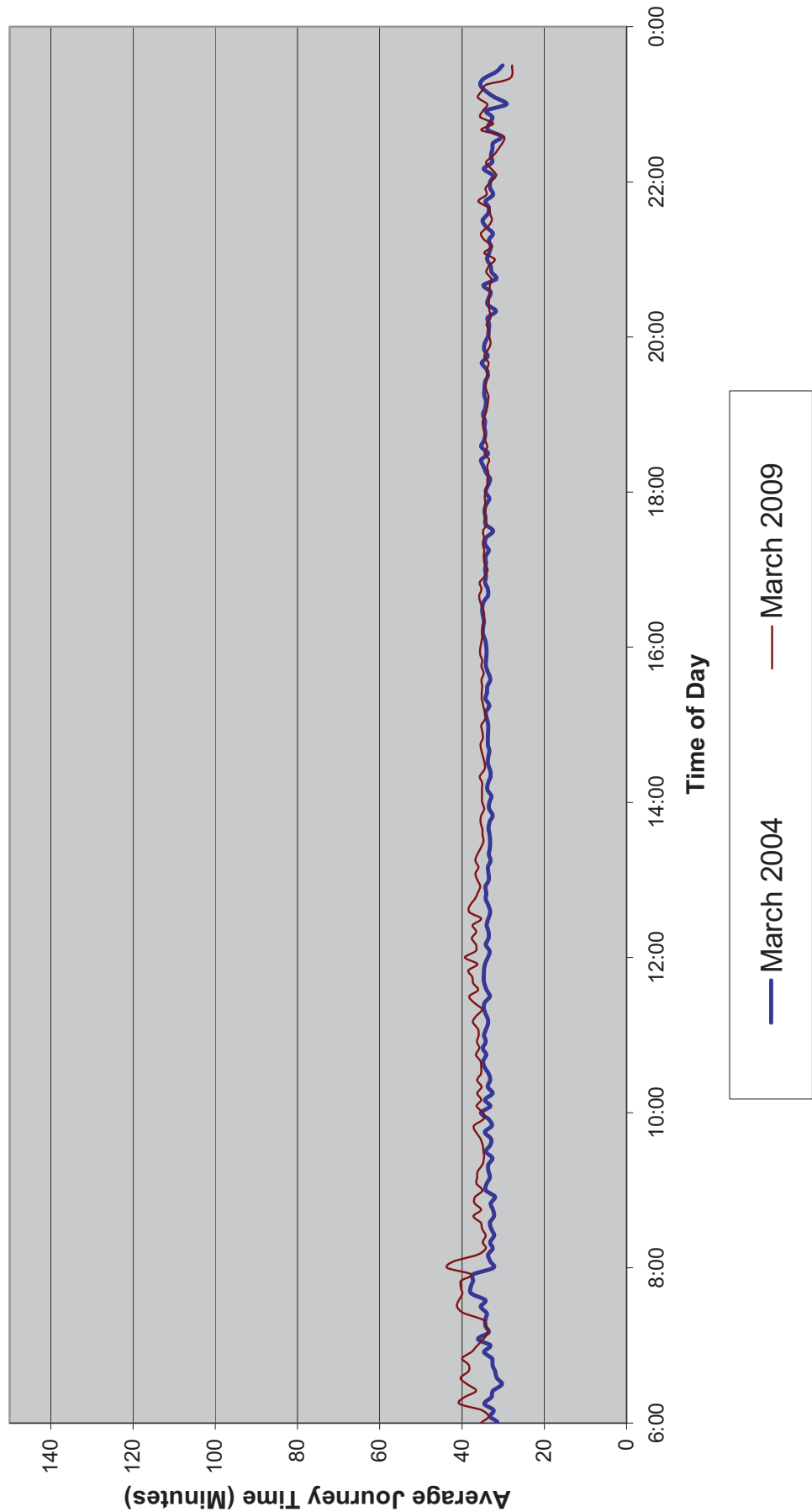
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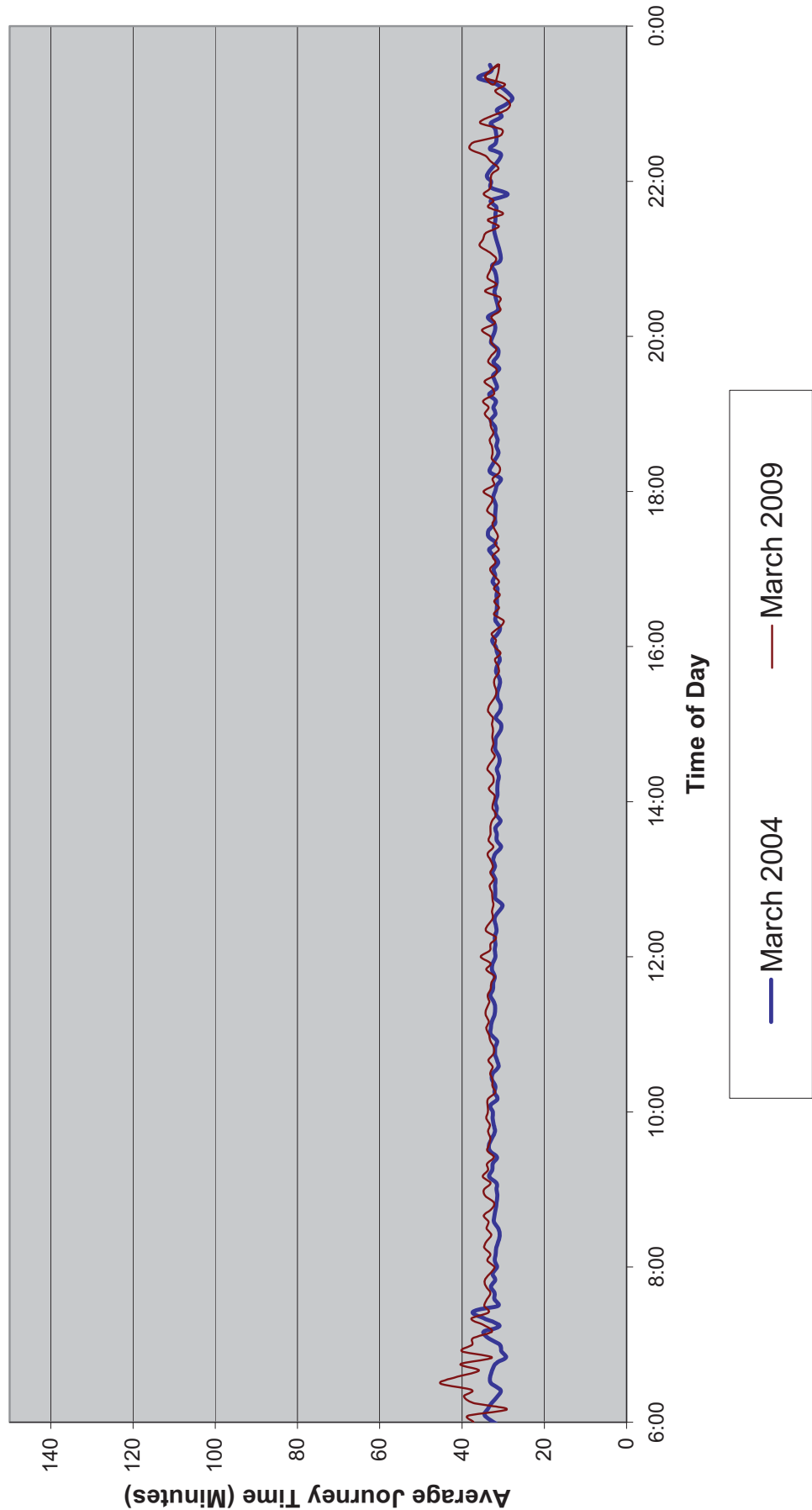
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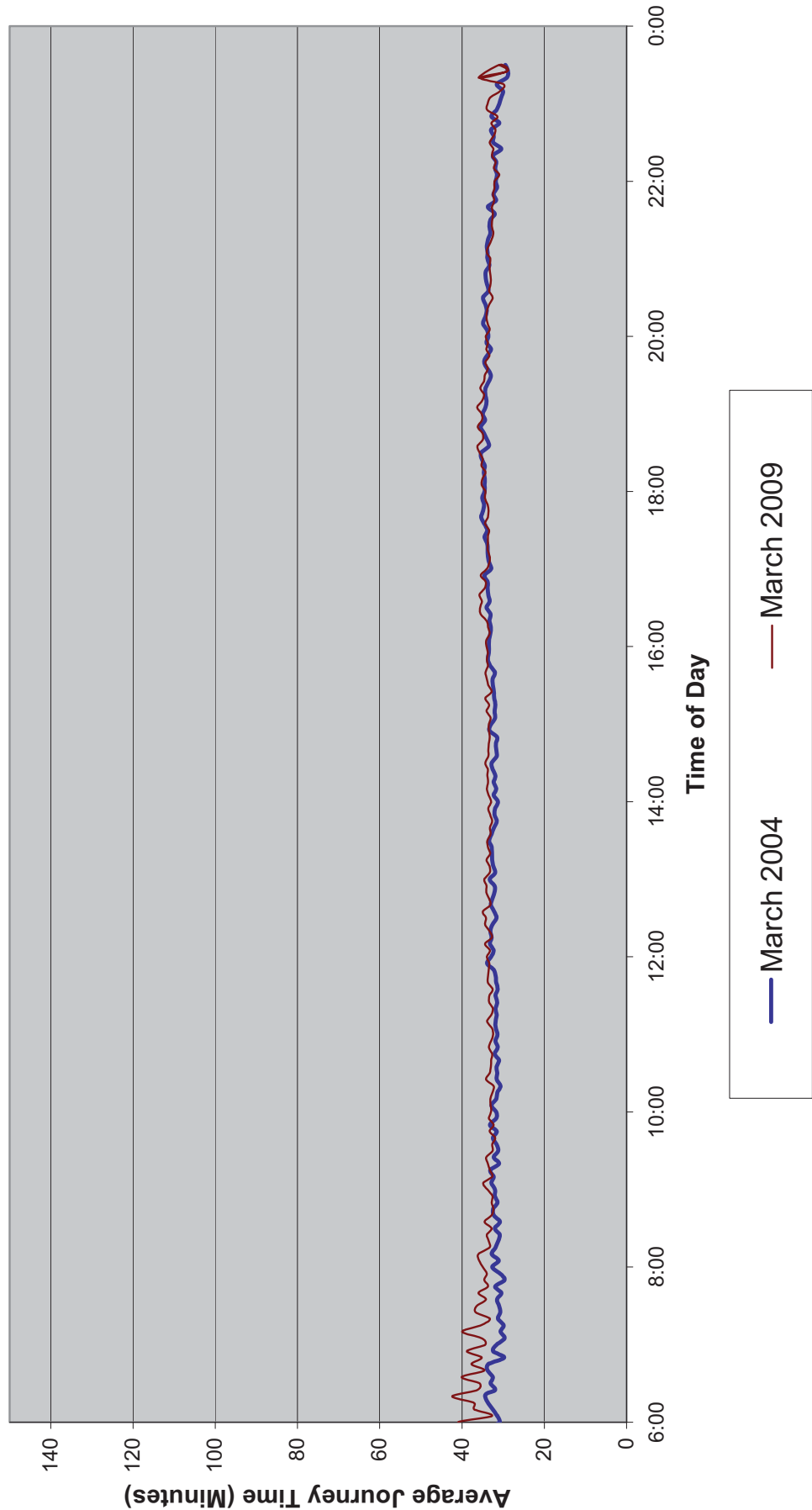
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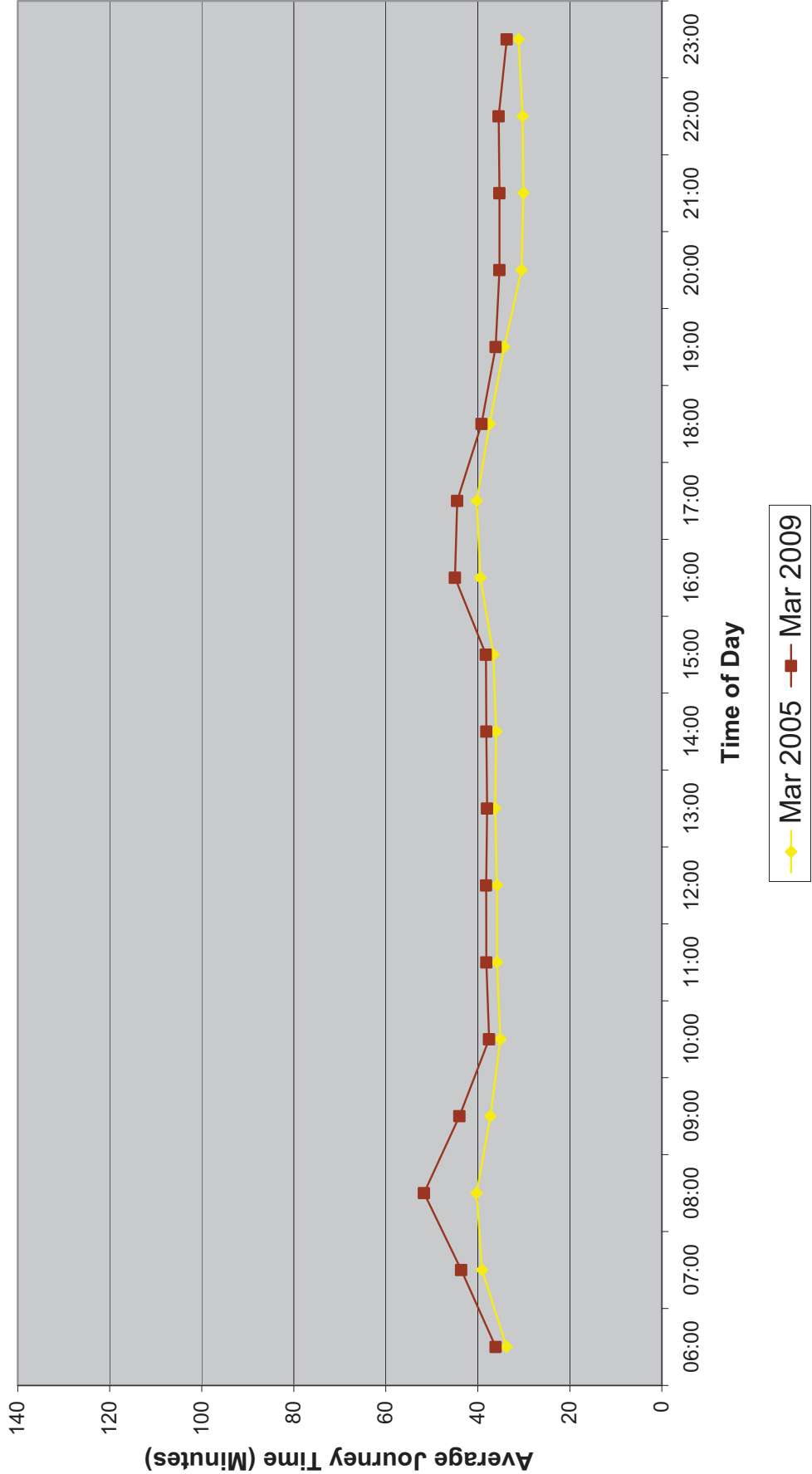


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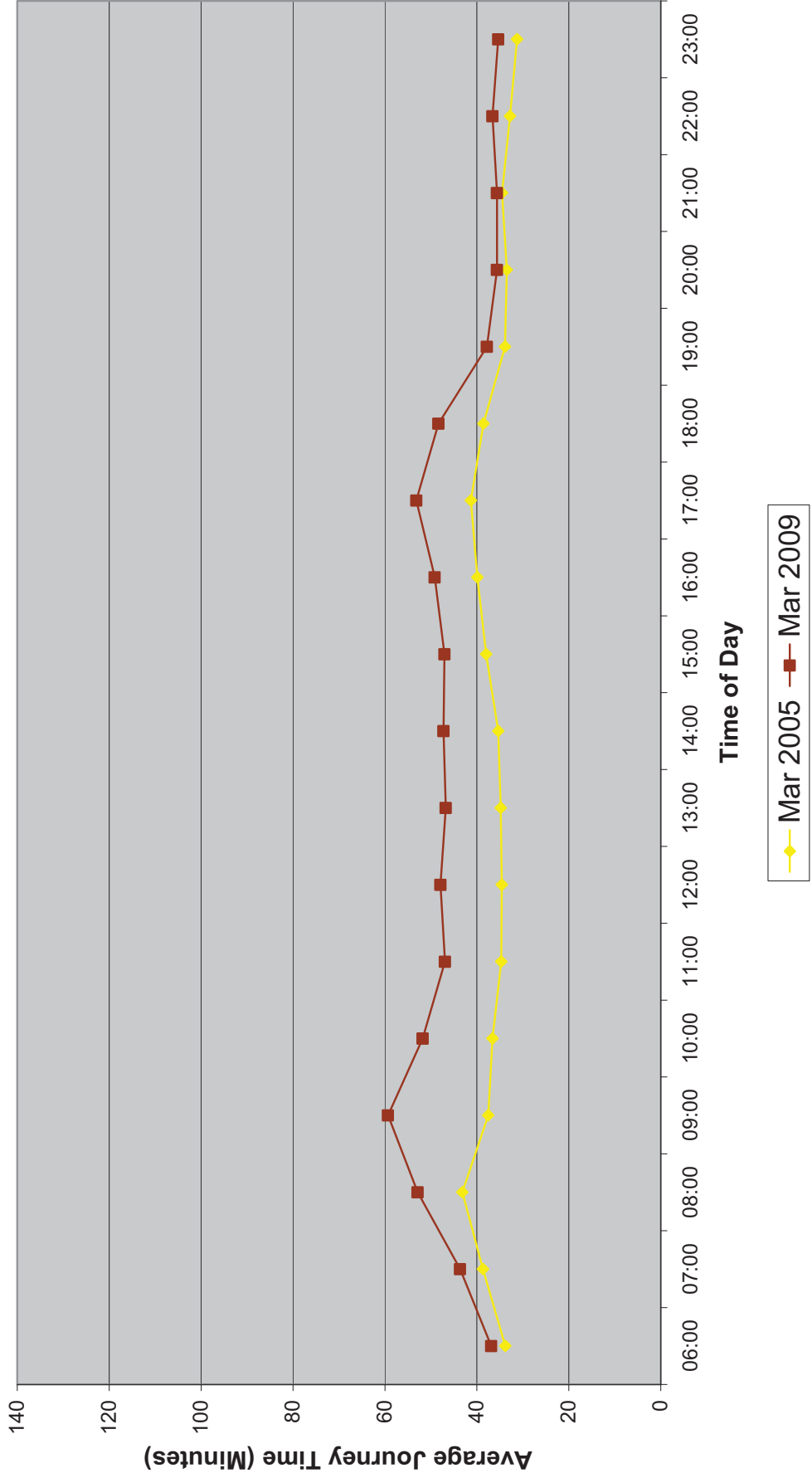


A.2 NTCC – Average Journey Times (2005 and 2009)

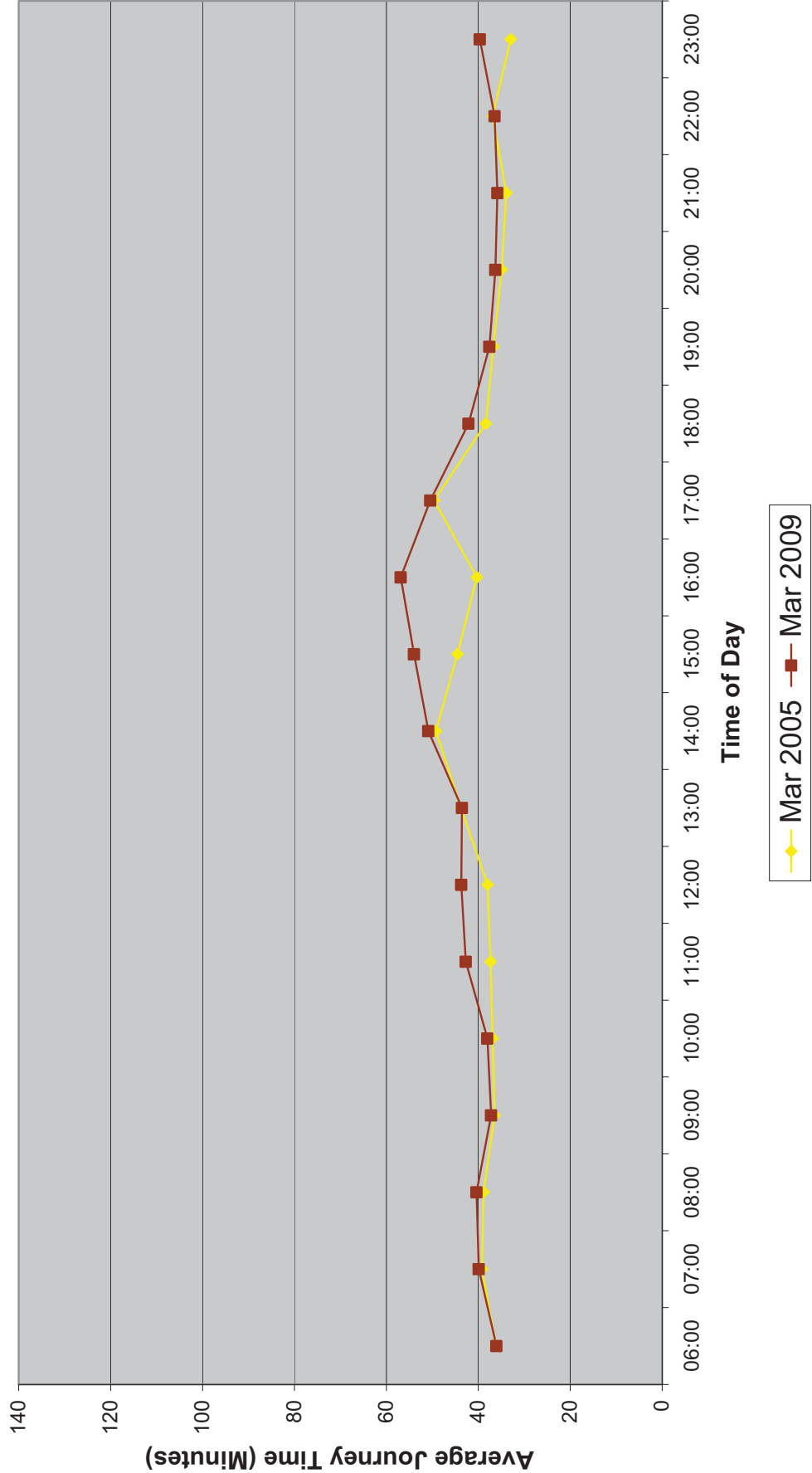
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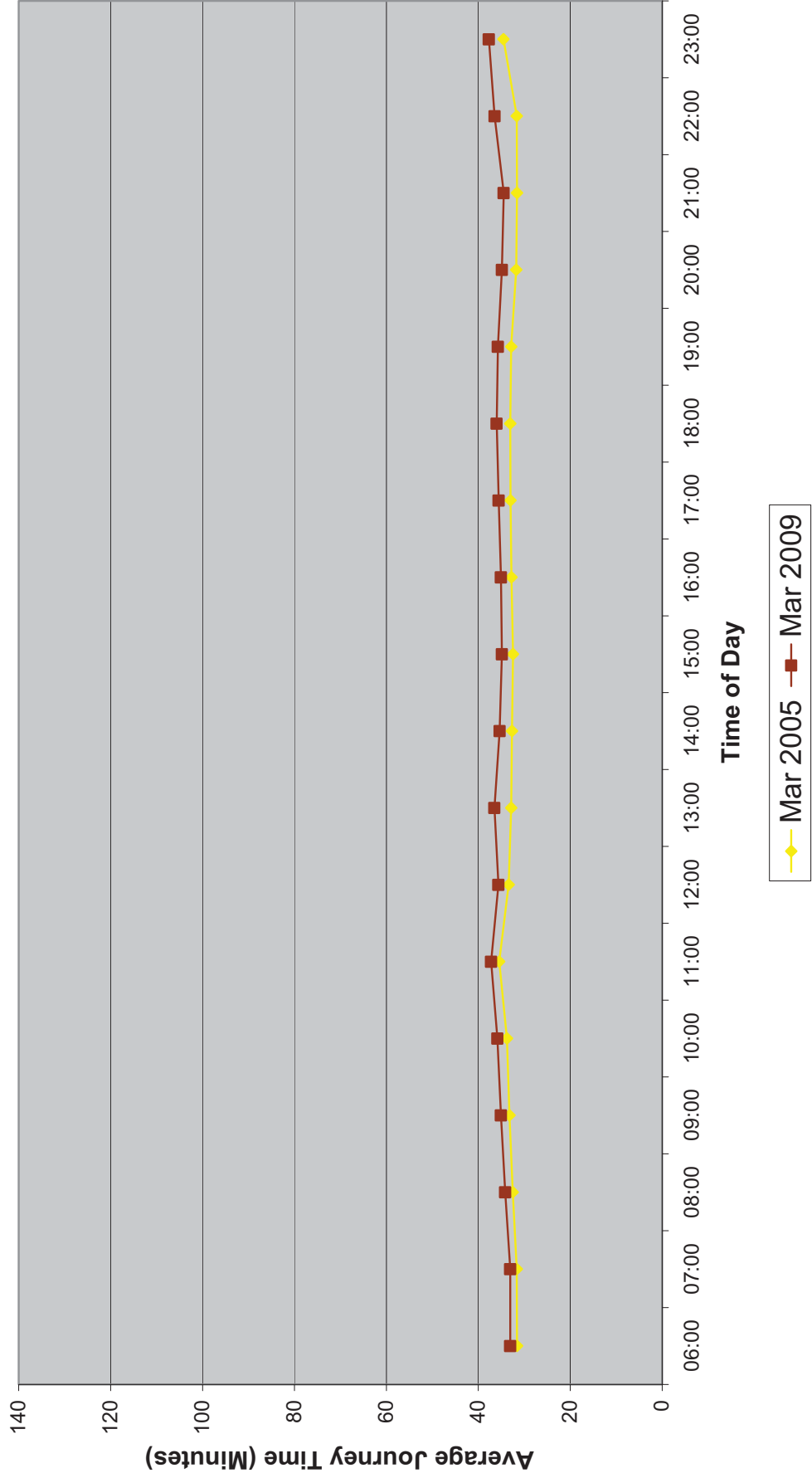
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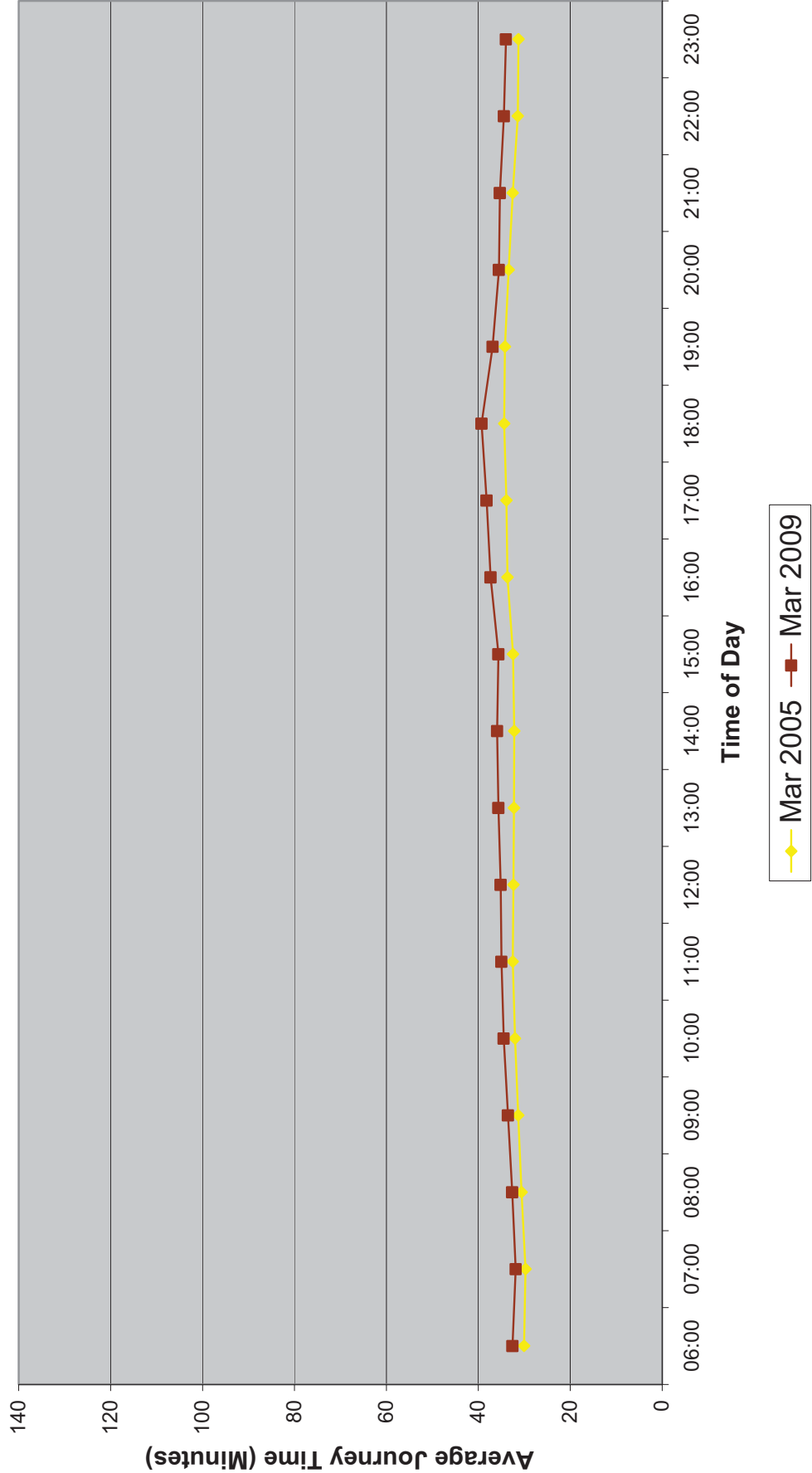
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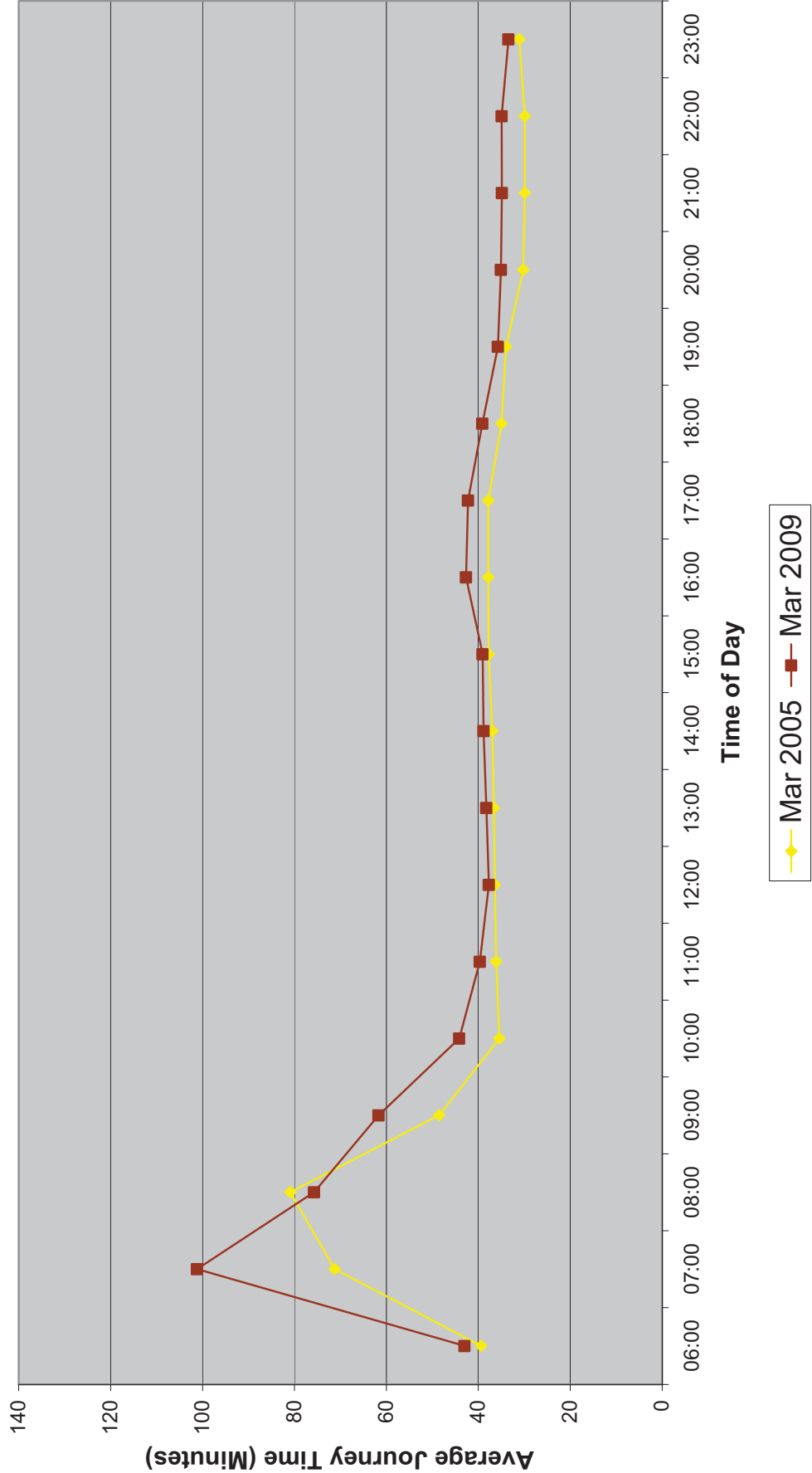
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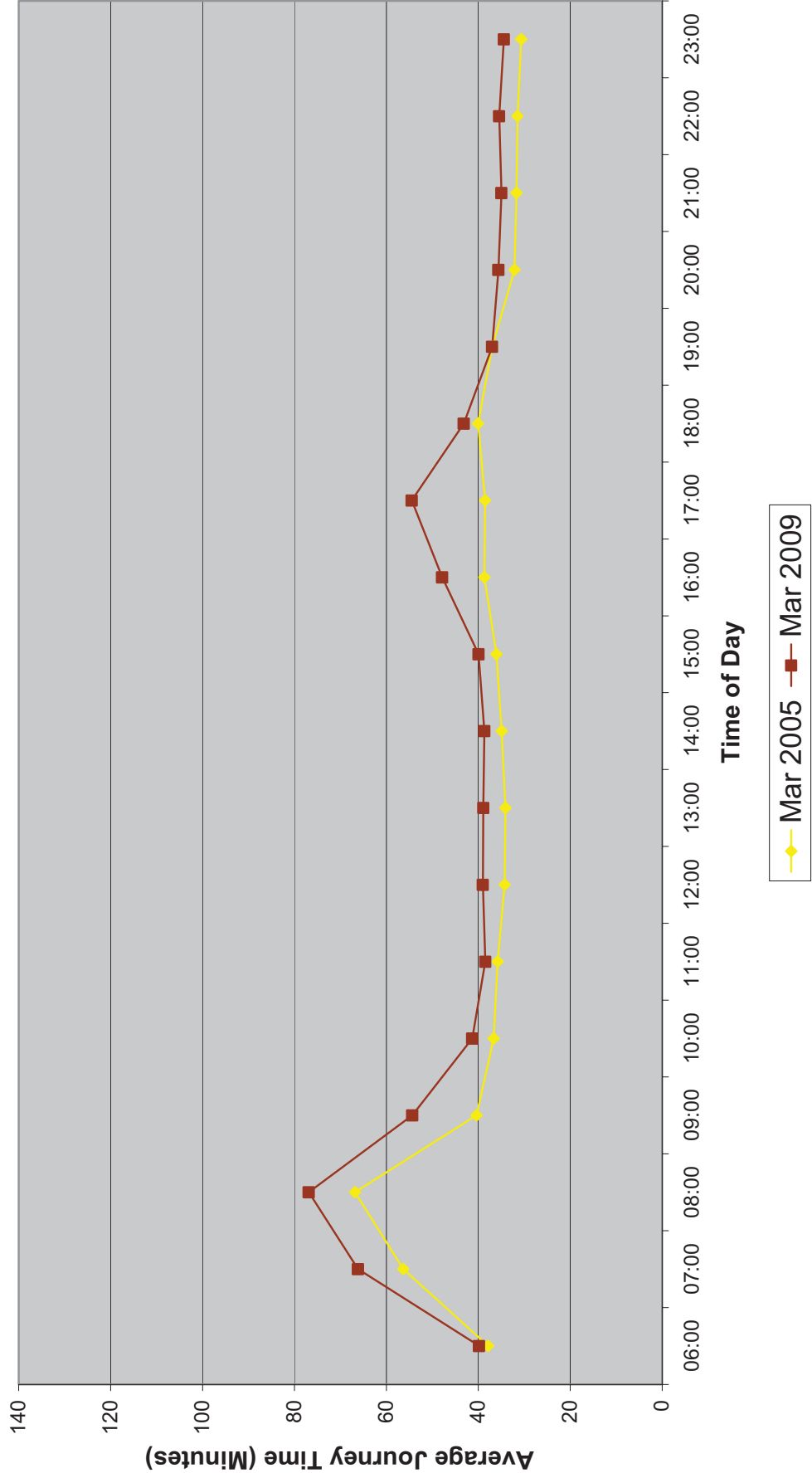
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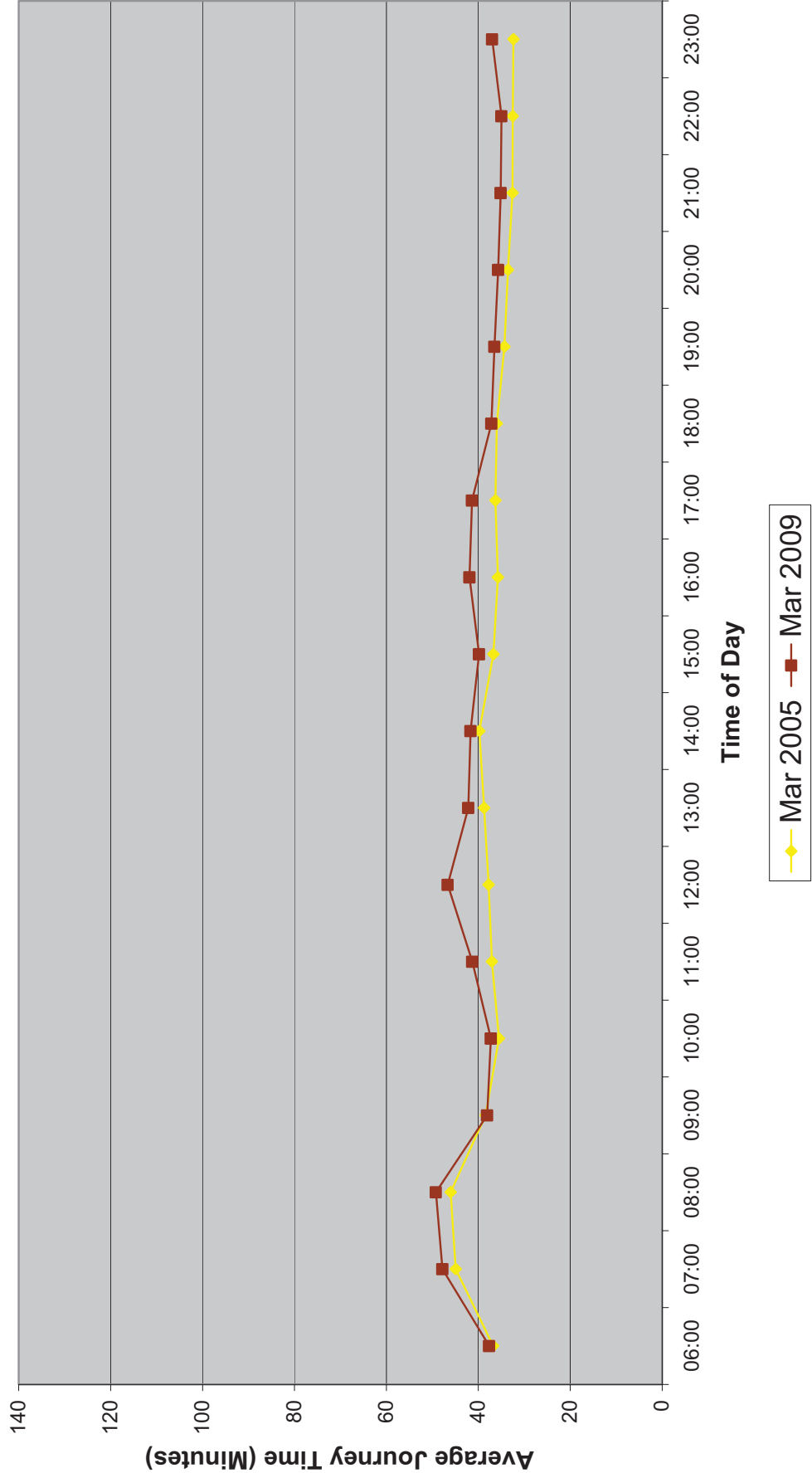
Mondays: M6 Southbound



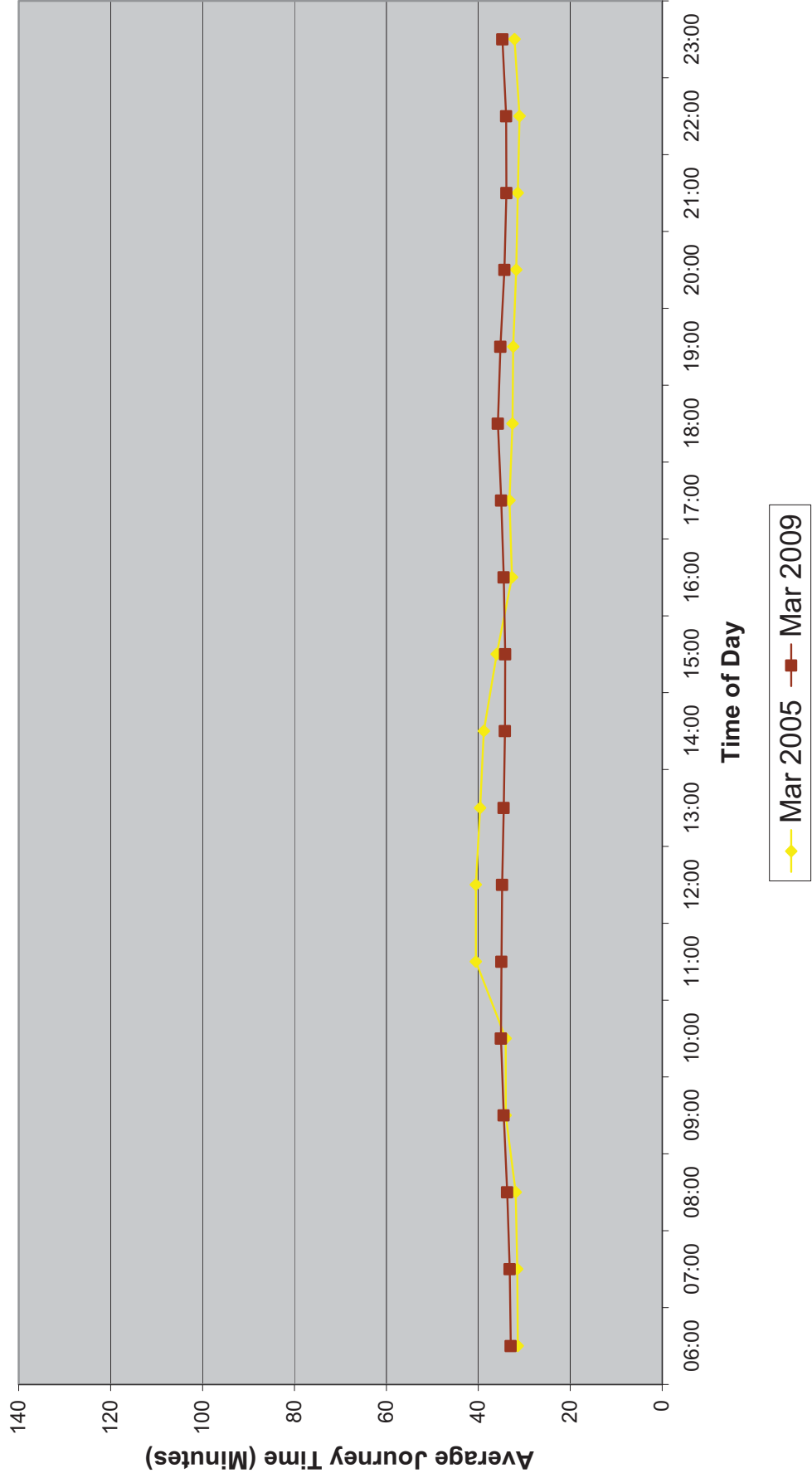
Tuesday - Thursday: M6 Southbound



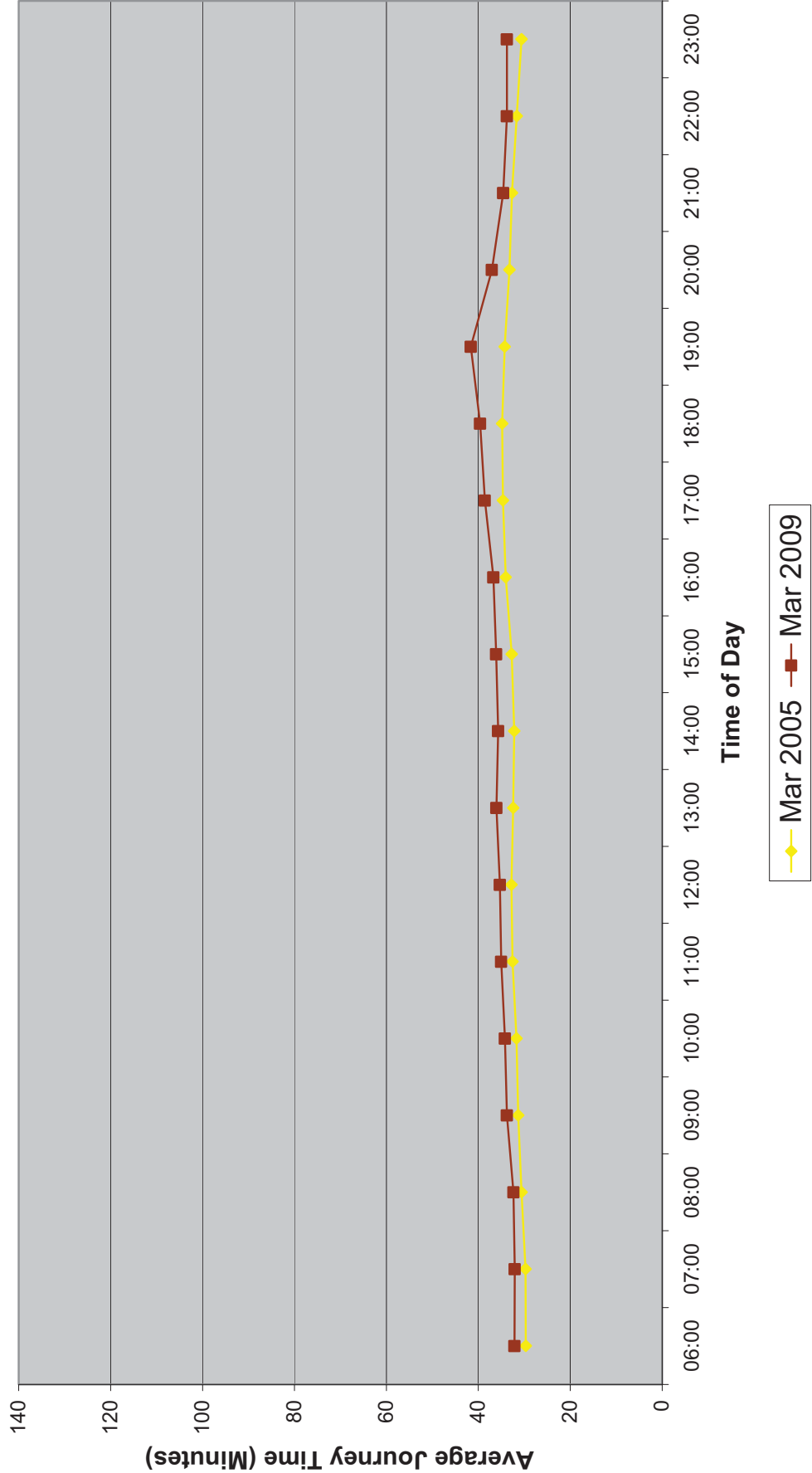
Fridays: M6 Southbound



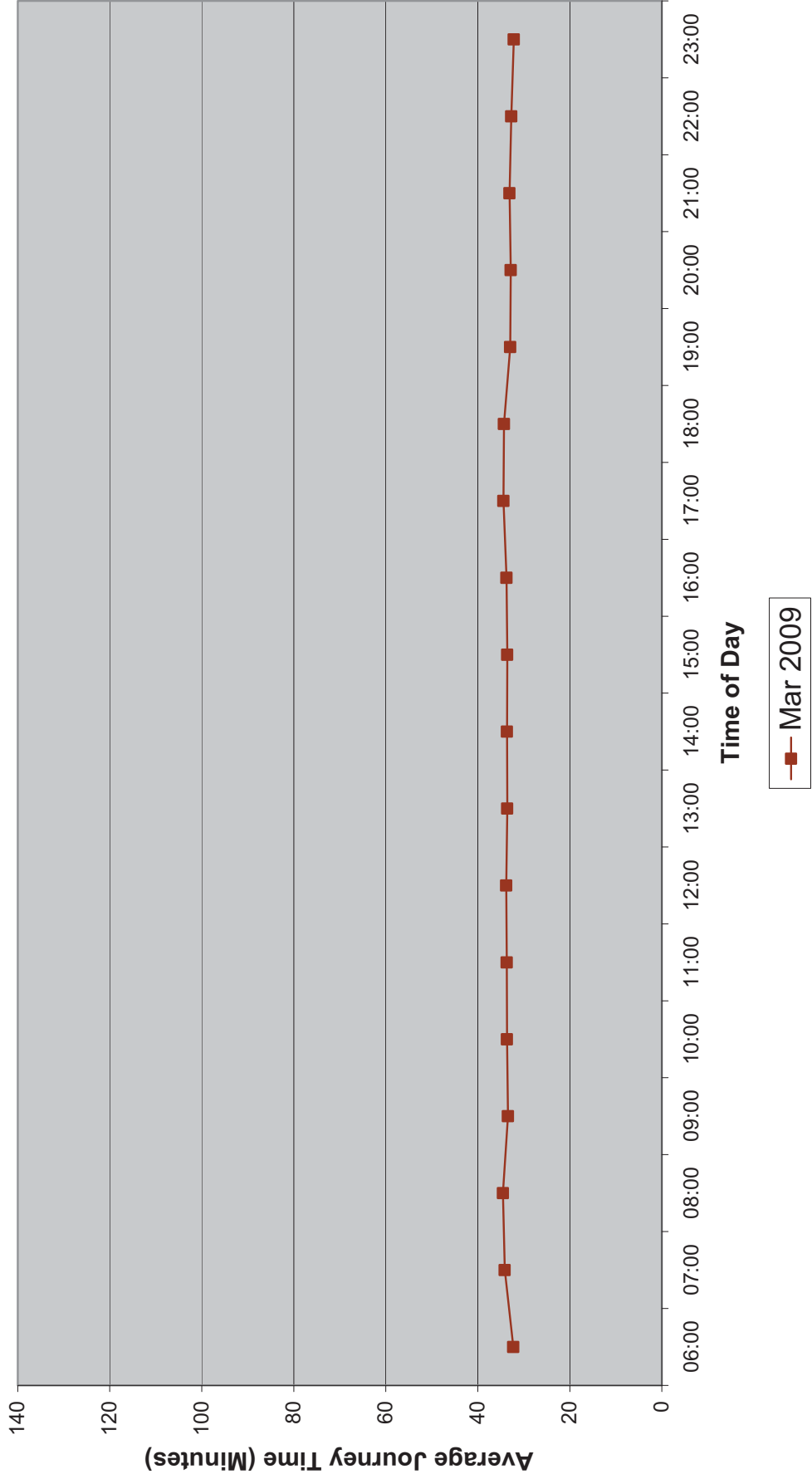
Saturdays: M6 Southbound



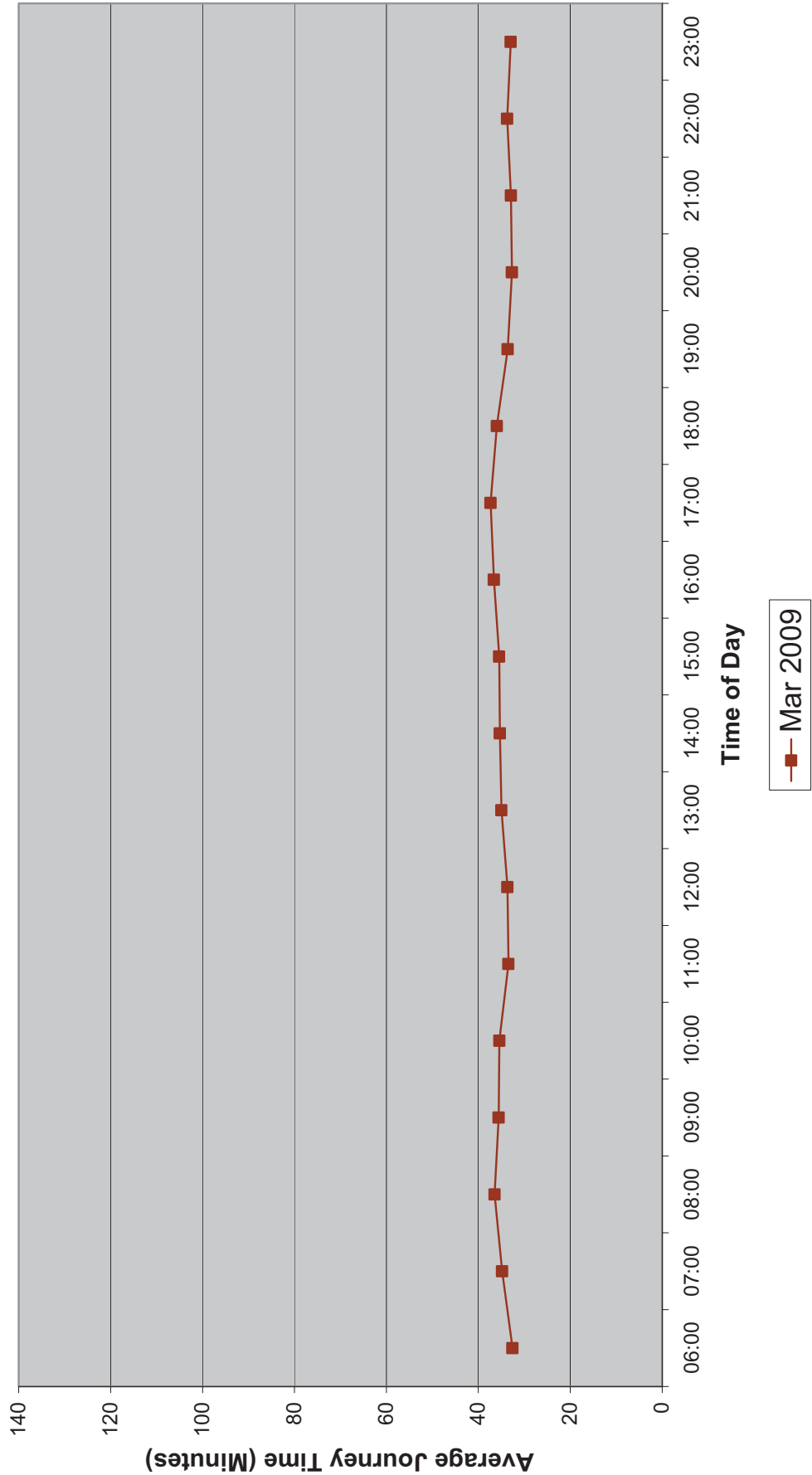
Sundays: M6 Southbound



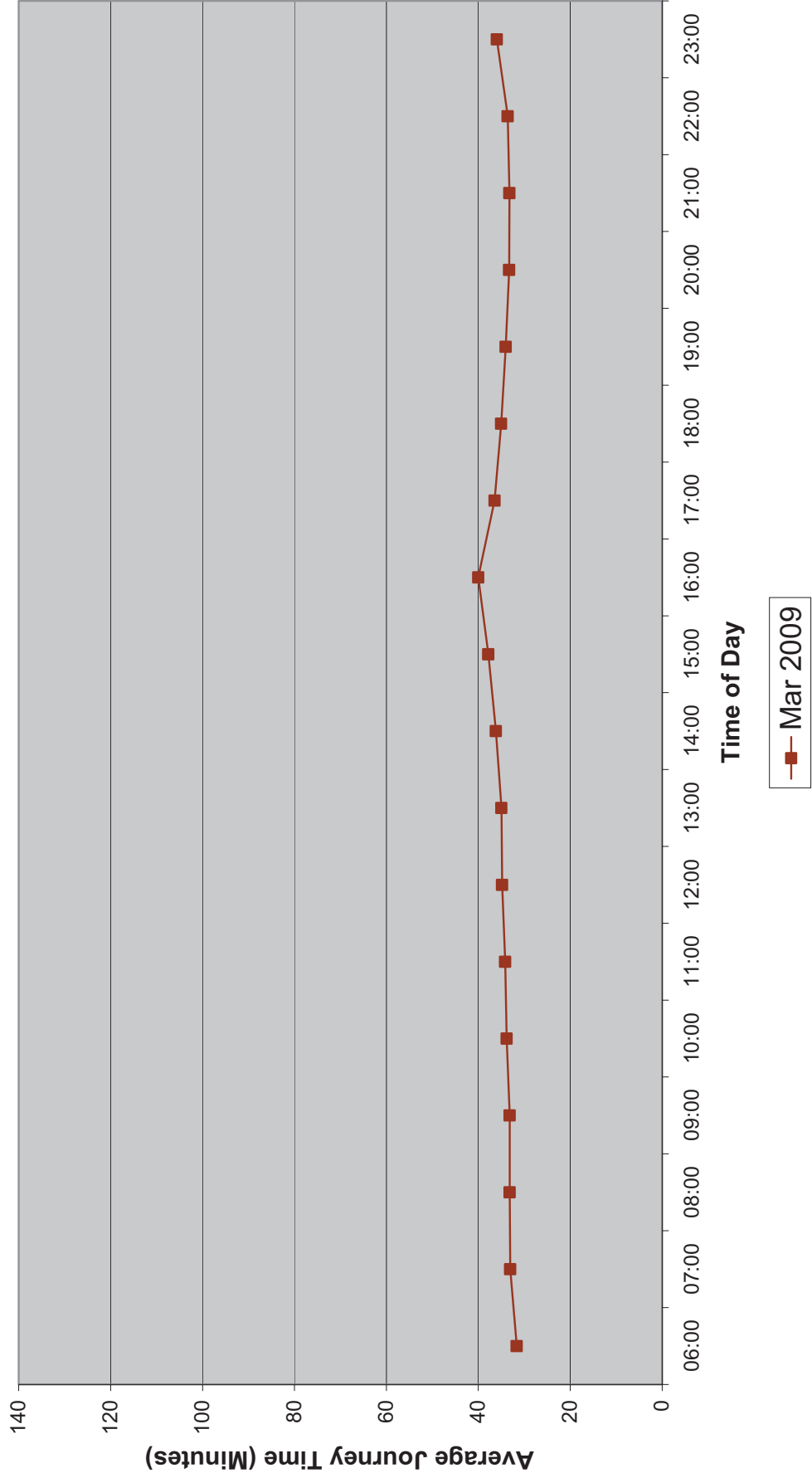
Mondays: M6 Toll Northbound



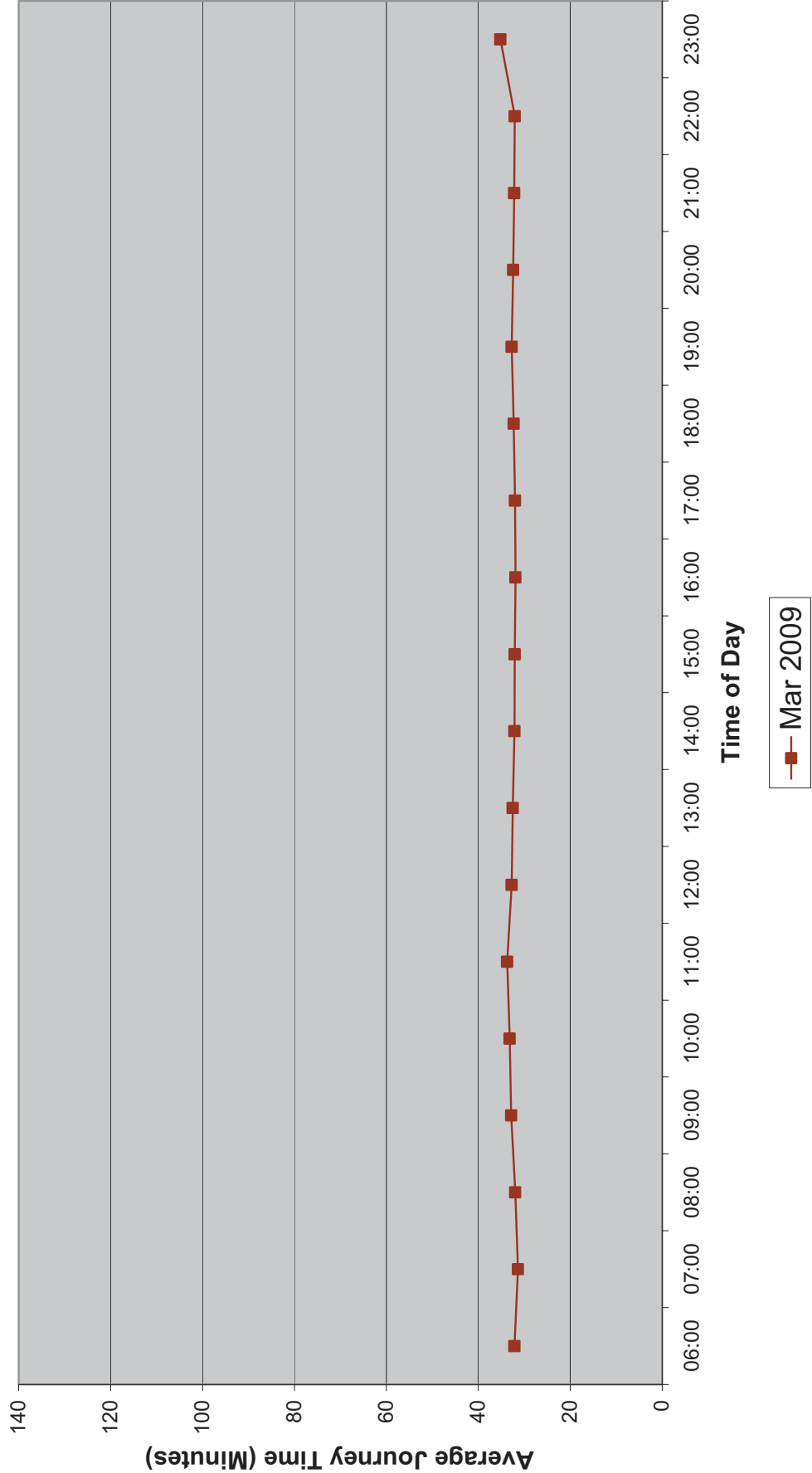
Tuesday - Thursday: M6 Toll Northbound



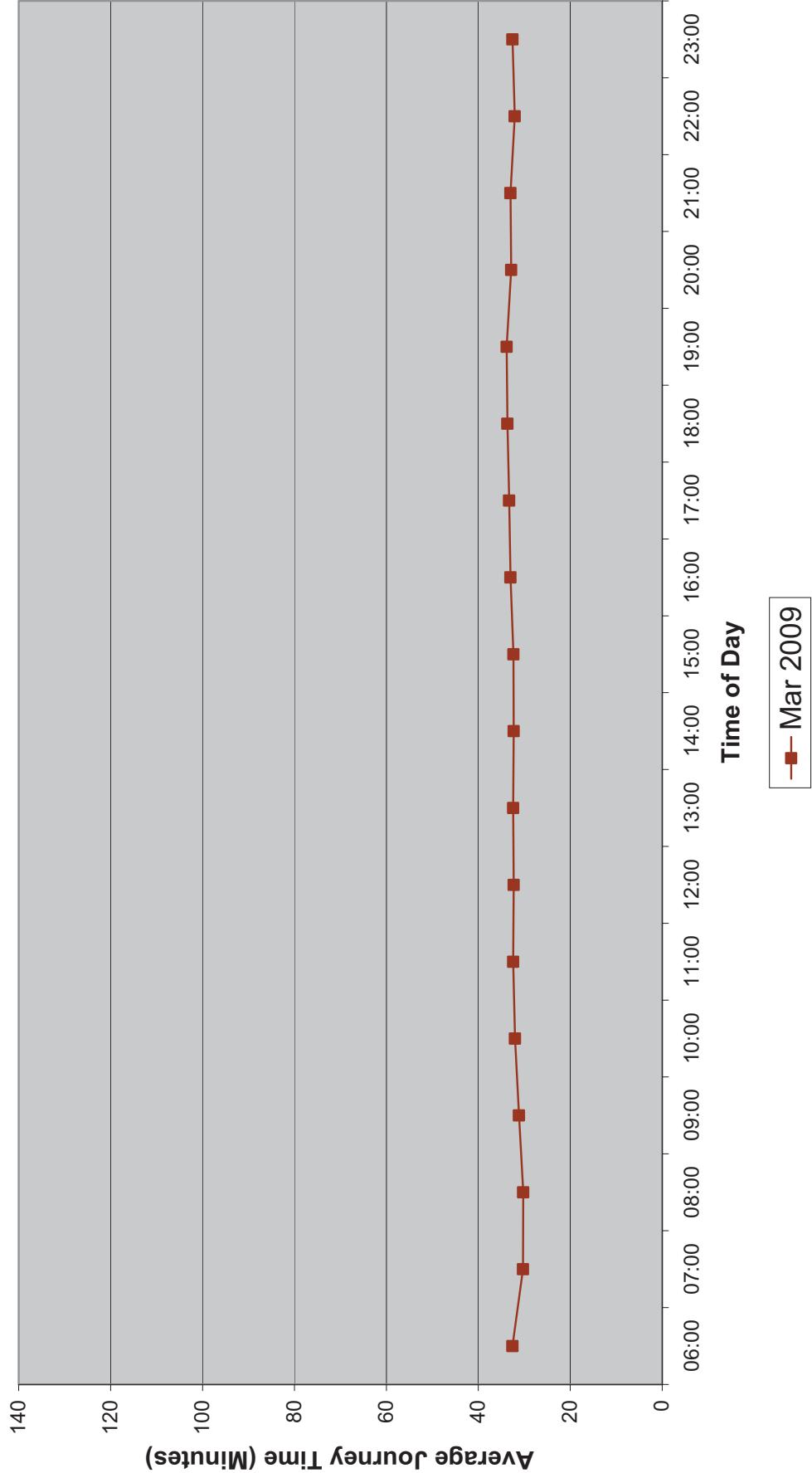
Fridays: M6 Toll Northbound



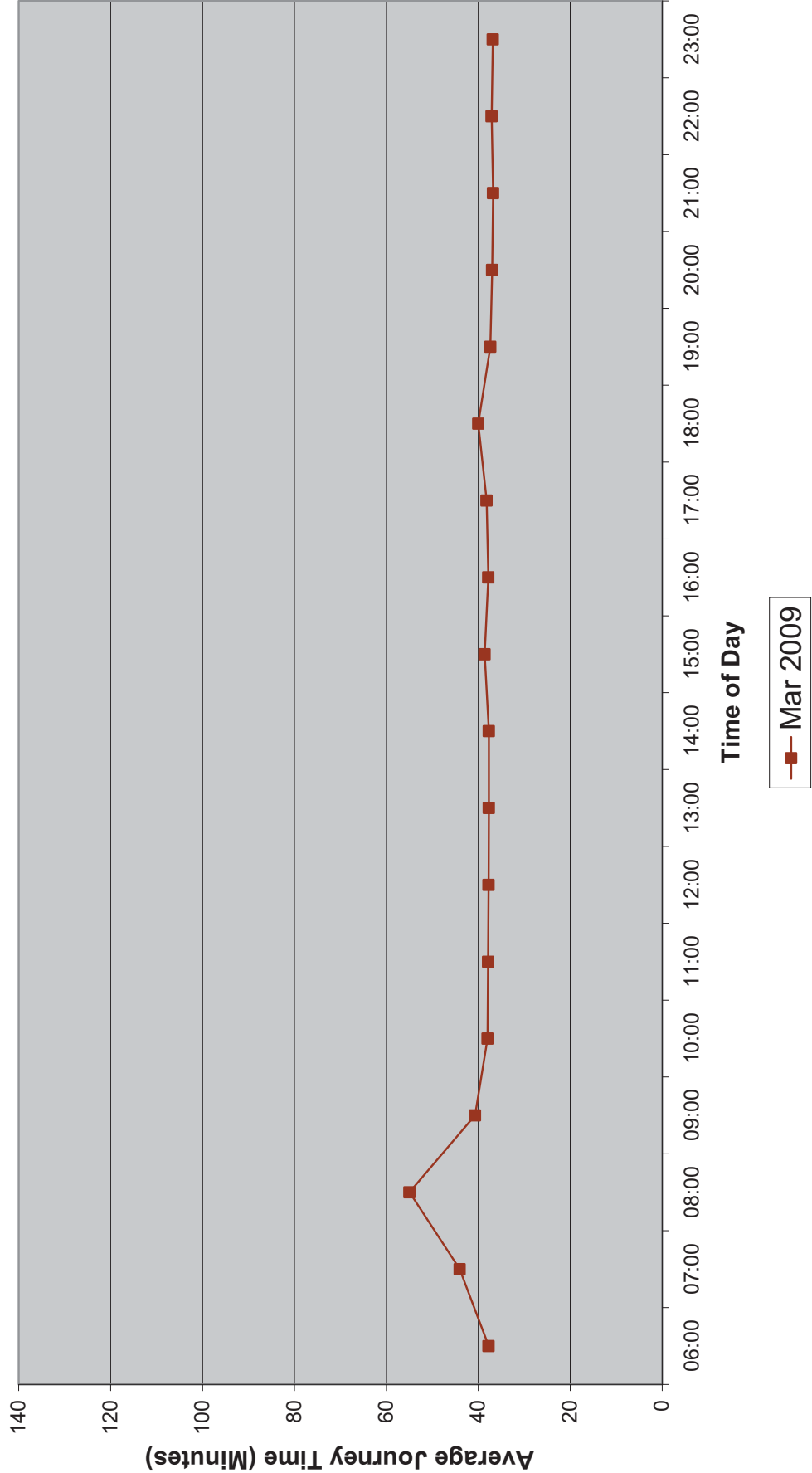
Saturdays: M6 Toll Northbound



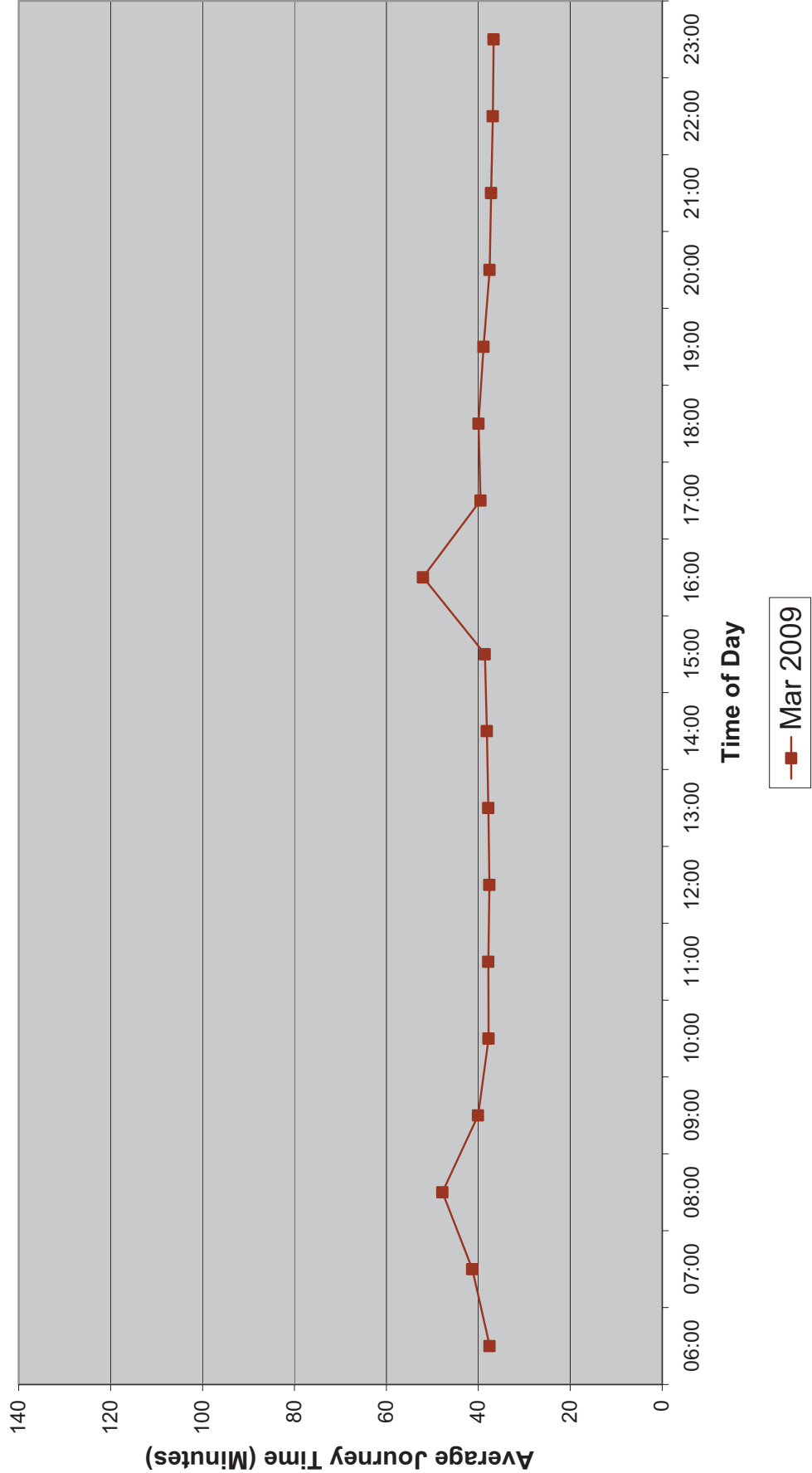
Sundays: M6 Toll Northbound



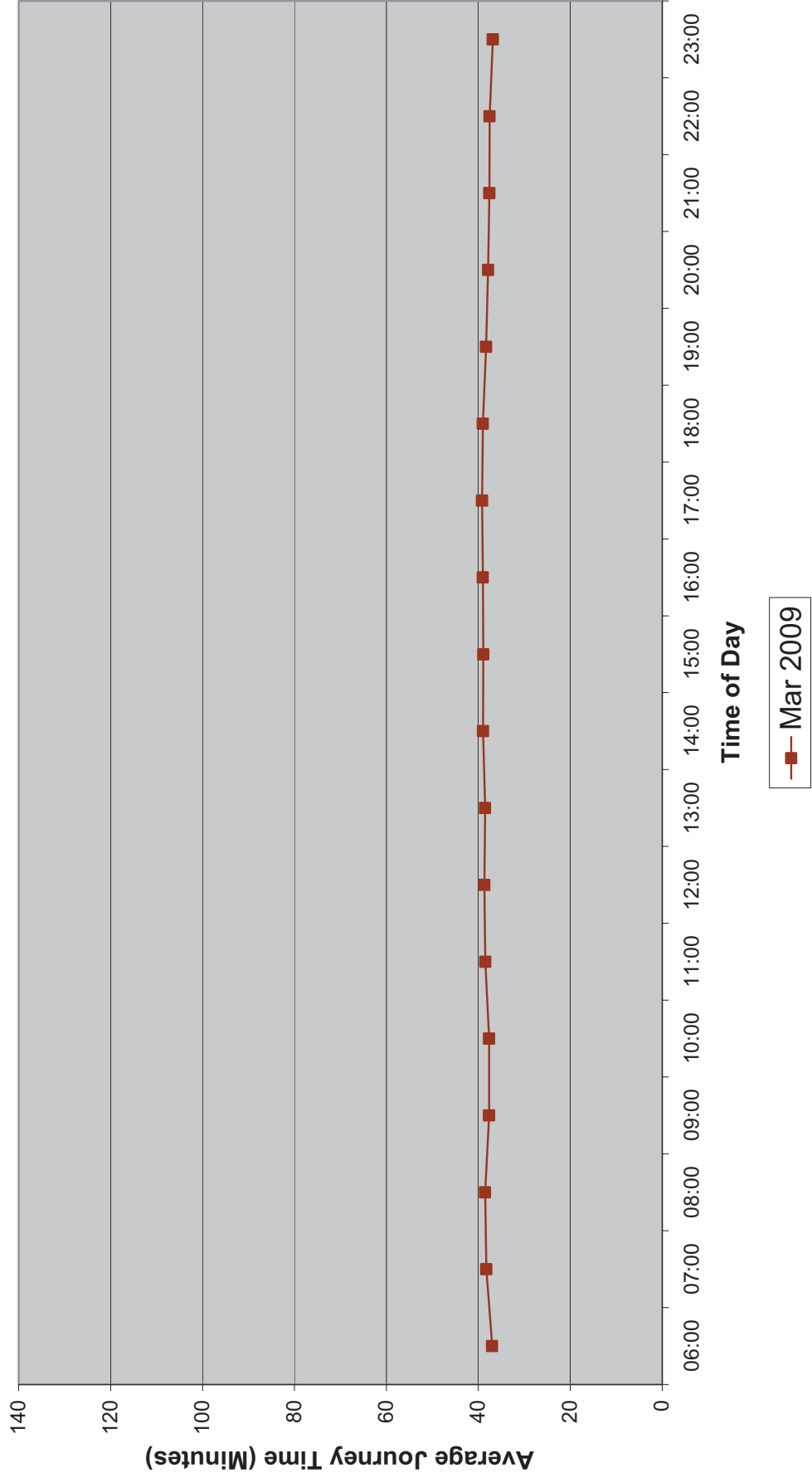
Mondays: M6 Toll Southbound



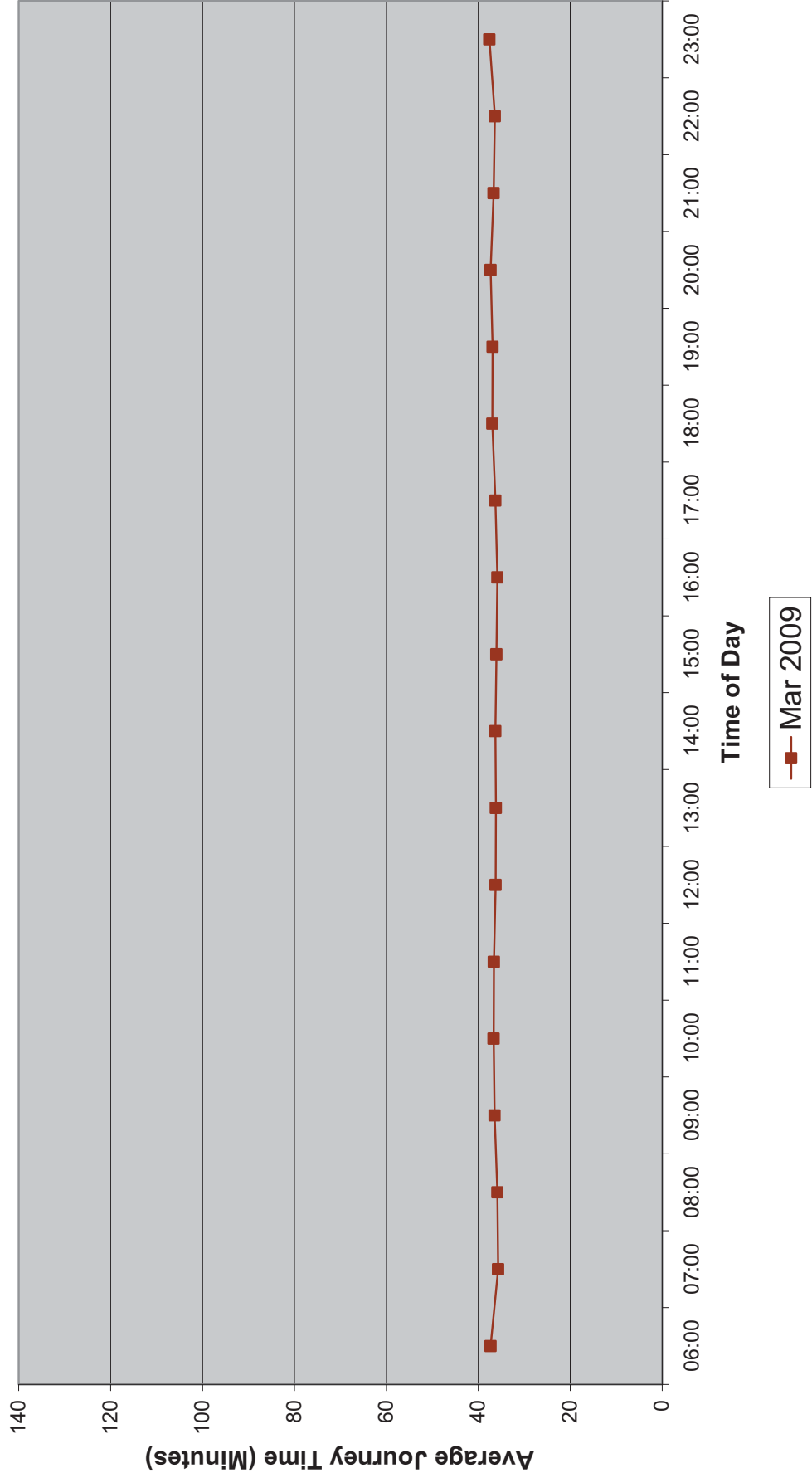
Tuesday - Thursday: M6 Toll Southbound



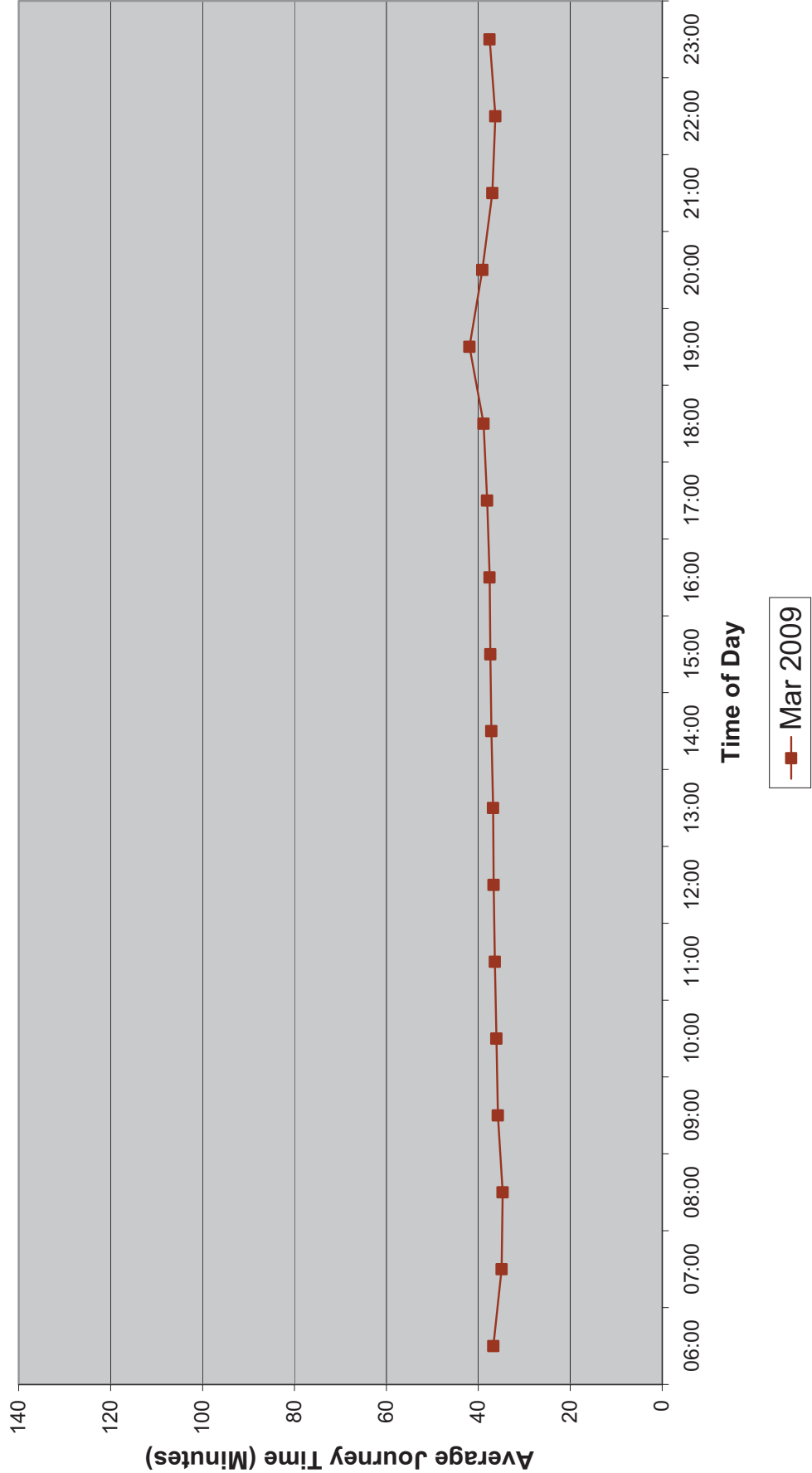
Fridays: M6 Toll Southbound



Saturdays: M6 Toll Southbound



Sundays: M6 Toll Southbound



A.3 Analysis Methodology of Police ANPR data

Methodology for derivation of Journey Times on M6 and M6 Toll using data from ANPR cameras on M6

Camera data

- A.3.1 ANPR cameras are at numerous locations around the Midlands motorway box as illustrated in fig 8.1. This study has used anonymised number plate data from three of these cameras on the M6, located near Coventry between J1 – J2 (Camera E), Birmingham J4a – J5 (Camera H), and near Cannock J12 – J13 (Camera C). This has allowed us to identify the times that individual vehicles pass these cameras. Where a vehicle is identified as passing several cameras in succession on the same day, a journey time can be calculated.
- A.3.2 In the absence of an equivalent camera on the M6 Toll, the route where vehicles are observed at cameras C and E and vice-versa, but not at camera H has been used as a proxy for the journey using the M6 Toll rather than the M6 only.
- A.3.3 The camera sequences used to derive journey times of individual vehicles identified by their anonymised number plates are detailed in the table below.

Sequence of Cameras	Route
C, H, E	M6 only - southbound
C, not at H, E	M6 / M6 Toll / M6 - southbound
E, H, C	M6 only - northbound
E, not at H, C	M6 / M6 Toll / M6 - northbound

Derivation of average journey times using the half-population method

- A.3.4 The aim of this method is to use the data set of journey times of individual vehicles calculated from the camera data to derive mean journey times for straight-through trips.
- A.3.5 The half-population method is the process used to auto-correct ANPR journey data, removing diversive journeys.
- A.3.6 Diversive journeys are those journeys where a vehicle has travelled past one camera but has not travelled directly to the next camera. Instead the vehicle has diverted off the route - perhaps for minutes, perhaps for hours - only to appear later in the day at a subsequent camera. This vehicle's journey then appears in the data set as a slow or very slow journey time. These diversive journeys must be removed from the population before averages are taken.
- A.3.7 The removal method is based upon the following assumptions:
- The majority of journeys - more than half – made by vehicles passing the camera locations in sequence during the day are straight-through journeys (i.e. not 'diversive');
 - Straight through journeys using the motorways are also the fastest journeys;

- The day is split into a series of 288 five-minute sample periods⁵;
- Each recorded journey is assigned to one of these sample periods according to the time when the journey begins (when a vehicle passes the first camera on the route). The assignment of journeys to the time of passage of the first camera is purely conventional. We could equally well have assigned journeys to sample periods based on the camera in the journey's route, or to the midpoint time between passing the first and last cameras.

A.3.8 Thus we have a dataset of 288 samples of journey data for any given day, for any given route. Each sample could have from 0 to an indefinite number of journey times within it.

A.3.9 The steps for the half-population method of auto-correcting journey times are:

- For each sample period the journeys are sorted in order of time taken, quickest journey first.
 - *Example:* the first journey might be 34 minutes, the next 34.2 minutes and so on up to the 99th journey record which might be 212 minutes.
- The quickest half of this population are assumed to be good, straight-through journeys. This is as per our assumptions, listed above.
- The standard deviation and mean of the 'quick' half of the data are taken. The slow half of the data in any given sample period do NOT contribute either to the mean or the standard deviation.
- All those journeys in the slow half of the data for the given sample period that take longer than the mean + one standard deviation are marked 'ignore' and are not used in averaging calculations⁶.
- A second pass is then taken on the data using a half-hour sample period and ignoring all data that is greater than the mean of the 'fast half' of the data + three standard deviations. Although this second pass tends to ameliorate the 'morning spike' problem as mentioned below in known issues, it is not perfectly effective.

Known Issues with Method.

Morning Spikes

A.3.10 ANPR data has a low enough pickup rate that it is not unusual to have a few journeys recorded in off-peak five-minute sample periods – i.e. in the morning before 8am. These journeys could be slow diversive journeys but there is no quicker data in the sample period that would autocorrect them (mark them as being ignored). This can lead to journey times spiking quite high in the mornings.

Hybridisation of Journey Times by Route

A.3.11 Because the pickup rate of ANPR cameras is not 100%, and the matching rate of number plates across the two or three cameras on a journey route cannot be perfect there is an issue that has to be addressed whenever comparing journeys that use the M6 only (i.e. they are picked up by cameras CHE or EHC in sequence) against journeys that do not (CE or EC).

A.3.12 If a vehicle travels on the parallel section of the M6 only and past camera H but *is not picked up at H*, it will be initially recorded as a M6 Toll journey. The net effect is that the M6 Toll journey data

⁵ The optimal length of the sample period is not known. Five minutes was chosen because it was short enough to capture rises and falls in journey time, yet large enough to give fair sample sizes for statistical analysis.

⁶ There is nothing mathematically determined about using a single standard deviation. One could easily use half a deviation or three deviations, and so on. It just so happens that using the mean and one deviation appears to give good results when used within a five minute sample size.

set theoretically contains a heavy component of slower journeys which used the M6 only but have been mislabelled as M6 toll journeys.

A.3.13 The reason why hybridisation is NOT an issue is as follows. The data set of journeys initially identified as M6 Toll undoubtedly contains a heavy component of presumably slower M6 only journeys, however all of these slower journeys are erased by the auto-correction process. The authentic M6 Toll journeys in any five minute sample are always faster than any mislabelled M6 only journeys that have entered the population and as such the standard deviation and mean for the sample period are always formed from authentic M6 Toll journeys. The only way that an M6 only journey can be treated as a fast journey is if it is fast enough to be indistinguishable from the mass of genuinely fast M6 Toll journeys.

A.3.14 This would not work if the M6 only journeys were faster than the M6 Toll journeys. If that were the case, then the M6 Toll journeys would be completely washed out by the M6 only journeys. But because M6 Toll road users are faster, the toll road signal is clean.

The Overlapping journey times problem

A.3.15 If and when the M6 Toll road journey times get slower for any reason, then they may begin to approach the times for M6 only journeys. Of course whatever stressor is slowing traffic on the M6 Toll may also be slowing traffic on the M6 only route: but there may come a point when the M6 Toll journey times are no longer sufficiently faster to auto-correct against hybridisation of the two sets of journey times.

A.3.16 At this point the M6 Toll data set might be expected to be washed out, and the data for the toll road suddenly takes on the character of the M6 only journey. The average journey times for the M6 Toll users and the M6 only users overlap, and the M6 Toll journey times graph takes on the spiky, slow behaviour of the M6 only route.

A.3.17 This means that when the M6 Toll times and the M6 only times converge, then the toll road data effectively becomes washed out and unreliable – it will be slower than it really is, having absorbed slower journey times from users of the M6 only route and now being unable to auto-correct for it.

Summary of Decision of use Half population Method

A.3.18 In summary on investigation of the limitations of the this method as detailed above it was decided that the results do provide sufficiently robust data to enable meaningful comparisons of journey times for the same route over differing years and between the two routes during the majority of the day.

A.4 Strategic Screenlines

Strategic Screenline 2

	Mar-03				Mar-05				Mar-09			
	AWT	ADT	AM Pk	PM Pk	AWT	ADT	AM Pk	PM Pk	AWT	ADT	AM Pk	PM Pk
M6 J4A-5												
		WB	80,004	67,419	5,742			4,861				
		EB	82,308	69,521	5,554			5,311				
		Total	162,312	136,940	11,297			10,171				
A4097		WB	7,493	7,122	491			592				
		EB	7,248	6,937	596			498				
		total	14,742	14,059	1,087			1,090				
M6 Toll T2-T3 (T1-T3 NB)		NB	-	-	-			-				
		total	-	-	-			-				
A446		N of A4091	11,065	10,432	640			1,107				
		EB	11,065	10,432	1,028			692				
		total	22,129	20,863	1,668			1,799				
A4091		Tamworth Road, Near Middleton.(SCM)	6,674	6,641	278			816				
		SB	6,674	6,533	914			366				
		total	13,347	13,174	1,192			1,181				

Strategic Screenline 3

	Mar-03				Mar-05				Mar-09			
	AWT	ADT	AM Pk	PM Pk	AWT	ADT	AM Pk	PM Pk	AWT	ADT	AM Pk	PM Pk
M6 J6-7												
		NB	78,052	68,423	6,405			5,054				
		SB	72,048	63,160	5,456			3,971				
		total	150,100	131,583	11,861			9,025				
A452		CHESTER ROAD NORTH OF ANTROBUS ROAD	10,332	9,753	586			660				
		SB	11,057	10,485	781			699				
		Total	21,388	20,238	1,367			1,359				
A5127		BIRMINGHAM ROAD NORTH OF MONKSEATON ROAD	9,242	9,056	428			638				
		SB	10,744	10,285	732			686				
		total	19,985	19,341	1,160			1,324				
A453		TAMWORTH ROAD SOUTH OF FOX HILL ROAD	8,435	8,022	717			691				
		SB	7,858	7,582	634			600				
		total	16,294	15,604	1,351			1,291				
M6 Toll T3-T4		NB	-	-	-			-				
		SB	-	-	-			-				
		Total	-	-	-			-				
A38		N A453	19,305	17,393	1,208			1,799				
		NB	20,084	18,010	2,052			1,266				
		total	39,390	35,403	3,260			3,065				
A5		East of A38	7,008	6,696	507			512				
		SB	7,294	6,970	432			625				
		total	14,301	13,666	939			1,137				
A51		Hopwas Hill	6,594	5,978	489			674				
		SB	6,470	5,964	689			479				
		Total	13,064	11,942	1,178			1,152				

Note: Background growth factors applied to 2003 and 2005 data, as per Section 3 Table 3.1 of report

Strategic Screenline 4

Strategic Screenline 4

				Mar-03				Mar-05				Mar-09				
				AWT	ADT	AM Pk	PM Pk	AWT	ADT	AM Pk	PM Pk	AWT	ADT	AM Pk		
M6 J10-10A		NB		85,289	75,055	4,690	5,687	73,135	63,019	4,324	5,572	75,850	71,179	4,727		
		SB		73,920	69,163	3,550	4,339	66,355	59,333	3,665	4,174	68,196	65,645	3,595		
	total			159,209	144,218	8,240	10,026	139,490	122,352	7,989	9,746	144,045	136,824	8,322		
B42 10		Spring Hill	NB	5,021	4,618	307	497	5,052	4,614	645	386	4,806	4,507	350		
		SB		6,468	5,792	740	524	4,833	4,496	347	500	5,067	4,628	646		
	total			11,489	10,409	1,047	1,021	9,885	9,110	992	885	9,873	9,135	996		
A34		NB		8,360	7,638	370	874	7,935	7,535	398	790	6,398	6,030	352		
		SB		9,429	8,447	1,080	569	8,479	7,905	1,030	609	7,007	6,458	871		
	total			17,789	16,085	1,450	1,443	16,414	15,440	1,428	1,400	13,405	12,488	1,222		
M6 Toll T6-T7		NB		-	-	-	-	21,277	17,754	1,212	2,220	17,381	15,170	1,170		
		SB		-	-	-	-	22,905	20,168	2,029	1,959	18,986	16,864	2,140		
	total			-	-	-	-	44,182	37,922	3,240	4,179	36,367	32,034	3,310		
A5		NB	Little Wyrley		13,275	11,703	873	1,036	14,215	12,225	1,169	1,137	14,428	13,249	1,188	
		SB		26,353	23,291	1,797	1,981	14,159	12,178	1,091	1,172	15,093	13,747	1,143		
	total			38,628	34,992	2,594	2,969	28,374	24,403	2,259	2,309	29,522	26,996	2,331		
B4154		NB		7,988	7,297	504	653	7,237	6,926	437	654	5,779	5,129	324		
		SB		8,014	7,296	685	513	7,347	6,986	714	479	5,858	5,150	521		
	total			16,001	14,593	1,189	1,167	14,584	13,912	1,151	1,133	11,637	10,279	845		
A5190		NB	Burntwood		7,172	6,351	540	630	6,939	6,415	467	611	9,461	8,700	624	
		SB		6,821	6,044	600	560	6,736	6,197	587	559	9,147	8,381	940		
	total			13,992	12,395	1,139	1,190	13,675	12,612	1,053	1,170	18,608	17,082	1,565		
A5190		NB	Cannock		3,893	3,544	255	293	3,368	3,180	220	254	3,659	3,405	228	
		SB		4,400	4,021	287	337	3,794	3,606	255	300	4,189	3,937	263		
	total			8,294	7,565	542	630	7,161	6,787	474	554	7,847	7,342	491		

Strategic Screenline 5

Mar-03					Mar-05					Mar-09				
	AWT	ADT	AM Pk	PM Pk		AWT	ADT	AM Pk	PM Pk		AWT	ADT	AM Pk	
M54					N/B	24,289	20,796	1,663	1,946		23,247	21,560	1,716	
					S/B	20,868	19,038	1,338	1,318		21,168	20,161	1,334	
	total	45,157	39,834	3,001	3,264		44,415	41,721	3,049					
A460					N/B	10,216	9,742	705	845		13,376	12,609	1,014	
					S/B	10,492	9,905	950	766		13,214	12,322	1,057	
	total	20,707	19,647	1,654	1,611		26,590	24,932	2,071					
A5					N/B	9,972	8,651	729	828		9,506	8,828	906	
					S/B	9,972	8,651	729	828		9,506	8,828	906	
	total	1,695	1,695	1,695	1,695		19,013	17,657	1,812					
M6					N/B	61,729	52,165	3,319	3,888		60,588	56,768	3,893	
					S/B	59,714	52,739	3,152	3,480		60,321	56,563	4,210	
	total	121,443	104,904	6,471	7,368		120,909	113,331	8,103					
B5012					N/B	2,512	2,285	152	288		2,319	2,049	190	
					S/B	2,512	2,285	152	288		2,299	2,021	149	
	total	5,023	4,570	303	576		4,618	4,071	339					
A34					N/B	7,710	6,910	600	689		7,267	6,801	609	
					S/B	7,397	6,648	602	621		7,401	6,910	559	
	total	15,108	13,558	1,203	1,310		14,668	13,711	1,169					
A513					N/B	4,746	4,442	322	400		4,632	4,453	340	
					S/B	4,905	4,587	353	391		4,695	4,500	382	
	total	9,651	9,029	675	792		9,327	8,953	722					
A518					N/B	7,745	6,760	632	594		8,030	7,113	671	
					S/B	7,392	6,421	450	692		7,791	6,939	503	
	total	15,137	13,181	1,082	1,287		15,821	14,052	1,174					
A51					N/B	7,167	5,777	667	622		5,881	5,271	644	
					S/B	6,965	5,649	574	702		5,844	5,240	599	
	total	14,132	11,426	1,241	1,324		11,725	10,511	1,242					
A50					N/B	38,596	30,862	2,821	2,628		33,625	30,984	2,776	
					S/B	36,135	31,069	2,393	3,107		33,780	31,361	2,361	
	total	74,730	61,931	5,214	5,735		67,405	62,537	5,137					

Note: Background growth factors applied to 2003 and 2005 data, as per Section 3 Table 3.1 of report

Appendix B – Environment Evaluation

B.1 Environmental Evaluation

- B.1.1 This evaluation focuses on those aspects not fully evaluated during the one year after study, or where suggestions were made for further study.

Documentation obtained

- B.1.2 Background information requested and received to help with the environmental evaluation is listed in Table B.1 below.

Table B.1 – Environment Related Information Requested and Response

Box 1 Item	Information Provided
Environmental Statement	Birmingham Northern Relief Road (BNRR) Environmental Statement May 1993 provided by HA at one year after stage
Appraisal Summary Table	Not applicable to this scheme
Any amendments, updates or addendums to the ES or any relevant further studies or reports. Any significant changes to the scheme since the ES.	None provided
'As Built' drawings for landscape, ecological mitigation measures, drainage, fencing, earthworks etc.	Not requested
Landscape and Ecology Management Plans	M6 Toll Landscape Management Plan construction issue rev 0 dated 19/4/03 provided by MEL at one year after stage
Handover Environment Management Plan	Not available for this scheme
Relevant contact names of people with knowledge of the scheme (Statutory bodies were consulted with at OYA and have not been contacted for this report)	Local authority contacts sourced by the POPE team
Archaeological reports (popular and academic)	Provided to County Archaeologists
List of properties eligible for noise insulation	Not requested
List of Part 1 Claims regarding noise, air quality or lighting (from HA National Part 1 Team)	Provided by HA Part 1 Team
Results of any post opening survey or monitoring work e.g. ecology surveys, water quality surveys pre- and post-construction	Ecological Monitoring Strategy 2000-2013: Interim Report and Mitigation Audit:2006/2007, dated May 2007. M6 Toll Ecological Monitoring 2008/09 Hedgerow Surveys
Animal mortality data, pre and post scheme construction	Provided by MEL
Any scheme newsletters or publicity material for the scheme	Available on MEL website
Copy of the Non-motorised User (NMU) post opening survey	Not requested, physical fitness & journey ambience have not been considered as part of this report
Information may be available regarding environmental enhancements to streetscape/townscape for bypassed settlements	Not applicable

Site Inspection

- B.1.3 A site inspection was carried out in July 2009.

Approved Scheme

- B.1.4 The approved M6 Toll scheme underwent the required statutory process starting in the late 1980's, starting with the production of an Environmental Statement dated May 1993 and culminating in a Public Inquiry which ran from June 1994 to October 1995.

Consultations

- B.1.5 For the one year after study, four statutory environmental organisations (Countryside Agency, English Nature (subsequently combined as Natural England), English Heritage and the Environment Agency) were consulted and feedback was received from all except the Countryside Agency. Consultation with these organisations has not been repeated. Organisations contacted for this Five Years After report are listed in Table B.2.

Table B.2 – Summary of Consultation Responses

Authority	Environmental aspect	Response	Comments
Staffordshire County Council	Landscape	Yes	Limited comments
	Biodiversity	Yes	Limited comments
	Heritage	Yes	Published report received
	PROW/NMU	No	
Warwickshire County Council	Landscape	Yes	Comprehensive comments
	Biodiversity	Yes	Brief comments on planting
	Heritage	Yes	Published report received
	PROW/NMU	No	
South Staffordshire District Council	Landscape	Yes	Brief comments
	Biodiversity	No	
Cannock Chase District Council	Landscape	Yes	Unable to comment due to short deadline and lack of resources
	Biodiversity	Yes	Unable to comment due to lack of monitoring data
	Water/air quality/noise	Yes	Comprehensive comments
Lichfield District Council	Landscape	No	
	Water/air quality/noise	Yes	Comprehensive comments
North Warwickshire Borough Council	Landscape	Yes	Unable to comment due to lack of prior knowledge of the area

Authority	Environmental aspect	Response	Comments
	Water/air/quality/noise	Yes	Brief comments
Tamworth Borough Council	Water/air quality/noise	No	
Birmingham City Council	Landscape	No	
	Biodiversity	Yes	Comprehensive comments

B.1.6 The Highways Agency Part I Claims Team has also been contacted and provided the following information: to date there have been 10,787 Part 1 claims relating to noise, lighting and fumes. There have been 6,975 successful claims so far and as outstanding claims remain it is likely that the number of successful claims will increase. A further breakdown of these figures has been requested.

B.1.7 Telephone discussion has also taken place with MEL.

Noise

Predicted Impacts

B.1.8 The one year after report considered noise in some detail, it has been re-evaluated to take account of the 2009 traffic flow information.

B.1.9 The ES predicted that there would be increased noise levels for properties along the route of the proposed M6 Toll. The most severe impacts were predicted for the following areas in each section:

- M6 Saredon Brook to Churchbridge: Lodge Lane farm and the residential areas of Cheslyn Hay (Littlewood);
- Churchbridge to Chasewater/Burntwood: rural settlement of Common Side; and residential area of Anglesey estate and northern Brownhills; and
- Chasewater/Burntwood to Wishaw Holly Lane: countryside east of Burntwood, properties to the west of section between Weeford Interchange and Camp Road.

B.1.10 Imperceptible changes along the Wishaw Holly Lane to M6 River Blythe section were predicted due to the high existing noise levels along this section.

B.1.11 Reductions in noise levels, most of them being imperceptible (less than 3 dB(A)), on the facades of a few properties were predicted. This was due to:

- Relocated sections of existing roads such as the A460 and B4154 to integrate them with proposed junctions and interchanges on M6 Toll; and/or
- Reduction in traffic flows along the existing roads.

B.1.12 The ES included the objective to minimise the noise impact, particularly on residential properties and to maintain noise levels below 68 dB(A).

Approved Scheme

B.1.13 The approved scheme included the following mitigation proposals:

- To minimise the adverse environmental impacts by keeping the M6 Toll's vertical alignment as low as practicable;
- To reduce the adverse noise impact by proposing barriers obstructing the direct line between the noise source and the receiver. The barriers were proposed to be provided by:

- Placing the road in the cutting, where required and possible;
- Placing mounding or fencing of appropriate height adjacent to the affected road sections;
- To provide for noise insulation to eligible individual properties as a statutory obligation; and
- To locate the road away from concentrations of residences.

Modification to Scheme

- B.1.14 As noted in the one year after report the surfacing on the motorway and all side roads was undertaken using Proprietary Thin Wearing Course instead of the traditional Hot Rolled Asphalt (HRA) wearing course. It is generally accepted that such surfacing gives around 3dB(A) reduction in noise levels compared to an HRA surface. This measure was proposed and implemented by MEL as additional mitigation subsequent to the ES.

Consultation

- B.1.15 Cannock Chase District Council responded to the consultation and stated that it had received no complaints in relation to noise from the M6 Toll, and that no other noise issues had been raised in connection with the scheme.
- B.1.16 Lichfield District Council responded to the consultation and stated that it considered that noise levels had worsened because the M6 Toll is a new noise source that did not originally exist.
- B.1.17 North Warwickshire Borough Council responded to the consultation and stated that it had received a few complaints relating to noise from the M6 Toll that had been passed to the District Valuer for compensation, but that the level of noise experienced is as expected.

Key Findings

- B.1.18 As noted in the one year after report, noise mitigation measures have been incorporated into the scheme as expected.
- B.1.19 A broad assessment has been undertaken as to whether the 'observed' impact of the scheme at 2011 would be greater or less than that forecast. In order to compare the forecast traffic levels in the ES, which were defined for the year 2011, the observed 2009 traffic flows have been growthed forward to 2011 in accordance with default traffic growth factors in NTM (National Transport Model). However, it should be noted that:
- The traffic forecast models made for 2011 in the ES included the assumptions that other changes to the road network would have occurred by that time, in particular, the widening of both the M6 north of the M6 Toll and of the M42 to the south. As of 2009, when the traffic flows surveys took place, this widening had not taken place although Active Traffic Management was operational on the M42, therefore the flows are likely to be lower than modelled; and
 - The straight-line model of traffic growth on the M6 Toll used here to predict 2011 flows is a simplistic approach that does not take account of the complexity of the pattern of traffic ramp up on the first toll motorway in the UK. A range of factors such as public attitudes towards tolling and the level of toll rates will have significant influence on the level of usage of the toll road. However the method above is the best before and after available at this stage.
- B.1.20 The ES presented two traffic cases for 2011 based on upper and lower forecast usage of the M6 Toll for the thirteen sections of road as defined in Table B.3. The comparison of these cases against the 2011 'observed traffic' in the table provides an indication that the traffic noise impact of the scheme is likely to be less than that forecast within the M6 Toll route corridor:
- For the 2011 ES 'upper usage' case, the ES forecasts were higher in eleven of the thirteen cases than the equivalent 2011 'observed' post-opening flows based on the 2009 observed traffic data; and

- For the 2011 ES 'lower usage' case, the ES forecasts were higher in all the equivalent 2011 'observed' post-opening flows based on the 2009 observed traffic data.

Table B.3 – Comparison of Forecast and 'Observed' Traffic Flows

Link	ES Forecast AADT 2011		2011 AADT based on observed 2009 flows ⁷	Difference from Forecast	
	Lower Usage on M6 Toll	Upper Usage on M6 Toll		Lower	Upper
M6 J3–J3A (E of M6 Toll tie-in)	164,000	164,700	118,200	-28%	-28%
M6 J11-11A	106,700	93,100	87,700	-18%	-6%
M6 J11A -J12	143,000	147,600	122,800	-14%	-17%
M42 J9 – 10	84,200	81,400	71,400	-15%	-12%
A38 A5 – A453 (Canwell Hall)	53,100	32,200	31,700	-40%	-2%
A5 East of Brownhills (A452-A461)	23,700	14,400	21,100	-11%	47%
A5 Great Wyrley, (E of A34)	37,000	28,000	27,700	-25%	-1%
A446 A38-A4091	26,600	8,900	22,500	-15%	153%
M6 Toll (T2 – T3)	38,900	76,700	31,400	-19%	-59%
M6 Toll (T3 – T4)	37,100	79,100	31,400	-15%	-60%
M6 Toll (T5 – T6)	50,100	84,800	32,500	-35%	-62%
M6 Toll (T6 – T7)	48,000	83,100	33,100	-31%	-60%
M6 Toll (T8 – M6 North)	36,500	54,500	27,200	-26%	-50%

B.1.21 Traffic data is not available to consider any impacts the M6 Toll might have had on the local noise climate of adjacent roads. Further study would be required to evaluate noise impacts at particular locations. It should also be noted that 6,975 Part 1 Claims had been successful by July 2009 and one of the main reasons given was noise due to traffic.

⁷ Factored using NTM 2007 using March 09 ADT as proxy for AADT, or equivalent March flows factored to 2009 then factored to 2011

Noise – Key Findings

- By July 2009, 6,975 Part 1 Claims had been successful and one of the main reasons given was noise. However, observed traffic flows in 2009 are still lower than forecast and it is considered likely that the local noise climate is better than expected for properties close to the road corridor;
- Traffic information is not available to evaluate noise impacts as a result of the M6 Toll on adjacent roads;
- Although not included in the ES a low noise surface was proposed and implemented as an additional measure by MEL to help reduce noise impacts; and
- Mitigation measures in the form of earth mounding and environmental barriers have been provided in line with the ES.

Local Air Quality

Predicted Impacts

- B.1.22 The one year after report considered air quality in some detail, and it has been re-evaluated to take account of the 2009 traffic flow information and available air quality monitoring data from the local authorities.
- B.1.23 The ES noted that that generally the air quality in the M6 Toll route corridor was good. However major roads in the area including the A5, A38, A446 and A460 experienced heavy traffic flows resulting in poor air quality at properties close to these roads. Construction of the scheme was expected to cause changes in traffic flows on existing major roads; overall a decrease in flows was expected to prevail leading to an improvement in local air quality.
- B.1.24 With the Scheme, air quality standards for carbon monoxide were predicted to be exceeded at the toll stations and residential properties at A460 Wolverhampton Road and A461 Walsall Road over the US⁸ air quality standards of 9 ppm. The ES noted that at Wolverhampton Road air quality would be better with the scheme than if the existing road system was retained.
- B.1.25 Nitrogen dioxide concentrations at these locations would meet the World Health Organisation one hour guidelines, but the EC annual limit value would be exceeded (except at Walsall Road).
- B.1.26 An increased level of heavy metals was predicted within one metre of the motorway with the likely impacts being significant up to approximately 10m from the route in the long term. As these impacts were within the fenceline, it was predicted that no properties would be affected by heavy metals from the road.
- B.1.27 The ES included the following objectives:
- To assess air quality changes arising from the proposed M6 Toll and establish the significance of traffic exhaust emissions on human health and the environment;
 - To identify possible methods of mitigating against the effects of air quality changes;
 - To assess the nature and impacts of heavy metal deposition on human health and environment; and
 - To consider the impact of fog and frost and the effects on driving conditions on the road.

Approved Scheme

- B.1.28 The approved scheme included the following mitigation proposals:
- Direct mitigation measures for air quality being limited to the realignment of road, and reduction of traffic volumes and/or increase in mean traffic speeds, the ES proposes policy level mitigation measures like the role of Government Policy by introducing legislation to reduce vehicle emissions;
 - To minimise the impacts to residential properties by routing the M6 Toll Motorway to avoid as many of them as possible;
 - Reduction in traffic volumes on some existing major roads is expected to result in some improvement in air quality at properties located nearby; and
 - To control pollution levels at tolling stations by ensuring that the toll booths are under positive pressure preventing ingress of polluted air.

⁸ At the time of ES, no EC or UK air quality standards of Carbon monoxide were set, so the ES uses the US Federal Air Quality Standards of 9ppm.

Modification to Scheme

- B.1.29 Not aware of any modifications to the scheme.

Consultation Comments

- B.1.30 Cannock Chase District Council responded to the consultation and stated that in July 2006 it installed a diffusion tube monitoring Nitrogen Dioxide close to Norton Canes MSA (Grid Ref SK 019037). The UK air quality objective for Nitrogen Dioxide had not been exceeded. The council also stated that there is an automated air quality monitoring station sited in Betty's Lane Norton Canes, approximately 350m from the M6 Toll (Grid Ref 011076). The station monitors levels of Nitrogen Dioxide, Sulphur Dioxide and PM10. The UK air quality objectives for these gases have not been exceeded. It also commented that there are no other known air quality issues associated directly with the M6 Toll. However, Cannock Chase District Council had declared an AQMA in 2005 for Nitrogen Dioxide in excess of the annual 40 µg/m³ level, with monitoring on the A5 at Bridgetown, Cannock. It was anticipated that the M6 Toll may alleviate this problem through a reduction in HGVs using the A5. However, this has not occurred and recent (undated by consultee) monitoring results have demonstrated levels slightly elevated to those in previous years and still exceeding the air quality objective.
- B.1.31 Lichfield District Council responded to the consultation and stated that it considered that air quality has got worse because the M6 Toll is a new pollution source that did not previously exist and that the percentage of HGVs using the A5 has increased, rather than easing local routes as anticipated. This can be seen in Table 7.2 in Section 7.
- B.1.32 North Warwickshire Borough Council responded to the consultation and stated that it had expected local air quality to have improved significantly, but that this has not proven to be the case, and the AQMA south of Coleshill is still in place.

Key Findings

- B.1.33 No air quality monitoring or modelling has been undertaken as part of this study and traffic flows have been used to evaluate impacts.
- B.1.34 The critical receptors identified in the ES were at the following locations:
- A460 Wolverhampton Road ('Maysun');
 - A5 Churchbridge (13 Watling Street);
 - A461 Walsall Road (number 5); and
 - Water Orton (1 George Road).
- B.1.35 The traffic count site at Water Orton, in both directions near the shared section of the M42/M6 Toll, is no longer operational, and it has not therefore been possible to obtain comparable figures for 2009.
- B.1.36 The observed flows in 2009 (projected to the design year 2011 using the same method as detailed for the noise evaluation) have been compared with the ES forecasts for the 2011-'with M6 Toll scenario'. Forecasts of traffic speeds were not available, but it can be assumed that that traffic flows were modelled as free-flowing as was observed in 2009 (as detailed in the Traffic and Safety sections of this report).

Table B.4 – Comparison of Traffic Flows near critical receptors for Air quality

	ES Forecast of AADT 2011		2011 AADT based on observed 2009 flows	Difference from Forecast	
	Lower usage of M6 Toll	Upper usage of M6 Toll		Lower usage of M6 Toll	Upper usage of M6 Toll
A460 Wolverhampton Road	28,800	27,300	19,700	-32%	-28%
A461 Walsall Road	21,500	21,400	16,700	-20%	-19%
A5 Churchbridge	35,000	25,000	27,000	-20%	12%

- B.1.37 Table B.4 indicates that at the three critical receptors where information is available, traffic flows are less than forecast for both 'lower and upper usage' except for A5 Churchbridge where flows are higher than forecast 'upper usage'. Although a new source of traffic has been introduced into the area it is likely, based on the traffic flow information available, that air quality close to the M6 Toll is better than expected in the ES.

Local Air Quality – Key Findings

- Three of the consultees found issues with air quality.
- The M6 Toll has introduced an additional source of traffic into the route corridor and local air quality will have worsened, however this may be better than expected based on observed traffic flows in 2009 which are less than forecast.
- Local Authority air quality monitoring of the M6 Toll near Norton Canes indicates that levels of Nitrogen Dioxide, Sulphur Dioxide and PM10 do not exceed the UK air quality objectives and that there are no other known air quality issues associated directly with the M6 Toll; and
- There are likely to have been other air quality impacts across the whole of the region as traffic volumes have changed considerably. It is difficult to assess the extent to which these changes are due to the opening of M6 Toll. However consultees have commented that the % of HGVs on the A5 has increased, rather than decreasing as expected and easing local routes, and an AQMA remains in place at Bridgetown and another south of Coleshill.

Greenhouse Gases

- B.1.38 The assessment of greenhouse gas emissions was not an assessment requirement when the original ES was published in 1993.
- B.1.39 There is insufficient data to evaluate the true effect of the scheme on carbon emissions from vehicles in the corridor. A recent study by Staffordshire University estimated annual emissions in the M6 / M6 Toll motorway corridor to be 324,000 tonnes. This has not been verified by this study.

Landscape

- B.1.40 The one year after report recommended that the five years after study should review the establishment of the landscape mitigation measures and evaluate the impacts of lighting.

Predicted Impacts

- B.1.41 The ES predicted the following impacts:
- Changes to landscape character and quality;
 - Visual impact;
 - Lighting leading to change in rural character; and
 - Scale of the proposed development including interchanges and structures difficult to integrate into the landscape.
- B.1.42 The ES summary of likely lighting impacts included within the landscape section notes the following impacts:
- M6 Saredon Brook to Churchbridge – Lighting would lead to a permanent change in the rural character between the M6 and Middle Hill. At Hatherton Reservoir lighting would remain intrusive in the long term despite the provision of belts of screen planting. Close to the residential areas of Cheslyn Hay and Churchbridge lighting would remain intrusive in the long term, although in the context of high levels of existing lighting;
 - Churchbridge to Chasewater/Burntwood – Lighting at the Kingswood toll station would have an effect on some views long term although these would be filtered by planting. Lighting would remain intrusive in the Anglesey Basin canal area;
 - Chasewater/Burntwood to Weeford Island – Lighting impacts at the toll station on properties at Brownhills and Burntwood would be intrusive, however mounding and planting would reduce the visual intrusion;
 - Weeford Island to Wishaw Holly Lane – Lighting and traffic on elevated sections of the route would remain locally intrusive;
 - Wishaw Holly Lane to Water Orton – Additional lighting at the M42 junction would generally be seen against the backdrop of existing lighting at the junction; and
 - Water Orton to M6 River Blythe – Existing lighting in the Coleshill area already impacts on the local landscape.

Approved Scheme

- B.1.43 The mitigation proposals for the scheme were developed around the following objectives:
- To reduce the levels of visual impact to property, particularly residential property, as far as possible;
 - To reduce the effect of the road and associated facilities on the existing landscape;
 - To blend the road into the existing landscape as far as possible;
 - To provide planting and visual improvements within urban areas and degraded impoverished landscapes;
 - To replace vegetation lost to road construction with new planting appropriate to the prevailing landscape character of the area; and
 - To provide a pleasant and varied environment for the road user.

- B.1.44 The ES included the following mitigation proposals:

- To reduce visual impact by extensive landscape planting, careful road alignment and earth mounding. It was stated that this objective would be achieved in most areas although it is not possible to totally ameliorate the visual intrusion caused by a major new road;
- To reduce effects on the existing landscape by comprehensive landscape proposals. It was stated that in some areas e.g. Middle Hill and Langley Mill, despite extensive landscape proposals which would reduce the effects as far as possible, the character and quality of the landscape would be permanently adversely affected;
- To blend the road into the existing landscape by reinforcing the existing landscape to allow the road to be integrated within its setting; reflect the character of the surrounding landscape, particularly parklands around the Belfry and the Coleshill area to assimilate in visual terms and improve the fabric of the landscape generally where the landscape character had been degraded by development e.g. Churchbridge, Chasewater and Burntwood;
- Where the scheme passes through degraded or impoverished landscapes, to provide substantial areas of new planting, leading to an overall visual improvement;
- To provide more vegetation than would be lost through construction; and
- To screen the road from surrounding properties, but allow opportunities to provide glimpses of places of interest and recognisable features along the route creating a sense of place.

Modification to Scheme

- B.1.45 Not aware of any modifications to the scheme.

Consultation Comments

- B.1.46 Warwickshire County Council responded to the consultation and stated that it believed that the impact of the road has probably been about as expected. This is because the landscape character of the area was already changing before the M6 Toll was constructed, due to other major roads in the area, and that some of the 'Arden' characteristics had already been lost. A lack of hedgerows was noticed. The turquoise colour of the toll booth canopies was felt to stand out too much, and a darker green colour would have blended into the landscape more effectively. It was suggested that further offsite planting could be undertaken in mitigation. It was also noted that there are some gaps in the planting due to failures, although in other areas planting is establishing well. Planting was considered to be most effective when the road is in cutting, when the new planting blends in with the existing landscape and screens the road fairly well. However, where the road is on embankment, or crosses a more flat, open landscape, it was considered that mitigation planting has not established, or is insufficient. Lighting columns near T1 (Curdworth) and T3 (Langley Mill) were considered to be very noticeable.
- B.1.47 South Staffordshire District Council responded to the consultation and stated that it felt that the landscape and visual impact mitigation had been delivered effectively, particularly the tree planting, although a better growth rate would have been expected. It was considered that the maintenance had not been carried out in such a way as to encourage the best possible start for the plants.
- B.1.48 Staffordshire County Council responded to the consultation and stated that it considered that the planting had been initially poorly looked after and is therefore taking longer than necessary to mature. In addition, it considered that associated planting outside the main road corridor had not been adequately maintained because of problems with committed sums for maintenance.

Key Findings

- B.1.49 Based on the site visit most areas of tree and shrub planting are establishing well, with plants exhibiting good, healthy growth. If the management operations recommended in the Landscape

Management Plan are followed, there is no reason why the scheme landscape objectives should not be fulfilled. No inspection or survey information has been made available for this report. Figure B.1 and Figure B.2 show the development of planted areas near the Belfry.



Figure B.1 – Cutting with tree planting near the Belfry (1 Year After)



Figure B.2 – Cutting with well established tree planting near the Belfry (5 Years After)

- B.1.50 Planting was carried out during the winters of 2002/2003 and 2003/2004. A three year maintenance and defects liability period followed on from the end of the implementation period in spring 2004. The ES Volume 2 Section 2.13 Maintenance and Management stated that by monitoring the landscape, it would be possible to monitor the success of the proposed planting along the route corridor. The M6 Toll Landscape Management Plan (LMP) sets out measures for managing the landscape scheme to enable achievement of the strategic landscape objectives and compliance with the detailed commitments made at Public Inquiry. It provides general management procedures and management operations for each planting type and detailed management strategies are provided for individual plots.
- B.1.51 The LMP states that 800mm diameter weed-free circles around each tree and shrub should be maintained up to Year 5, and some of these are still clearly visible, indicating that this aspect of maintenance was carried out until spring 2009.
- B.1.52 Some areas of relatively poor tree/shrub establishment were apparent (Figure B.3), notably on embankments close to overbridges and near to balancing ponds with screening less effective. This may have been as a result of soil compaction necessary for slope/pond engineering.

However, the less vigorous trees and shrubs may create a valuable scrub habitat. Some specialised areas such as species-rich grassland and marginal pond planting have not developed as expected. There are issues regarding responsibility for maintenance of the translocated heathland at Chasewater, and alterations to pond profiles do not appear to have been followed by replanting, although natural regeneration of marginal plants is occurring.



Figure B.3 – Area of poor vegetation establishment on embankment near Wishaw

- B.1.53 The LMP states that from Year 5 to Year 25, weed control should be carried out when required. There was considerable evidence of ragwort in many tree/shrub plots (Figure B.4) and control of this weed is required to prevent seed spreading to agricultural areas. However, MEL has stated that ragwort is controlled in accordance with *DEFRA Code of Practice on How to Prevent the Spread of Ragwort*. There was no evidence of major infestations of other noxious weeds.



Figure B.4 – Ragwort infestation in planting area near Wishaw

- B.1.54 Maintenance of grass verges and sight lines appears to be as set out in the LMP, giving a tidy appearance, whilst leaving some areas of long grass for visual interest and biodiversity.
- B.1.55 The Green Arc Initiative was a three year partnership between MEL, local authorities, the Forestry Commission and Natural England that was set up to carry out landscape improvements in areas affected by the M6 Toll. The partnership has now expired, however, under the Green Arc Initiative and a Section 106 agreement, MEL provided funds for environmental improvements at Muckley Corner (Wall Butts) Common. The 'Friends of Muckley Corner' website states that the funding will be spent on an ecological survey, Japanese knotweed control, re-grading of soil, rubbish removal,

wetland habitat improvements, new signage and information, and new tools for the Friends of Muckley Corner.

- B.1.56 The LMP states that tree guards, stakes, ties and rabbit spirals should be progressively removed in Years 3-10. There was some evidence of tree growth being inhibited by spiral guards (Figure B.5).



Figure B.5 – Birch tree showing growth restricted by rabbit spiral

- B.1.57 The planting at Norton Canes Motorway Service Area (MSA) was generally well established, particularly the drainage ditch and grassed and wildflower areas. However, several of the specimen standard trees close to the MSA building had failed. Some had been removed, but others were still in place. Replacement planting is required in these locations to ensure that the high quality of the landscape scheme is retained. MEL is not responsible for the maintenance of the MSA.



Figure B.6 – Failed specimen trees at Norton Canes MSA

- B.1.58 The hard landscaping at Norton Canes MSA is in good condition, except for small areas of resin bound gravel (Figure B.7) which detract from the high quality finish elsewhere at the MSA.



Figure B.7 – Resin bound gravel in poor condition at Norton Canes MSA

- B.1.59 An area of picnic tables set in grass was waterlogged at the time of visiting (Figure B.8). Although there had been a period of heavy rain at the time consideration could be given to using an alternative surfacing material below picnic tables in future schemes.



Figure B.8 – Waterlogged picnic tables at Norton Canes MSA

- B.1.60 It is understood that MEL have achieved a British Astronomical Association Good Lighting Award for preferring 'sky-friendly' night-time exterior lighting at M6 Toll. The lighting is without upward spill and located at strategic points, rather than lining the whole route. A non-technical survey of lighting impacts has been undertaken as part of this evaluation. The survey was undertaken between the hours of 21.30 and 00.30 on 24/25 July 2009. In general, the downward directed lighting associated with the M6 Toll appeared to create less light spill than the lighting associated with existing junctions and roads in the vicinity of the M6 Toll, and the 'white' light was considered to be less intrusive than the 'orange' glow of low pressure sodium lighting. In many locations it was very difficult to assess the additional impact of M6 Toll lighting because of the 'skyglow' of other lighting associated with the west midlands conurbation and transport corridors and interchanges. The following impacts were noted:

- M6 Saredon Brook to Churchbridge – Lighting columns during the day and night time lighting have lead to a permanent change in the localised rural character between the M6 and Middle Hill (Figure B.9), although the M6 corridor was already a dominant feature in the landscape.

Close to the residential areas of Cheslyn Hay and Churchbridge the M6 Toll lighting adds to the high levels of existing lighting and additional lighting associated with new retail, leisure and hotel developments (Figure B.10);



Figure B.9 – Night time lighting at Middle Hill



Figure B.10 – Night time lighting at Churchbridge

- Churchbridge to Chasewater/Burntwood – Lighting at the Kingswood toll station is having an effect on some views (Figure B.11), although long term these will be partly filtered by planting. At Chasewater and close to the residential areas of Chasetown/Burntwood the M6 Toll lighting is adds to the high levels of existing lighting, particularly where the A5 is close to the M6 Toll;



Figure B.11 – Night time lighting at Kingswood Toll Station

- Chasewater/Burntwood to Weeford Island – Lighting impacts at the toll station on properties at Brownhills, Burntwood are present, but mounding and maturing planting will reduce the visual intrusion over time. Shenstone interchange is highly visible because of the other lighting associated with the A5 and A5127, but is largely removed from visual receptors at Shenstone;
- Weeford Island to Wishaw Holly Lane – Large sections of the M6 Toll are unlit but lighting columns and traffic on elevated sections of the route are locally intrusive;
- Wishaw Holly Lane to Water Orton – Additional lighting at Dunton Island (Figure B.12) and the M42 junction is seen against the backdrop of existing lighting at the junction, particularly visible at night from Allen End and Curdworth; and



Figure B.12 – Night time lighting at Dunton Island

- Water Orton to M6 River Blythe – Existing lighting, associated with built up areas and transport corridors in the Coleshill area already impacts on the local landscape.

Landscape – Key Findings

- Most areas of tree and shrub planting are establishing well, with plants exhibiting good, healthy growth. If the management operations recommended in the Landscape Management Plan are followed, there is no reason why the scheme landscape objectives should not be fulfilled.
- However, some areas of relatively poor tree/shrub establishment were apparent, notably on embankments close to overbridges and near to balancing ponds and some specialised areas such as wet woodland, species-rich grassland and marginal pond planting have not developed as expected.
- The turquoise colour of the toll booth canopies was felt to stand out too much by a consultee, who considered that a darker green colour would have blended into the landscape more effectively and that further offsite planting could be undertaken in mitigation.
- With regard to lighting it is considered that the downward directed lighting associated with the M6 Toll appeared to create less light spill than the lighting associated with existing junctions and roads in the vicinity of the M6 Toll, and the 'white' light was less intrusive than the 'orange' glow of low pressure sodium lighting. Lighting columns near T1 and T3 were considered to be very noticeable by Warwickshire County Council.
- In many locations it was very difficult to assess the additional impact of M6 Toll lighting because of the 'skyglow' of other lighting associated with the West Midlands conurbation, transport corridors and interchanges.

Heritage of Historic Resources

- 11.9 The one year after study concluded that it appeared that the archaeological remains were satisfactorily preserved by record, and that the only outstanding issue was that the results of the archaeological work on site had not been written up and published.

Predicted Impacts

- 11.10 The ES predicted the following impacts:
- Direct and indirect impacts upon known features of cultural heritage interest including conservation areas and listed buildings/structures, historic landscapes, archaeological sites and features; and
 - Risk of affecting unknown archaeological remains.
- 11.11 The ES included the following objectives:
- To avoid physical impact, landtake and severance of known areas of significant historic landscape, archaeological remains, buildings and other features of architectural or historic value;
 - To minimise landtake and disturbance to areas of possible archaeological importance, or known areas of value which may be unavoidably affected;
 - To minimise the effect of visual intrusion on the setting and amenity of historic, architectural and archaeological features of value;
 - To minimise the impact of noise on the amenity of features or areas of historic, architectural and archaeological value; and
 - To minimise damage to organic artefacts and deposits through hydrological draw-down effects, due to changes in local water-table levels.

Approved Scheme

- 11.12 The mitigation proposals for the scheme were developed around the following objectives:
- Modification of the vertical or horizontal alignments of the main route and the position of its associated structures;
 - Minimising landtake e.g. by the use of retaining walls or by using shallower gradients for mounding;
 - Siting construction facilities in locations which would avoid sensitive areas;
 - Avoidance of soil stripping under embankments or landscape regarding in archaeologically sensitive areas;
 - Adopting of landscape and engineering solutions which minimise noise or visual intrusion and sensitive design of structures in historic settings;
 - Adoption of guidelines for the control of construction operations;
 - Investigation and recording of threatened archaeological sites and non-listed buildings or structures of local historic interest; and
 - Adoption of a programme of archaeological investigation to identify, evaluate and record unknown archaeological sites.

Modification to Scheme

- B.1.61 Not aware of any modifications to the scheme.

Consultation Comments

- 11.13 The County Archaeologists for Staffordshire and Warwickshire have now received the post-excavation analysis and published report from the archaeological sub-consultants to the project.

Key Findings

- 11.14 The published report states that important archaeological results had been produced, but that it is debateable that the archaeological potential of the area was fully realised, largely because of the longevity of the project and subsequent changes involved. Fieldwork began in December 2000, as part of a work programme established six years earlier, and the mitigation approach had been developed using data gathered up to ten years previously. It also stated that the 'watching brief' approach fell short of what would be regarded as desirable today.
- 11.15 On the Birmingham and Fazeley Canal, the lock at Dunton was demolished and replaced by a new lock. The original lock was subject to preservation by record. Fixtures such as the stone copings, lock gates, sluice assemblies, winch gear, and the sill beam buffer plate were salvaged for reuse by British Waterways.
- 11.16 Two culverts large enough to be incorporated as tunnels into any future restoration of the Hatherton Canal through Churchbridge were constructed under the A5 and M6Toll. The demolition works revealed a relatively well preserved canal basin, and the original 'watching brief' fieldwork methodology was expanded to more fully record the structure. Surviving coping stones were recovered for use in canal restoration.
- 11.17 Three of the excavation sites proved to be important: a medieval fish farm and artefacts from Mesolithic (8,500 – 4,000 BC) through to Romano-British (AD410-650) times near Wishaw, an Iron Age settlement at Langley Mill and a Roman burial ground at Wall.
- 11.18 MEL facilitated the construction of a new aqueduct for the Lichfield Canal over M6 Toll north of Muckley Corner, which means that any future restoration of the canal will not be impeded by the motorway.
- 11.19 The published report states that no building recording was specified in the original project design and that the eventual recording of the demolition at Lock Keepers Cottages, Dunton Wharf and Swan Farm, Norton Canes was more hurried than was desirable. No recording was carried out at the principal building complex demolished, Wishaw Hall Farm.

Heritage – Key Findings

- The results of the archaeological work on site have been published and provided to the relevant County Archaeologists;
- The archaeological findings were largely as expected;
- The published report states that important archaeological results had been produced, but that it is debateable that the archaeological potential of the area was fully realised, largely because of the longevity of the project and subsequent changes involved.
- The archaeological recording methodology used was based on data obtained up to ten years before recording began, and the methods used were not always reviewed as archaeological 'best practice' evolved during the course of the project.

Biodiversity

- B.1.62 The one year after study suggested further evaluation at five years after when the five years post construction monitoring report would be available as well as confirming effectiveness of the mitigation measures this report was expected to report on the status of previously reported remedial measures.

Predicted Impacts

- B.1.63 The ES predicted the following impacts:
- Impact on areas of wildlife importance e.g. by noise and lighting disturbance, road mortality, discharge into lakes, ponds, rivers and streams, airborne pollutants and changes in landscape;
 - In general the route line would follow existing road corridors and other areas of low conservation value. It was predicted that the most important sites likely to be affected were;
 - River Blythe, a nationally important river;
 - Hatherton Clay Pit, containing a protected species;
 - Chasewater Heaths SSSI, a nationally important heathland and canal basin;
 - A valuable wetland site, containing locally rare plants, adjacent to the River Blythe; and
 - Hatherton Reservoir, a large water body of local importance.
 - Overall there would be a net loss of conservation value associated with the construction and operation of the road scheme.

Approved Scheme

- B.1.64 The approved scheme included the following objectives:
- To avoid, where possible, adversely affecting areas of conservation value;
 - Where sites of significant conservation value cannot be avoided, to minimise the impact of the proposals; and
 - To mitigate any unavoidable impact by creating new areas of conservation value or diversity as a result of road construction.
- B.1.65 The approved scheme included the following mitigation proposals:
- Woodlands – use of locally native species. No tree species in areas of heathland or species rich grassland. Translocation of surface soil and seedbank of valuable ground flora to be lost to the scheme. Felled timber retained on site to decay naturally;
 - Hedgerows – replant new hedgerows to compensate for losses. Translocate old species-rich hedgerows to suitable sites nearby;
 - Grasslands – where valuable grassland would be lost, reseed suitable areas with equivalent seed mix. Translocate particularly rich grassland flora to suitable alternative locations using turf transplants;
 - Heathlands – Translocation of lowland heath to suitable sites nearby;
 - Marsh – where valuable marshes would be removed, crossed or drained by the route, an equivalent area of marsh would be created (where such opportunities exist) as a replacement habitat;
 - Rivers and streams – Construction work controlled to ensure no pollution or increased turbidity. Operational discharge via pollution control measures. Stream diversions would

maintain or improve the existing nature of the stream and where appropriate include meander and riffle reinstatement. New ditches to include berms, silt traps and planted banks;

- Lakes and ponds – new ponds created to replace those lost; and
- Fauna – provide new habitats, protective fences and mammal underpasses, translocate species as appropriate.

B.1.66 The following requirements for Post- Development Monitoring of Ecological Sites were also included in the ES Section 2.13:

- Hedgerow translocation – surveys of both tree species and ground flora for the first five years and once more after ten to assess the degree of success;
- Hatherton Clay Pit – the water levels and water quality regularly monitored over a three year period following construction;
- Norton Green and Anglesey Wharf (Chasewater Heaths SSSI) – brief botanical survey of the reinstated areas of acid grassland/dwarf heath would be undertaken annually for the first five years to monitor establishment, and once after ten years to assess the degree of success;
- Collets Brook new woodland – a botanical survey of the new woodland should be carried out annually for the first five years to monitor establishment of the trees and development of the ground flora, and once after ten years to assess the degree of success;
- Petty Whin site – the translocated site would be monitored annually for the first five years including a study using fixed point photography and permanent quadrats. Both botanical and invertebrate surveys would be undertaken. A final survey after ten years would assess the degree of success;
- Balancing Ponds – monitoring would include a survey of the emergent vegetation colonising all ponds to ensure that emergent plants establish a filter bed. Water quality of ponds with upstream pollution control investigated one year after construction. If suitable relocate plants and animals to these ponds. Monitor reestablishment of the appropriate habitats once a year for the first five years; and
- Hatherton Reservoir (Walkmill Claypit) – monitor new emergent vegetation in the redesigned reservoir once a year for the first five years.

Modification to Scheme

B.1.67 Not aware of any modifications to the scheme.

Consultation Comments

B.1.68 Birmingham City Council responded to the consultation and stated that it has concerns that the M6 Toll has isolated red deer at Brownhills, that the M6 Toll is a barrier to otter movements and that the effect on the movement patterns of raptor birds was not properly considered in the ES. But in addition, it considers that 50% of the mitigation ponds are better for biodiversity than the agricultural land they replace.

B.1.69 Warwickshire County Council responded to the consultation and stated that it was unable to comment on the success of the project in terms of ecology, but that it felt that the planting in rows gave a uniform appearance, and that the grass appears to have poor species diversity and potential connective value had been lost.

B.1.70 Staffordshire County Council responded to the consultation and stated that it considered that hedgerow translocation at Laney Green had had mixed success, that the heathland translocation at Chasewater Country Park had suffered because of failure to instate grazing, the translocations of great crested newts had been ineffective (Reference: surveys carried out for Lichfield District

Council 2009), although 2 small non-viable populations survive on each side of the M6 Toll, that heathland planting on the verge adjacent to Chasewater appears to have been successful, but will have little effect on heathland severance caused by the M6 Toll.

Key Findings

- B.1.71 Ecological monitoring is to continue until 2013. The ecological consultants to MEL have undertaken post-construction monitoring of the M6 Toll and have provided the following information on behalf of MEL for this evaluation:
- Ecological Monitoring Strategy 2000-2013: Interim Report and Mitigation Audit 2006/2007, dated May 2007;
 - Animal mortality data;
 - M6 Toll Ecological Monitoring 2008/09 Hedgerow Survey;
 - M6 Toll Ecological Monitoring 2008/09 Great Crested Newt Surveys, and
 - M6 Toll Ecological Monitoring 2003-2008 White-Clawed Crayfish.
- B.1.72 The above reports have been used as the basis of this evaluation, supplemented by site visit observations undertaken in July 2009.
- B.1.73 Translocated hedgerows – The hedgerows identified for translocation were coppiced, lifted and replanted at Laney Green (location changed slightly from that indicated on ES plans) and at Hall Walk / Green Lane. The process had limited success, as shown in Figure B.14 and Figure B.16 (Figure B.13 and Figure B.15 were taken at One Year after). Monitoring by the ecological consultants to MEL was carried in 2001, 2003 and 2008, and indicated a steady decline in the number of individual plants surviving.
- B.1.74 The M6 Toll Ecological Monitoring 2008/09 Hedgerow Surveys states that
- At Laney Green, only 21% of trees/shrubs surveyed were in good health, and the remaining 79% are exhibiting some signs of dieback or are dead (32%); and
 - At Hall Walk/Green Lane, only 6% of trees/shrubs surveyed were in good health, with 59% dead and many of the remaining trees/shrubs (35%) in poor health.



Figure B.13 – Translocated Hedge at Laney Green, north of T8 (1 Year After)



Figure B.14 – Translocated Hedge at Laney Green, north of T8 (5 Years After)



Figure B.15 – Translocated Hedge at Hall Walk/Green Lane near Coleshill (1 Year After)



Figure B.16 – Translocated Hedge at Hall Walk/Green Lane near Coleshill (5 Years After)

- B.1.75 The M6 Toll Ecological Monitoring 2008/09 Hedgerow Survey states that many of the root butts of translocated trees/shrubs were raised above ground level, that major tree/shrub roots were severed close to the stem on many specimens, and that a large number of trees/shrubs had exposed roots as a result of their elevated position. These were considered to be the principal reasons for the increasing levels of tree/shrub dieback over time. It was also stated that many of the observed declines are the result of impeded drainage at the receptor sites. In addition, at Hall Walk/Green Lane there were problems with grazing damage from horses in the adjacent field, exacerbated by a lack of management of the hedgerows.

- B.1.76 The M6 Toll Ecological Monitoring 2008/09 Hedgerow Survey also states that the monitoring undertaken to date indicates that the ground flora associated with each hedgerow is establishing well, with a species mix indicative of woodland/hedgerow ground flora establishing, although there are some problems with dominance by a few species of vigorous plants, for example bramble and nettle. The MEL ecological consultants consider that the translocated hedgerows therefore continue to function as wildlife corridors in the wider landscape because of the value of the ground flora.
- B.1.77 Petty Whin – Cuttings from rare plants (*Genista anglica*, Petty Whin) at Petty Whin site were undertaken in 2004. The MEL ecological consultants noted in their 2007 report that only one plant was in good health, although a further seven plants had survived. Competitive weed species have been removed to increase likely survival of the Petty Whin plants. Individual guarding of plants carried out to prevent continued rabbit damage.
- B.1.78 Heathland translocation – Wetland heath has been translocated from the MSA site to a donor site at Chasewater Country Park (Figure B.17). The MEL ecological consultants noted in their 2007 report that whilst the translocation of habitat has been successful, factors resulting from a lack of management are becoming apparent, such as the dominance of Purple Moor-grass and the emergence of tree and shrubs, such as Pedunculate Oak, Grey Willow, Gorse and Broom, which could shade out the heathland community. Both of these factors are largely a consequence of lack of grazing or cutting, as set out in the management plan for the site. It is understood that Lichfield District Council is responsible for the management of the site, and that the heath has been grazed this summer (2009).



Figure B.17 – Translocated Heathland at Chasewater Country Park (1 Year After)



Figure B.18 – Translocated Heathland at Chasewater Country Park (5 Years After)

- B.1.79 Ecology ponds – The 14 ecology ponds were surveyed by the MEL ecological consultants, who noted in their 2007 report that three did not hold water at the time of the survey and the need for lining should be considered, and that seven do not function as an ecology pond and would benefit from additional marginal planting. The ES stated that the loss of ponds would be mitigated by the construction of a similar amount of marginal habitat around balancing ponds.
- B.1.80 Ecology Pond 5A was created close to Pool Road at Chasewater Heaths SSSI. The MEL ecological consultants noted in their 2004 report that in its current form it was of no value to nature conservation and that significant works to this pond were required in order to comply with the details of the DEFRA great crested newt licence and agreements with English Nature (now Natural England). The MEL ecological consultants noted in their 2007 report that to enhance the nature conservation value for great crested newts, the island had been removed, that small numbers of aquatic plants were recorded in one margin and that it would be appropriate to continue monitoring. The 2008/2009 report noted that these works have improved its value for breeding amphibians, but that the pond appeared to have been stocked with coarse fish, negating the benefit. At the time of the site visit, (July 2009) considerably more marginal vegetation had developed (see Figure B.19 and Figure B.20).



Figure B.19 – Ecological Pond at Chasewater (Pond 5a) (1 Year After)



Figure B.20 – Ecological Pond at Chasewater (Pond 5a) (5 Years After)

- B.1.81 It was recommended in the ES that the water levels and water quality at Hatherton Clay Pit be regularly monitored over a three year period following construction, and therefore there was no requirement for this to be included in the Interim Report and Mitigation Audit:2006/2007. However, at the time of the site visit, (July 2009) more marginal vegetation had developed and the trees and shrubs planted around the perimeter were developing well (Figure B.21 and Figure B.22). Great crested newt monitoring not undertaken at this site.



Figure B.21 – View of Walk Mill (Hatherton) Clay Pit. Noise fencing seen on left. (1 Year After)



Figure B.22 – View of Walk Mill (Hatherton) Clay Pit (5 Years After)

- B.1.82 Ecological balancing ponds – 15 ecological balancing ponds were surveyed by the MEL ecological consultants, who noted in their 2007 report that two would benefit from additional planting of marginal vegetation and that 2 require monitoring of changes in water levels and the subsequent effect on marginal vegetation.
- B.1.83 Wetland habitats – Other wetland habitats monitored included Hatherton Reservoir, where the MEL ecological consultants considered that management of invasive ruderal species would be

beneficial, Brownhills Road Pond, where the MEL ecological consultants considered that low water levels should be monitored and the pond at Slade Road where a hedgerow has failed due to high water levels.

- B.1.84 Wet woodland – In order to achieve the ES and PI commitment the location for the creation of compensation wet woodland was to be between ecological balancing pond 395 and Langley Brook. In the 2007 report this wet woodland is reported as having not established, although there is some planting around the north west corner and at the eastern end.
- B.1.85 New species rich grassland – Monitoring was undertaken at 5 locations for the 2007 report. The MEL ecological consultants considered that weed control was required at two locations where the species mix did not represent the intended acid grassland. At one location it was considered that monitoring of shading by trees/shrubs was required.
- B.1.86 Aquatic invertebrates – 12 sites were sampled for aquatic macro-invertebrates at Wash Brook, Laney Breen Brook and Gains Brook, as previous monitoring had shown that these sites were still suffering the effects of silt accumulation. 10 of the sites showed a return to or an improvement on, pre-construction values. Only two of the sites at Wash Brook showed a decrease compared to pre-construction values.
- B.1.87 Birds – No bird surveys were undertaken for the 2007 report.
- B.1.88 Terrestrial invertebrates – Monitoring at MSA receptor site and verges embankments adjacent to Chasewater Heaths SSSI was undertaken to determine the value of the sites as habitat for terrestrial invertebrates. The MEL ecological consultants considered that the management regimes at the sites should be changed to improve the habitat, and that the recommendations should be discussed with the Managing Agent and Lichfield District Council.
- B.1.89 White-clawed crayfish – the crayfish receptor site at Sandwell Country Park, Wyrley Brook, Walk Mill Clay Pit, Wyrley and Essington Canal and Crane Brook at Burntwood have all been monitored and the 2008 white clawed crayfish report noted that whilst the population at Walk Mill Clay Pit remains healthy, numbers have declined in the other locations. However, white clawed crayfish populations across the UK are suffering serious decline, largely due to crayfish plague and the presence of alien crayfish. The 2008 report does not include data on white-clawed crayfish in the newly created M6 Toll watercourses. The report concludes that further habitat enhancement measures may be appropriate to mitigate the decline in numbers, but that consultation should be undertaken with Natural England and the Environment Agency, as enhancement works are futile if alien crayfish are present within 50km in a connecting watercourse.
- B.1.90 Great crested newts – two populations of great crested newts were discovered in 2000. Mitigation measures including translocation undertaken as Advance Works and during construction. Monitoring on behalf of MEL was undertaken at Chasewater that confirmed the presence of a small but viable population to the south of the M6 Toll. As required by the Natural England licence issued for translocation of great crested newts, Pond 5A was significantly modified in order to provide a suitable habitat. The MEL ecological consultants noted in the 2007 report that the pond had not yet filled with water and that marginal planting had not been carried out. However, the site visit of July 2009 showed that the pond was full of water and that marginal vegetation had developed. No great crested newts were recorded during surveys in 2006/2008, although common frogs, common toads, sticklebacks and unidentified coarse fish were recorded. The presence of coarse fish (possibly introduced by anglers) has negated the benefit of the marginal planting and Pond 5a is considered to be of negligible value for great crested newts. The 2008/2009 great crested newt survey concludes that the success of the great crested newt mitigation operations to the north of the M6 Toll at Chasewater remains equivocal at best, largely due to the introduction of fish into Pond 5a. In order to meet the favourable conservation status of great crested newts (as per the licence requirements) the 2008/2009 report recommends that additional breeding habitat is created in the Chasewater area.

- B.1.91 Bats – 300 bat boxes erected as compensation mitigation for trees with potential for use by roosting and / or hibernating bats. 100 boxes were checked in February 2007. Two boxes in Round Wood, Four boxes at Pottal Pond, three boxes at Weeford Quarry and two boxes at Langley Mill were found to contain bats or evidence of use by bats. The 2007 report states that all 300 boxes will be monitored in 2013.
- B.1.92 Water voles – No water voles surveys were undertaken for the 2007 report. The 2007 report states that water voles will be monitored in 2013.
- B.1.93 Otters – Monitoring reveals signs of otter activity at one artificial holt (Ch. 53000, tributary to the River Blythe), but no conclusive signs were found at the other four artificial holts. No otter deaths on the M6 Toll have been recorded to date. The MEL ecological consultants noted that otters are clearly moving along the watercourses crossed by the M6 Toll, but it was difficult to confirm use of pipes and ledges. Recommendations for remedial works to fences were made to MEL in 2006 were still outstanding.
- B.1.94 Badgers – Two artificial setts were constructed, mammal underpasses provided and badger resistant fencing erected along the entire route. One artificial sett became disused and was destroyed in error during earthworks, the other shows signs of partial use, with no current occupants. Of the three retained larger setts two showed signs of use. With regard to mammal underpasses, which are used by badgers, there was no evidence so far that badgers are using them. 13 badger deaths were recorded by MEL from December 2003 to June 2009. Weaknesses in the badger fences have been notified to MEL and some remedial measures undertaken.
- B.1.95 Deer – signs of deer activity were recorded throughout the route corridor. Deer-resistant fencing is installed between Butts Lane and Ogle Hay Road and from the River Blythe to the southern end of the scheme. Four deer deaths were recorded by MEL from December 2003 to June 2009. Deer resistant fencing defects and remedial measures have been suggested to reduce the likelihood of deer gaining access to the motorway here. However, a higher fencing specification and removal of potential jumping off points which reduce the effective height of fences would be required to deter deer from crossing the M6 Toll. Monitoring is to continue and the need for additional fencing in the future is to be reviewed in consultation with the Highways Agency's specialist advisors.
- B.1.96 A Wildlife Mitigation Audit was carried out by the consultant ecologists to MEL in December 2006 and January 2007. This included an inspection of all otter ledges and mammal pipes and a review of the wildlife fencing. The main issues identified during the audit were largely the same as those found in 2004:
- In a number of locations, the otter/badger resistant fencing required repair or modification to ensure it is effective;
 - Crossings of drainage ditches are not otter/badger resistant;
 - Pedestrian gates and access gates to balancing ponds, and entry barriers to toll plazas are not otter/badger resistant;
 - The environmental noise fencing does not have buried mesh at the base to prevent animals burrowing beneath it;
 - The entrances to a number of mammal underpasses appear to hold water;
 - Otter ledges do not tie-in with the bank side profile; and
 - 'Funnel' effect to entrance pipes is not always effective.
- B.1.97 The ecological consultants' recommendations for appropriate remedial measures from 2004 were provided to MEL in the report dated February 2005. The report dated February 2006 noted that it is understood that these recommendations would be addressed during 2006 and that the most

critical of these would be re-inspected once the remedial works were complete. The MEL ecological consultants noted in the 2007 report that many recommended remedial works were still outstanding.

- B.1.98 The One Year after report noted that a five years post construction ecological monitoring report was due to be produced in 2008, which would evaluate the ecological trends post construction and include more detailed recommendations for ongoing management of the ecological mitigation measures. However, this report has not been undertaken,, although specific reports on hedgerow translocation, great crested newts and white clawed crayfish have been received.

Biodiversity – Key Findings

- Limited up to date information to fully evaluate biodiversity although based on what is available most impacts are likely to be as expected;
- White clawed crayfish populations have survived, but numbers have declined in common with the rest of the UK;
- A small but viable population of great crested newts remains present to the south of the M6 Toll, but none were present to the north. Further mitigation works are needed to meet the requirements of the great crested newt licence;
- Creation of an area of wet woodland was an ES requirement that has not established as expected;
- Recommended remedial works to otter fences have not been undertaken;
- Monitoring of 5 species-rich grassland sites indicated that remedial works were required at 3 sites;
- The hedgerow translocation was largely unsuccessful. Following the failure of most of the trees and shrubs in the translocated hedgerows, a more rigorous analysis of the benefits of the procedure should be undertaken at future sites; and
- The information provided regarding ongoing monitoring and maintenance of the ecological mitigation measures indicates that the commitment to undertake some monitoring is being fulfilled, however, based on the information available some remedial and management works appear to remain outstanding.

Water Environment

- B.1.99 The one year after report suggested further study as part of the five years after evaluation with regard to water quality.
- B.1.100 The Environment Agency was contacted at the one year after stage and stated that it was unlikely to sample to ascertain chronic impact on water quality and was under the impression that post construction sampling would be carried out by the Highways Agency or its contractors.

Predicted Impacts

- B.1.101 The ES predicted the following impacts:
- Risk of flooding;
 - Risk of pollution to ground water, watercourses and sensitive sites;
 - Effects on water supplies from superficial and deep ground water; and
 - Effects on wetland habitats of conservation value.

Approved Scheme

- B.1.102 The approved scheme included the following objectives:
- Not to affect to any significant degree the water balance or water quality of sites of conservation importance at any stage;
 - Not to affect any other water course or water body to a degree likely to cause significant permanent deterioration in its quality classification, as defined by the National Rivers Authority;
 - Not to affect the availability, flows, levels or quality of ground water in areas where such waters are used for public or for private water supply, or are important for the existence of features of conservation value; and
 - Not to increase significantly the risk of flooding by altering or replacing existing water courses and their flows.
- B.1.103 The approved scheme included the following mitigation proposals:
- Broad road design adjustments to avoid sensitive sites, reduce depth of cuttings to avoid affecting superficial surface water adversely by draw-down due to drainage into cuttings, and relocation of drainage outfalls to avoid sensitive sites;
 - Control devices would be included as part of the overall drainage design including silt traps, wet balancing ponds, accidental spillage tanks, downstream channel works, interceptor tanks; and
 - Replacement of water supplies – only to be undertaken if the relevant effects after construction were proven.

Modification to Scheme

- B.1.104 Not aware of any modifications to the scheme.

Consultation Comments

- B.1.105 Cannock Chase District Council responded to the consultation and stated that there are no known water related issues in connection with the scheme.
- B.1.106 North Warwickshire Borough Council responded to the consultation and stated that it was not aware of any effect on the water environment.

Key Findings

- B.1.107 Water mitigation measures including balancing ponds and pollution control facilities have been provided in line with expectations as an integral part of the scheme and no consultation comments have been received which would indicate that the facilities are performing other than as intended. The ES mitigation included marginal vegetation which when established would provide a filter bed and balancing ponds were designed to have an ecological function as wildlife habitats. At the pond at Wishaw visited for the July 2009 site visit marginal vegetation was establishing satisfactorily as illustrated in Figures C.23 and C.24.
- B.1.108 Post construction monitoring was identified in the ES Section 2.13 Maintenance and Management. MEL has confirmed that routine inspection of pollution control measures is undertaken monthly, including inspection of pen-stocks, observation of silting and unusual weed growth. Maintenance of pen-stocks is carried out every 6 months. Reactive measures for spillage containment are carried out as necessary. Monitoring of water quality at sewage outfalls from the Toll Stations and MSA is carried out by the Environment Agency on behalf of MEL.



Figure B.23 – Balancing Pond near Wishaw (1 Year After)



Figure B.24 – Balancing Pond near Wishaw (5 Years After)

Water – Key Findings

There is no evidence to suggest that the scheme has performed other than as expected.

Key Points – Environment

- Environmental impacts are considered to be generally as expected;
- Air quality – Based on lower observed traffic flows on the M6 Toll compared to ES forecasts, it is likely that air quality impacts are lower than expected. Traffic data is not available to evaluate the impact of the M6 Toll on adjacent local roads, but 3 consultees found issues with air quality on local roads because traffic had not decreased as expected;
- Noise – by July 2009, 6,975 Part 1 Claims had been successful and one of the main reasons given was noise. However, observed traffic flows in 2009 are still lower than forecast and it is considered likely that the local noise climate is better than expected for properties close to the road corridor. Although not included in the ES a low noise surface was proposed and implemented as an additional measure by MEL to help reduce noise impacts;
- Greenhouse gas emissions – Not considered in the ES and there is insufficient data to evaluate in this study;
- Landscape – Planting is largely establishing well, although there are some gaps / less well established areas and some specialised areas such as wet woodland, species-rich grassland and marginal pond planting have not developed as expected. 2 consultees considered that adequate maintenance had not been carried out. Lighting impacts have been reduced by the use of downward directed lighting;
- Biodiversity – limited up to date information available to fully evaluate although most impacts are likely to be as expected. Based on the information available some remedial and management works remain outstanding, particularly to otter fencing, and management of ecological ponds, establishment of wet woodland and species rich grassland. Further mitigation measures needed to meet requirements of great crested newt licence. The hedgerow translocation was largely unsuccessful, and the value of hedgerow translocation in future schemes should be assessed particularly where it is identified that suitable donor sites are not available;
- Heritage – Archaeology report has now been provided to the relevant County Archaeologists. Important archaeological findings were produced, but the archaeological potential of the area may not have been realised. The recording methodology was based on old data and ; and
- Water – Based on the information available it is likely that the impacts on the water are as expected.