Client **A6MARR Client Board**

Project **A6MARR (A6 to Manchester Airport) Relief Road**

Subject **HFAS Report 1800: A6MARR Local Model Validation Report**

This Report describes the production and validation of the 2009 A6MARR (A6 to Manchester Airport) Relief Road SATURN Model. The model validation follows guidelines in the Design Manual for Roads and Bridges (DMRB) issued by the Department for Transport (DfT).
The Report describes the development of the highway networks and trip matrices, and presents the results of the link flow and journey time validation.

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Executive Summary

Overview

1. In Autumn 2008, the Government announced it would contribute up to £165m towards the cost of the A6 to Manchester Airport phase of the A6MARR Relief Road, if that sum were matched with local contributions, and subject to a satisfactory business case submission.

2. In 2009, the then Greater Manchester Transportation Unit (GMTU) was commissioned to build a SATURN model (A6MARR 7B) to provide traffic forecasts to inform the development of the business case for the scheme. The SATURN model represents traffic movements by road, and it forms part of a modelling system that also includes a travel demand model (A6MARR VDM) that is being developed by the consultant MVA.

3. In Spring 2011, TfGM HFAS was asked by the A6MARR Project Board to undertake additional data collection (origin-destination surveys and counts) in the east of the A6MARR Area of Influence (AOI) and revalidate/calibrate the highway and variable demand models (the updated highway model becoming A6MARR).

4. The SATURN model will have two main roles:

   - It will provide traffic forecasts for studies focusing on the road network ; and
   - It will provide the road network that the VDM needs to model travel demand. In turn the VDM model will generate inputs, in particular forecast year trip matrices, for the SATURN model.

5. In line with standard practice, the extent to which the model reproduces conditions in the base year (the validation) was assessed against guidelines in the Design Manual for Roads and Bridges (DMRB) issued by the Department for Transport (DfT). This involved comparing modelled and observed link flows on cordons and screenlines within the study area, and journey times on a selection of routes.

Zoning

6. The zoning system for the A6MARR SATURN Model was derived from that established for the GM-SATURN model. It is based on local authority wards in order to facilitate the compilation of input data, such as population and employment totals, and provide a well-understood framework for summarising and reporting model outputs (local authorities and local authority wards, as at 2001, were used as the basic area building blocks). The model incorporates 1097 zones allowing a realistic and detailed representation of the actual origins and destinations of trips and traffic within the area likely to be affected by the proposed scheme i.e. the A6MARR Area of Influence.

7. The zoning is most detailed within the A6MARR AOI and within the rest of Greater Manchester. Zones just outside these areas are somewhat larger than those within, and the zones further away from Greater Manchester are larger still.

Network Build

8. An Area of Influence of the proposed scheme has been defined which encompasses an area bounded (approximately) by the M60 to the north of Stockport, the A6/A523 to the east, the A537 to the south and the A34 to the west. Within this area the SATURN network is coded in full simulation format that means that delays occurring at junctions are explicitly modelled. This level of coding also applies to the remainder of Greater Manchester. Beyond the AOI and Greater Manchester the network is coded in SATURN buffer format that uses link based flow-delay curves to estimate link speeds and consequently junction delays are not explicitly modelled in this part of the network.

9. The information required for simulation coding is detailed including, for example, link length and cruising speed, permitted movements, saturation flows, lane usage, signals staging, timings and offsets. Initial coding was taken from GM-SATURN and a local SATURN model developed earlier for A6MARR (by Mott MacDonald). This was updated and enhanced as required within the A6MARR AOI. Details of traffic signals (layouts and timings) were obtained from the Greater Manchester Urban Traffic Control Unit (GMUTC) and Cheshire East Council. Bus routes and frequencies were obtained from the then TfGM Northwest Journey Planner and timetables. All other information was obtained from aerial photography (undertaken in 2009), site visits and Ordnance Survey mapping.

10. The buffer network outside Greater Manchester was built using the Ordnance Survey Meridian network as a basis.

11. As part of the update from A6MARR 7B to A6MARR a comprehensive network audit was undertaken focussing particularly on the key areas along the A6 corridor and Manchester Airport. The audit was informed by site visits and detailed inspection of recent aerial photography.

Matrix Build

12. The initial ('prior') trip matrices for the A6MARR7C SATURN Model were built using information from the 2001 National Census for journeys to and from work. For other purposes data was taken from roadside interview surveys undertaken for A6MARR in October 2009, supplemented by other RIS undertaken since the completion of the final section of the M60 Manchester Outer Ring Road in October 2000. Other elements of the matrices were taken either from synthetic matrices developed by MVA.

13. The A6MARR RSI data was collected at 46 sites on screenlines or cordons near the proposed scheme in October 2009. The other roadside interview data was collected in phases over the period June 2001 to April 2004, with interviews being conducted with drivers of private vehicles crossing a series of cordons and screenlines within the Greater Manchester.

14. In June 2011, additional roadside interview data was collected at 5 sites, forming a cordon in the study area, to intercept movements to and from Stockport (south of M60), Hazel Grove, High Lane and Poynton. To complete the cordon A6MARR RSI data was supplemented with information from 11 sites that were surveyed previously.

15. Trip matrices were built for car, Light Goods Vehicle (LGV) and Other Goods Vehicle (OGV) trips for three time periods for a 2009 October average weekday, which is assumed to represent a neutral month, avoiding holidays and unusual traffic periods. In scheme appraisal it is intended

that 3 car user classes will be assigned, namely employer's business and journeys to work (i.e., commute) plus other car trips. LGVs and OGVs will each have a separate user class, to give five user classes.

16. Separate matrices were built for the AM peak hour (08:00-09:00), an average inter-peak hour ((09:30-16:00)/6.5) and the PM peak hour (17:00-18:00).

Matrix Estimation

17. Initial assignment validation statistics for a prior matrix assignment indicated that the validation fell short of the DMRB guidelines. Matrix estimation was therefore used to enhance the prior trip matrices and improve the match between observed and modelled flows.

18. Traffic counts for both assignment validation and matrix estimation were drawn from HFAS's count database and from data held by Cheshire East Council and Manchester Airport. The counts considered were mainly post-January 2008, excluding those affected by known 'special' events (e.g., accidents, road works and holidays). To provide reassurance of the validation outside the A6MARR Area of Influence counts on screenlines and cordons throughout Greater Manchester were included. Overall, some 916 counts were selected for matrix estimation and validation purposes of which 834 were used in the matrix estimation runs across Greater Manchester. In the A6MARR Area of Influence a total of 215 counts were used in matrix estimation and 82 were used to provide an "independent" (of ME) check on the calibrated model. The counts were factored to 2009 average October weekday values using locally developed factors.

19. A number of matrix estimation strategies were explored, using different combinations of counts and parameter values. The final matrix estimation strategy changed the size of the individual vehicle (pcu) matrices by between –2.9% and -0.6%. Changes of this magnitude were considered acceptable.

Convergence

20. The DMRB criteria for an acceptable level of convergence are that:

- Delta should be less than 1% on the final assignment
- More than 90% of links should have a flow that changes by less than 5% on the final 4 iterations.

21. The A6MARR model was well converged in all time periods, with Delta values well below 1% and the percentage of links with flows changing by less than 2% approximately 99% or greater in all periods.

Assignment Validation

22. To provide reassurance that the validation of the base year model was acceptable over a wider area counts on cordons and screenlines across Greater Manchester were included in the validation process. For the purposes of this report only cordons and screenlines within the A6MARR Area of Influence have been reported but results for other cordons and screenlines within Greater Manchester are available on request from HFAS.

23. The SATURN model has been built to evaluate the A6MARR Relief Road. The model has therefore been validated by comparing modelled link flows and journey times with observed data across the A6MARR Area of Influence, for the 2009 base year.

24. In total, 16 cordons and screenlines were formed for the link flow validation within the AOI, whilst journey times were compared on 21 (two-way) routes covering key radials and orbitals crossing or parallel to the proposed scheme.

25. Of the 16 cordons and screenlines, 15 were made up of counts used in matrix estimation, while 1 was kept aside to act as an independent validation check along the A34 corridor.

26. In the AM peak, PM peak and inter-peak hours the percentages of all motorway and local road sites across Greater Manchester used in ME which met DMRB validation criteria were 88%, 92% and 89% respectively.

27. In the A6MARR Area of Influence, the AM peak, PM peak and inter-peak hours the percentages of all motorway and local road sites used in ME which met DMRB validation criteria were 92%, 95% and 93% respectively.

28. For Independent counts as a whole (the A34 screenline counts plus ad hoc counts), the percentage with GEH > 5.0 was 71%, 80% and 73% in AM peak, PM peak and the inter-peak hours respectively.

Assignment Validation On Cordons and Screenlines

29. DMRB suggests that for screenlines and cordons 85% should have a GEH value of 4 or less.

30. Considering the 15 ME cordon and screenlines within the A6MARR Area of Influence together, the percentage with GEH values less than 4 is 69% in the AM peak, 94% in the inter-peak and 78% in the PM peak.

31. On the independent A34 screenline, GEH values ranged from 0.3 to 8.5 depending on direction and time period.

Regression Analysis

32. The slopes of the regression lines and the R-squared values are within the guideline ranges specified in the DMRB for all time periods.

Journey Time Validation

33. The primary source of journey time data for this validation was the TrafficMaster database.

34. The DMRB guideline for journey time validation is that modelled times should be within 15% (or 1 minute if this is higher) of the observed time on more than 85% of routes.

35. The percentages of routes within 15% of the observed time ranges are 93%, 98% and 93% in the AM peak hour, inter-peak hour and PM peak hour respectively. The AM Peak, inter-peak and PM peak hours therefore comfortably meet DMRB criteria.

Conclusions

36. The model is well converged in all three modelled time periods and the modelled traffic volumes are therefore very stable.

37. The results presented in this report indicate that there is a good match between modelled and observed flows, in the critical area in all time periods.

38. The validation of modelled against observed journey times meets DMRB criteria in all of the periods.

39. Overall we consider that the model provides a sound basis for forecasting the effects of the proposed A6MARR (A6 to Manchester Airport Relief Road).

1. Introduction

The Report

1.1 This report describes the development of the 2009 A6MARR SATURN model and presents the results of the link flow and journey time validation using the criteria set out in the Design Manual for Roads and Bridges (DMRB, Reference 1).

1.2 The report has nine main sections:

Section 1 - Introduction and scheme background

Section 2 - Model background

Section 3 - Model zoning

Section 4 - Development of the 2009 (model) highway networks

Section 5 - Production of the prior trip matrices

Section 6 - Matrix estimation to enhance prior matrices and improve the fit between modelled and observed flows

Section 7 - Traffic flow validation results

Section 8 - Journey time validation results

Section 9 - Conclusions.

1.3 Further details of the validation are contained in the Appendices, including prior and estimated matrix comparisons by sector, and link flow validation results by vehicle type.

A6MARR Scheme Background

1.4 The Government Transport Policy review in the late 1990s included consideration of the trunk road building programme; culminating in the "*New Deal for Trunk Roads in England"* report. The report recommended that the trunk road network, which is the responsibility of the Highways Agency (HA), should be greatly reduced. In the south east Greater Manchester, the A6 and A523 were recommended for de-trunking.

1.5 The "*New Deal"* also recommended that future road schemes associated with detrunked routes be withdrawn from the road building programme, as they were no longer a HA responsibility. In south east Greater Manchester (GM) such schemes were:

- A6 (M) Stockport North-South Bypass (including the Stepping Hill Link)
- A523 / A555 Poynton Bypass
- A555 Manchester Airport Eastern Link Road (MAELR)
- A555 Manchester Airport Link Road West (MALRW).

1.6 The schemes have been identified in plans dating to the 1930's and various residential and employment developments in the area have been predicated on their delivery. All three corridors are protected in respective local authority strategic plans. Progress included agreed preferred routes and, following a Public Inquiry in 1988, appropriate procedures for the A6 (M).

1.7 The central section of the A555 MAELR was constructed as part of a local authority A34 bypass scheme, with HA and developer contributions, and assuming that the remaining route would be built shortly afterwards; the HA having presented strong supporting evidence.

1.8 The final relevant recommendation of the *New Deal* was that a multi modal study should be conducted across south east Manchester to consider existing transport problems and develop a long-term (20-year) strategy for addressing them; the South East Manchester Multi Modal Study (A6MARR) was commissioned and managed by the Government Office for the North West (GONW), which created a Steering Group (including relevant local authorities and transport organisations) and a wider reference group (to reflect local interests). Consultants were appointed to undertake the study, which began in January 2000 and completed in September 2001 when a final report, including a recommended strategy, was published.

1.9 Within multimodal study process, the package of recommendations was assessed using the GOMMMS methodology and the potential options were assessed against the Strategy objectives before recommendations were made. The local authorities, AGMA, the North West Regional Bodies and the Government, supported the strategy. A number of public consultations were also held during the process, to identify issues. A final consultation on the proposed strategy showed it had strong public support

The Original A6MARR Relief Road Scheme

1.10 The wider A6MARR strategy included the concept for a Relief Road, comprising 21.5 kilometres of new road from M60 Junction 25 to M56 Junction 5, of dual carriageway standard and with two single carriageway link roads – the Stepping Hill Link and Poynton Bypass. The central 3.9 kilometres of the A6MARR relief road has already been constructed as part of the A555 and A34 bypass scheme.

1.11 Three local authorities, Stockport, Manchester City Council and Cheshire (now Cheshire East) jointly produced a Major Scheme Business Case bid for funding the A6MARR New Relief Road, which was formally submitted to the DfT in July 2004. Over the next few years, further information was submitted to the DfT, including an investigation into the possibility of Private Finance Initiative (PFI) funding.

1.12 In July 2007 the DfT's considered response stated that the Relief Road scheme provided value for money, but limited funding capabilities meant it could not funded as a single scheme, so consideration should be given to phased delivery. Three potential phases of the scheme were identified by the local authorities, and were submitted to the DfT for consideration in 2007/ 08:

- M60 to the A6, including the Stepping Hill Link
- A6 to Manchester Airport with Poynton Bypass
- A6 to Manchester Airport without Poynton Bypass (A6MARR A6 to Manchester Airport Relief Road).

1.13 Local Authority officers examined the key policy drivers and transport problems in the area and decided that the A6 to Manchester Airport section was the priority scheme due to the potential economic impact on Manchester Airport (and therefore the City Region) of delaying access improvements, which in turn could constrain future growth.

1.14 Following the Eddington (Access to International Gateways) study, which highlighted transport's pivotal role in supporting the future economic success of the UK, reforms of the planning, funding and delivery of transport interventions were recommended. The study recognised the need to maximise sustainable returns from investment, whilst improving the environmental performance of transport.

1.15 Eddington also recognised the importance of connecting inter-regional routes as part of the network. This role is played by the A6, A523 and A34, linking Greater Manchester with Cheshire, Derbyshire and Staffordshire. Eddington considered a number of road schemes including the A6MARR Relief Road and recognised that it provided good value for money. Application of the Eddington criterion for Benefit Cost Ratios (BCR) raised the A6MARR Relief Road BCR slightly to 5.6.

The A6 to Manchester Airport Relief Road Scheme

1.16 In Autumn 2008, the Government announced it would contribute up to £165m towards the cost of the A6 to Manchester Airport phase of the scheme (without the Poynton Bypass), if that were matched with local contributions, and subject to a satisfactory business case submission. The scheme cost was estimated at £330m. This phase of the original A6MARR Relief Road is the scheme proposed in this document, known as the A6MARR A6 to Manchester Airport Relief Road.

1.17 In May 2009 the Leaders of the Association of Greater Manchester Authorities (AGMA) agreed to create a Greater Manchester transport fund of over £1.5 billion to fund key projects, including a contribution of £125m towards the A6MARR A6 to Manchester Airport Relief Road. Local Authority officers had indicated that, following a review, £290m would be sufficient to build this scheme. The Region accepted the AGMA approach and incorporated this within its response to the Regional Funding Allocation 2 (RFA2) process.

1.18 In July 2009 the Government responded to the RFA2 consultation saying "*We welcome AGMA's allocation of £125m from the Transport Fund for a new road link between Manchester Airport and the A6 to the east. This represents a very positive response to the Department's offer to provide up to £165m for this scheme if a local contribution was forthcoming to meet the balance of costs and will now allow preparation work to move ahead"*.

1.19 In March 2011 the Government named Manchester Airport as one of the new 'enterprise zones', the development known as Airport City will benefit from business rate discounts, simplified planning and access to superfast broadband. As a result of this the airport section (west of Shadowmoss Road) will be implemented prior to A6MARR and is therefore included as a committed scheme.

A6MARR Strategy Objectives

1.20 The A6MARR strategy was developed and accepted in 2000/01. The original strategy was developed on a 20-year timescale to deal with the existing and predicted transport problems in the area.

1.21 Five core objectives were adopted in the strategy:

- The promotion of environmentally sustainable economic growth;
- The promotion of urban regeneration;
- The improvement of amenity, safety, and health;
- The enhancement of the regional centre, town centres and local and village centres and the Airport; and
- The encouragement of the community and cultural life of the neighbourhood and of social inclusion.

1.22 The five core objectives have clear linkages to transport issues that were identified within a series of defined sub-objectives. These were broken down into five priority themes:

- **Improvements to public transport** to promote sustainable economic growth, the improvement of neighbourhood community and cultural life, and the encouragement of social inclusion;
- **Making better use of existing road space** through the reallocation among transport users, to form part of the broader promotion of urban regeneration and improved amenity, safety and health;
- The encouragement and facilitation of **behavioural change** to enable people to reassess their transport needs and promote sustainable modes of transport. This element of the strategy had a wide-ranging focus, looking beyond immediate transport issues to examine the needs of schools and businesses and helping them to understand how they could benefit from a change in travel mind-set.
- The **promotion of urban regeneration**, to improve the streetscape and public realm, and address the impacts
- The development of the package of **complementary highway works**, in particular the major highway schemes identified in the A6MARR strategy, was addressed fully in direct discussions between the DfT and the three authorities (Cheshire County Council, Manchester City Council, and Stockport Metropolitan Borough Council) charged by the Secretary of State with the development of the schemes. Other highway works included the longer-term objective of reducing the impacts of freight traffic on the A6MARR area, through appropriate freight route designation and the promotion of alternative modes (e.g. rail).

Specific objectives for the A6 to Manchester Airport Relief Road scheme

1.23 Whilst transport policy has moved on since the A6MARR strategy was developed, the underlying objectives and principles remain equally valid today as in 2001. The findings from Eddington and Stern strengthen the case as presented in the A6MARR strategy, with its emphasis on sustainable economic growth, regeneration of deprived areas, reduced environmental degradation, and general improved quality of life – all of which are captured within the current 'DaSTS' way of

thinking. Sustainable transport and behavioural change – both of which were integral to the A6MARR strategy – are seen as key tools in addressing current transport challenges.

1.24 Nevertheless, there are changes required to ensure that the objectives remain directly relevant to the current policy goals; most notably, the need to take explicit account of carbon emissions, and emphasise the importance of Manchester Airport as an international gateway and potential hub of economic development and regeneration in its own right.

1.25 Whilst the objectives for A6MARR A6 to Manchester Airport Relief Road have been primarily developed around the existing problems, it is important to note that this scheme is considered an integral part of the overall A6MARR strategy. Just as important is the demonstration that the objectives of the current scheme closely mirror those of the original A6MARR Relief Road scheme. With these issues in mind, the A6 to Manchester Airport Relief Road Scheme objectives are set out below:

- Promote sustainable economic development through the provision of efficient surface access to, from and between Manchester Airport, the Airport Enterprise Zone and the local, town and district centres and employment sites
- Reduce the productivity losses to business, and provide an improved route for freight, by limiting the conflict between local and strategic traffic
- Reduce the impact of traffic congestion on local air and noise pollution
- Regenerate the local communities and encourage community, cultural and social inclusion through reduced severance and improved accessibility to, from and between key centres of economic and social activity

Description of New Relief Road

1.26 The improved A6MARR A6 to Manchester Airport Relief Road scheme includes a new 2-lane dual carriageway connecting the A6 to Manchester Airport. The scheme bypasses Bramhall, Cheadle Hulme, Hazel Grove, Handforth, Poynton and Wythenshawe District Centres and Gatley and Heald Green Local Centres.

1.27 The scheme improves access to / from Manchester Airport and its employment areas as well as Hazel Grove, Newby Road, Bramhall Moor Lane, Poynton and Stanley Green employment areas. Access to a number of regeneration areas is also improved by the scheme, including Stockport Town Centre M60 Gateway, and Wythenshawe.

1.28 The scheme will provide a high quality route for freight vehicles to access the trunk road network (i.e. M56) and Manchester Airport from the southeast Manchester and Cheshire/Derbyshire area, and as an alternative route to using existing residential streets.

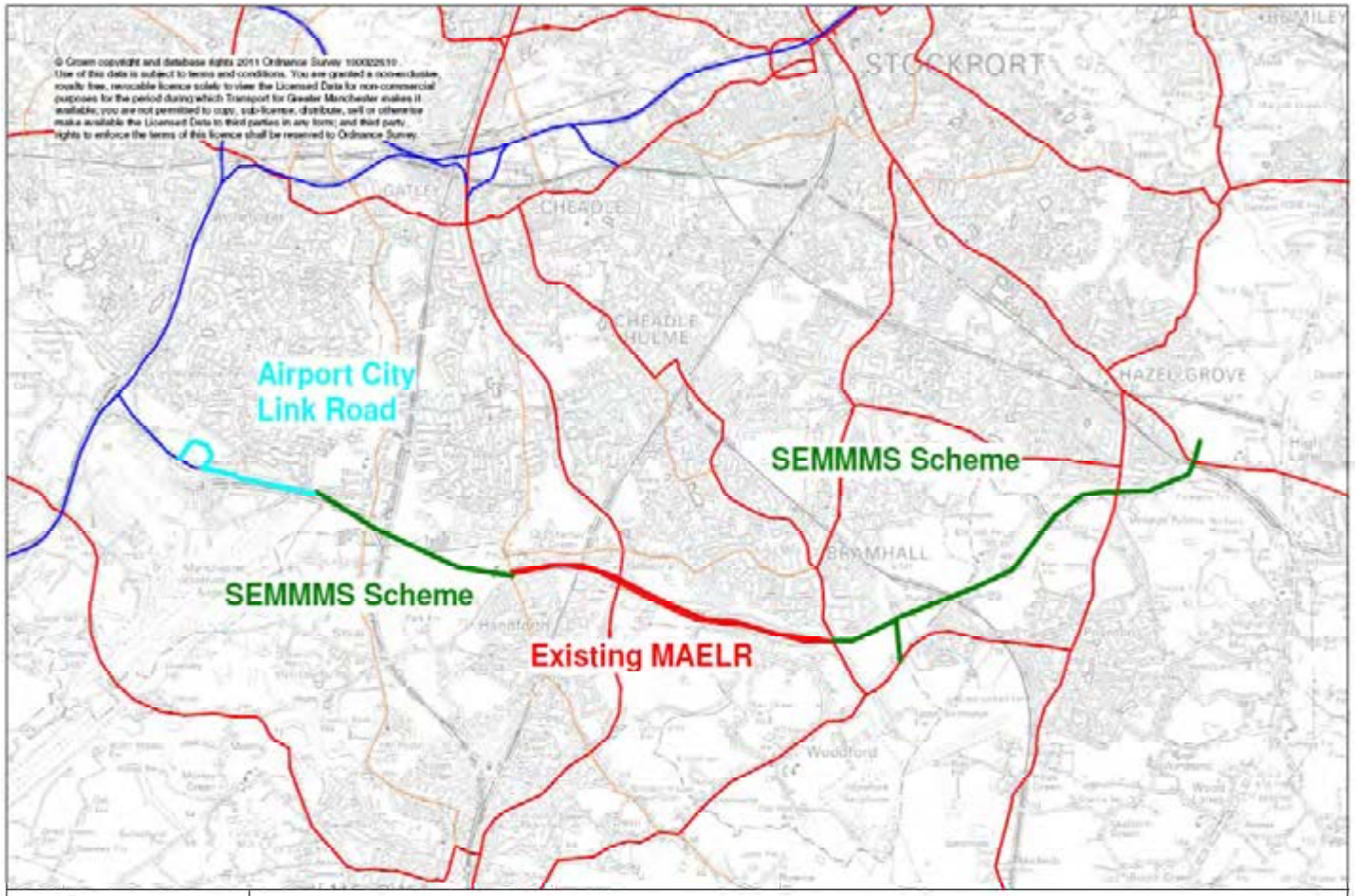
1.29 The proposed scheme consists of approximately 10km of new dual 2-lane and will include seven new junctions. It also incorporates approximately a further 4km of existing A555 dual carriageway to the south of Bramhall.

1.30 The location and extent of the scheme is shown in Figure 1.1.

1.31 The scheme includes three railway crossings including the West Coast Main Line. The scheme also includes provision of a cycle/pedestrian route adjacent to the carriageway, providing a new orbital link for the Strategic Cycle /Pedestrian Network.

1.32 The scheme has been designed to Department for Transport standards and adheres to the Design Manual for Roads and Bridges (DMRB). Any departures from approved standards will be authorised by the Director of the Overseeing Organisation.

1.33 A package of complementary and mitigation measures will ensure that the benefits of the scheme are locked into the surrounding transport corridor by reallocating road space to more sustainable forms of transport, traffic management and improvements to the public realm.



Transport for Greater Manchester 2 Piccadilly Place, Manchester, M1 3BG	SEMMMS (A6 to Manchester Airport) Relief Road - Location			
	Drawn By : Michael Reese	Scale : NTS	October 2011	Figure 1.1

2. Modelling Background

Overview

2.1 The A6MARR SATURN model has been developed from the Greater Manchester SATURN Model (GM-SATURN). GM-SATURN was originally built in Summer 2006 as part of a suite of inter-connected models to support the Greater Manchester Transport Innovation Fund (TIF) bid. These models comprised:

- The Greater Manchester Strategy Planning Model, (GMSPM2), which was developed by MVA and the David Symonds Consultancy, and which provides forecast year travel demand matrices for the GMPT and SATURN models
- The Greater Manchester Public Transport model, (SPM2-PT), which was developed by MVA and TfGM, and which provides PT travel cost data for input to the GMSPM
- The Greater Manchester SATURN Model, (GM-SATURN), which was developed by HFAS and MVA, and which provides highway travel costs for input to the GMSPM and link speeds for input to the SPM2-PT model.

2.2 The GM-SATURN model was validated for TIF to a base year of 2005.

2.3 In addition to its role as a detailed traffic assignment model for the GMSPM2, GM-SATURN has also provided a starting point for the development of local traffic models for use in major scheme appraisals within Greater Manchester, and a source of traffic speed and flow data for input to the Atmospheric Emissions Inventory for Greater Manchester (EMIGMA).

2.4 Geographically, the A6MARR model is focussed on the area surrounding the proposed scheme – namely Stockport, South Manchester (including Manchester Airport) and Cheshire East, (principally Wilmslow, Alderley Edge and Poynton) and an extension to cover the Bollington, New Mills, Disley and Whaley Bridge. It uses the GM-SATURN model area in full, but with the addition of a significant area of additional simulation network covering the northern part of Cheshire East. The model also incorporates a representation of the rest of Great Britain, albeit in less detail with increasing distance from the A6MARR area.

2.5 Separate versions of the A6MARR7C SATURN model have been built for the morning peak hour 0800-0900, the evening peak hour 1700-1800 and an average inter-peak hour for the time 09:30-16:00.

A6MARR SATURN Model

2.6 The A6MARR SATURN model has two main components comprising:

- The highway networks, which represent the roads and junctions used by traffic and bus services
- The trip matrices, which represent the demand for travel and the flow of vehicles between the zones in the model.

2.7 There are, however, a number of subsidiary files associated with the model, including:

- A 'KNOBS' data file, which contains additional data items for network links, such as the road class and number and the locations of zebra crossings
- A node-zone file, which is used for count-based validation, and gives details of the traffic zone in which each node lies
- A GIS file, used by SATURN to display links as curves rather than straight lines
- Inter-peak and PM peak 'X-files', to store supplementary link and turn data for the inter-peak and PM peak networks
- MapInfo node and link tables, to allow the network to be viewed in MapInfo.

2.8 Details of the highway networks and trip matrices are given below.

Highway Networks

2.9 The highway networks that are used with the model represent all roads of traffic carrying significance within the area through which the proposed scheme will run - Stockport, South Manchester and the north of Cheshire East - and the remainder of Greater Manchester, including all motorways, A-roads and B-roads. The networks also include all of the yellow coloured roads on the Ordnance Survey's Landranger maps of the area, and all roads carrying known bus services. The network outside the county is represented in much less detail, and becomes increasingly less dense with increasing distance from the county boundary.

2.10 The entire network within Greater Manchester and the northern part of Cheshire East and High Peak are coded in full SATURN simulation format, allowing the interaction of traffic at junctions and the resulting delays and queues to be accurately modelled. Outside of this area, the network is coded in SATURN buffer format, so that junction delays and queues are not explicitly modelled in this part of the network.

2.11 The information required for the simulation coding is much more detailed than buffer coding and includes, for example, the link length and cruise speed, the permitted movements at junctions, saturation flows and lane usage (including locations of bus lanes), details of traffic signals and settings, including stages, cycle times, green splits, inter-greens and off-sets. Details of traffic signal settings are obtained from information supplied by the Greater Manchester Urban Traffic Control Unit (GMUTC).

2.12 Buses are represented in the model as fixed loads, with routes defined as chains of nodes in the simulation and buffer networks.

Trip Matrices

2.13 The A6MARR trip matrices contain representations of all vehicle trips with an origin or destination inside the A6MARR area and the remainder of Greater Manchester, and all external-to-external trips that cross the county boundary. The matrices do not, however, represent intra-zonal trips that take place entirely within the same zone.

2.14 Separate matrices are maintained for car, Light Goods Vehicle (LGV) and Other Goods Vehicle (OGV) trips, for the morning peak hour (0800-0900), the evening peak hour (1700-1800) and an average inter-peak hour for the period 1000-1530.

2.15 For cars, matrices are available for 12 journey purposes comprising (see Chapter 5 for details). For assignment purposes, however, the matrices are aggregated to form 5 'user classes', comprising:

- Commuting cars (home-to-work plus work-to-home car trips)
- Employer's business cars (home-based plus non-home-based employer's business car trips)
- Other cars (all other car trips)
- LGVS (all purpose LGV trips)
- OGVS (all purpose OGV trips).

3. The A6MARR SATURN Model Zoning

Background to Model Zoning

3.1 The zoning system for the new A6MARR SATURN Model had to fulfil several requirements.

3.2 Firstly, the zoning system for the whole modelling system was based on local authority areas and, within these, wards (as of 2001).

3.3 This was done to:

- Facilitate the compilation of input data, such as population and employment totals
- Provide a well-understood framework for summarising and reporting model outputs.

3.4 Secondly, there was a need to represent the actual origins and destinations of trips and traffic within the area surrounding the proposed scheme realistically and in detail. This was facilitated by developments in the demand modelling incorporated within the A6MARR VDM that allowed more zones to be represented than in the "parent" GM-SATURN model. However, some caution was applied in defining zones to ensure that the usefulness of the model was not compromised by having so many zones that processing times became excessively long.

3.5 Finally, the focus of interest was the A6MARR area, and the zoning is therefore most detailed within this. The zones in that area are therefore smaller than or of a similar size to those in the remainder of Greater Manchester. Elsewhere, zone sizes increase with distance from the Greater Manchester boundary.

Derivation of A6MARR SATURN Model Zoning

3.6 The original GM-SATURN model contained 993 analysis zones of which 864 are within Greater Manchester. The original GM-SATURN model zoning is shown in Figure 3.1.

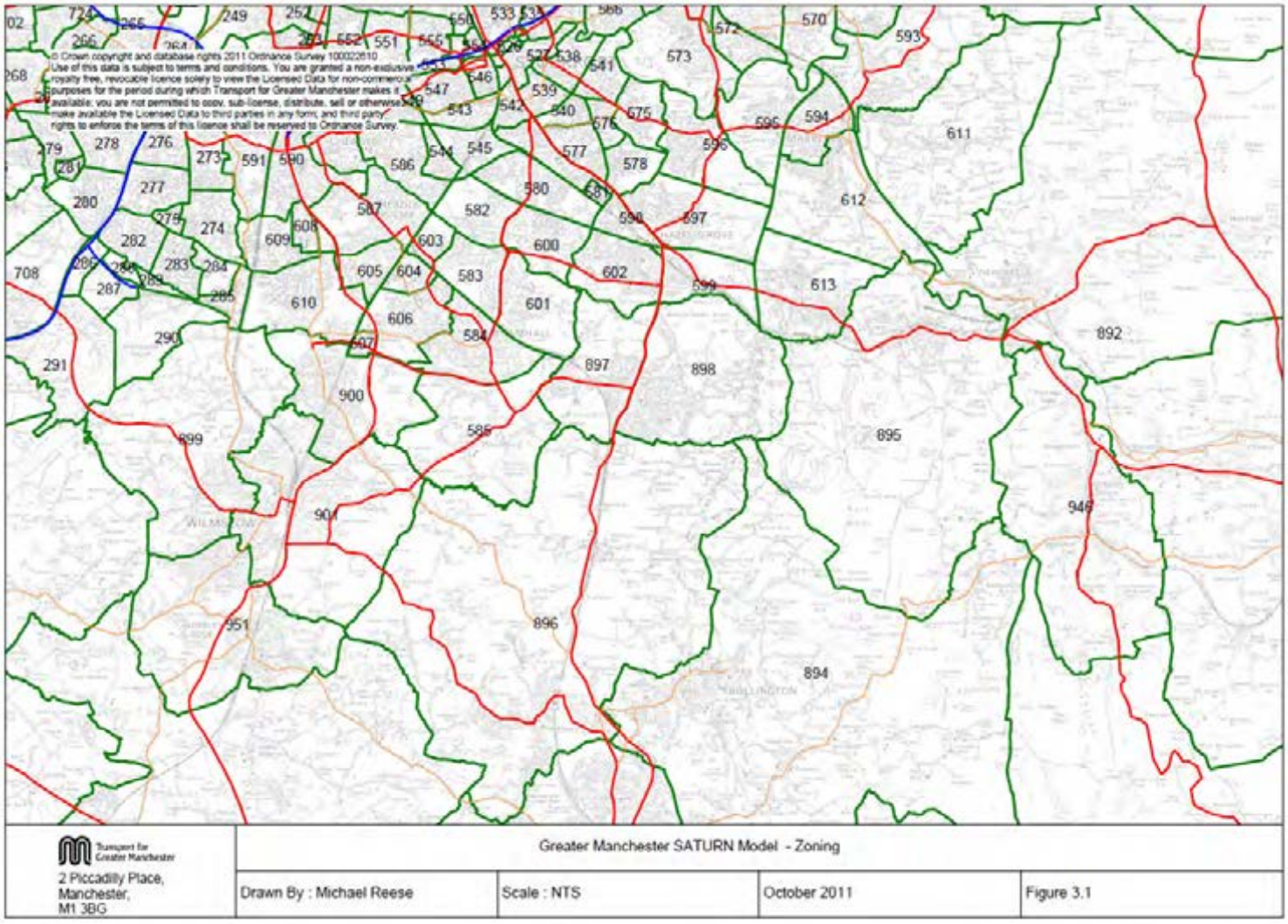
3.7 For the A6MARR SATURN model, zoning both within and outside the county was reviewed. Within Greater Manchester, GM-SATURN zones within Stockport, South Manchester and East Trafford were checked and existing zones were disaggregated to better represent key generators and future development sites.

3.8 The area surrounding Manchester Airport was looked at in detail and the zoning in that area was reworked based on local knowledge and with reference to several documents. The latter included 'Manchester Airport Masterplan' (reference 2), 'Manchester Airport Ground Transport Plan' (reference 3) and Manchester Airport: The Need for Land' (reference 4). Together, these outline Manchester Airport's future development proposals and parking requirements in some detail.

3.9 Outside Greater Manchester, in the original GM-SATURN model the zones in Cheshire East were significantly larger than those within GM. As a certain proportion of Cheshire East is now coded in simulation detail and is in close proximity to the proposed A6MARR scheme the zoning was reviewed and disaggregated.

3.10 In particular, the more built up areas around Wilmslow, Alderley Edge and Poynton required a more extensive rezoning to better reflect loading points on the network. As in Greater Manchester all zones in Cheshire East nest within ward boundaries.

3.11 The additional zoning within the Area of Influence and Cheshire has resulted in an increase in the number of zones in the A6MARR SATURN model to 1097 analysis zones. The revised zoning for the A6MARR7C SATURN model is shown in Figure 3.2.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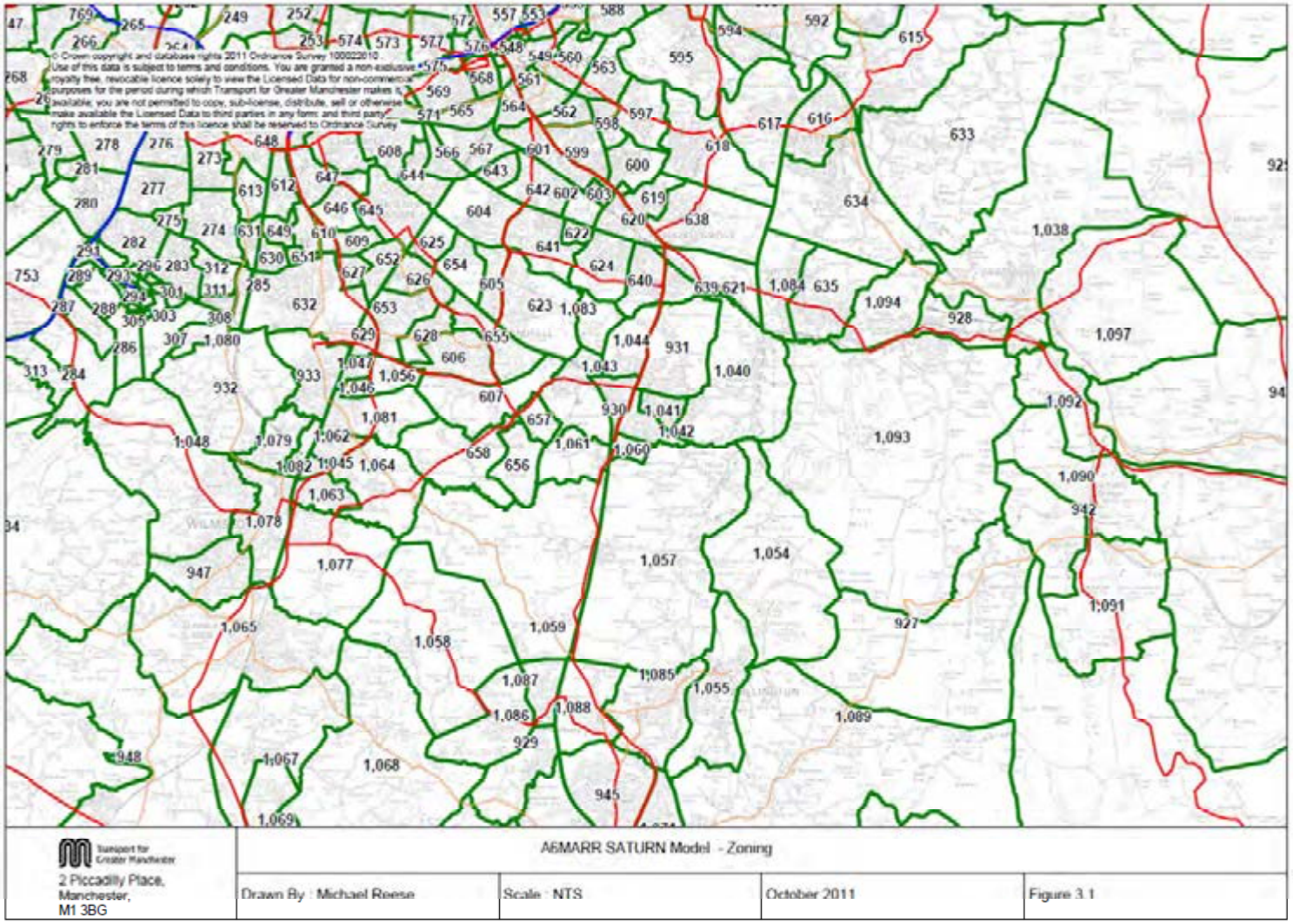
Transport for Greater Manchester
2 Piccadilly Place, Manchester, M1 3BG
Greater Manchester SATURN Model - Zoning
Drawn By : Michael Reese
Scale : NTS
October 2011
Figure 3.1


A6MARR SATURN Model - Zoning
Transport for Greater Manchester
2 Piccadilly Place, Manchester, M1 3BG
Drawn By : Michael Reese
Scale : NTS
October 2011
Figure 3.1

4. A6MARR SATURN Network Development

Overview

4.1 Within the A6MARR SATURN model, the A6MARR Area of Influence (see paragraph 4.11 on) is represented at detailed node-based 'simulation' level; roads represented include motorways, A/B-roads, and other roads of traffic significance.

4.2 The information required for simulation coding is detailed; it includes the following items for each link / turn:

- Link length and cruising speed, usually taken as the speed limit
- Permitted movements, and the saturation flows and priorities for each movement
- Lane usage and lane sharing
- Flare lengths and stacking capacity
- Gap acceptance for opposed movements
- For traffic signals, the staging, timings and offsets

4.3 The starting point for the A6MARR networks were 2009 GM-SATURN networks. These networks, in which the whole of Greater Manchester is in simulation detail, were developed from networks built in connection with the Regional Centre Transport Study (RCTS) in 2008 and which incorporated a number of enhancements from those originally created for the TIF work in 2005.

4.4 The GM-SATURN networks for 2009 were further enhanced to include all local traffic management schemes that HFAS were aware of that might affect network capacity (and consequently the routing and travel times of vehicles). These schemes were identified using information from a variety of sources including:

- Changes reported by Districts and HFAS staff
- Local knowledge
- Aerial photographs
- Discrepancies between the modelled and actual road system highlighted by the counts and accident validation procedures.

4.5 The 2009 networks also included major road schemes completed in recent years including:

- M60 Widening, Junctions 5-8
- A6193 Sir Isaac Newton Way, Phase 1.

4.6 The coding for that part of Cheshire East within the A6MARR AOI was initially taken from work undertaken for A6MARR by Mott MacDonald (Motts) and was added into the 2009 network in place of the previous buffer network. This extra simulation network broadly covers the area bounded by the GM Boundary to the north, the A523 to the east, the A537 to the south and the A34 to the west. HFAS reviewed the coding supplied for this area using recent aerial photographs undertaken in 2009 and site visits, and amended the coding as required.

4.7 Those roads outside the A6MARR area (and the remainder of Greater Manchester) are represented by an extensive link-based 'buffer' network that represents surrounding motorways, A-and B-class roads, but with density diminishing with distance. The buffer network is represented by links, rather than as a series of junctions, with capacity restraint being modelled using flow-delay curves.

Spigot and Zone Centroid Coding

4.8 In accordance with best practice (to aid transparency of loading points), all zone centroids are connected to the model network via spigots. Spigots are links that join the centroid or centre of gravity of the zone to a node on the model network. In the case of point zones such as superstores accessed via a single junction, the spigot representation of a zone is realistic because the junction to which it connects exists and can therefore be coded as a simulation junction. However, in most cases, traffic for a zone joins / leaves the real network at many different points within the zone, and the centroid and spigot representation in the model is a simplification. In particular, the node to which it connects does not exist as a real junction.

4.9 Centroids for each zone were generated in HFAS's network information system (GMNIS) using MapInfo; the software can identify the centre of gravity of a bounded area, e.g., a SATURN zone. Then, for zones where in practice the traffic joins / leaves the coded network at a number of different locations but where the model had to use a single access point, spigot nodes were created on the model network to attach the link (i.e., the spigot) to / from the centroid. This was done where needed, i.e., for all zones except point zones across the network.

4.10 Note that the spigot nodes are junctions in the model, but most of them are not junctions on the real network. To avoid modelling delays at such nodes, they were coded using a template that included additional lanes and maximum saturation flows for the turns into and out of the spigot with no priority markers. For point zones, however, where the spigot represents the site access road, the spigot node represents a real junction, and is coded appropriately.

Area of Influence

4.11 The A6MARR model covers all of Greater Manchester and the northern part of Cheshire East and, in progressively decreasing level of network and zone detail, the remainder of the mainland UK. The A6MARR scheme in its current form on the section between M56 (at the airport) and A6 (at Hazel Grove) is intended to have relatively local influence, and is being designed as such.

4.12 In light of the above, the A6MARR modelling team set out to identify an 'Area of Influence' (AOI) for the scheme, within which to focus attention on aspects such as network coding and density, inclusion of significant developments as individual zones, and compliance to DfT criteria (including base assignment validation).

4.13 The A6MARR AOI was initially identified using a base year network with the scheme added. The defined AOI was later confirmed using interim forecasts for 2032.

4.14 Two sets of criteria were examined to identify the AOI:

- GEH criteria based on the traffic flow changes between the without- and with- scheme situations; the purpose of this approach was to apply quantification that related to DfT criteria for validation, where a key threshold is a GEH value of 5.0; and

- Absolute flow differences between without- and with scheme scenarios; changes were analysed in steps of 50 pcus from 100 to 250 pcus).

4.15 The results of the analyses undertaken were presented to the Department for Transport (reference 5) and following discussion, the A6MARR modelling team decided to adopt an AOI based on changes of +/- 250 pcus. The area in which flow changes of this level were identified was converted into a boundary relating to SATURN zone boundaries.

4.16 The AOI is shown in Figure 4.1.

Traffic Signal Data

Overview

4.17 The traffic signal data in the A6MARR SATURN model is obtained using information supplied by the Greater Manchester Urban Traffic Control Unit (GMUTC) and Cheshire East Council.

4.18 The majority of the signal data in the Greater Manchester area was originally obtained in 2006 as part of the TIF project. The signal data in the Regional Centre was updated in Summer 2007, however, as part of the modelling work undertaken for the RCTS, and has subsequently been further updated to include information for all new signalised junctions that have been installed since the completion of the RCTS model.

4.19 The signal times at all junctions within the A6MARR AOI were reviewed in Spring 2010 and updated where required from the latest information available.

Pedestrian Crossing Data

4.20 Due to the number of individual crossings in the model and the time therefore required to monitor/source individual call data, model timings at pedestrian crossings were derived via a programme which identified the location of each pedestrian crossing in the simulation area and allocated green and inter-green (i.e. red to traffic) times which reflected the probable use of the crossing.

4.21 The crossings were split into groups using MapInfo. The locational criteria used varied by time period. In the AM peak crossings meeting one of three locational criteria were assumed to be called once every five minutes, namely:

- Those within 500m of a secondary school and 300m of a primary school
- Those within 500m of a hospital; and
- Those within 500m of a Census Special Output Area (SOA) zone centroid with greater than 500 employees.

4.22 In the inter-peak, crossings called once every five minutes were assumed to be those:

- Within 500m of a hospital
- Within 200m of a supermarket

- Within 200m of a health centre
- Within 500m of a university or college of further education.

4.23 In the PM peak, crossings meeting the following criteria were called once every five minutes:

- Within 500m of a hospital
- Within 200m of a supermarket
- Within 500m of a SOA zone centroid with greater than 500 employees
- Within 500m of a university or college of further education.

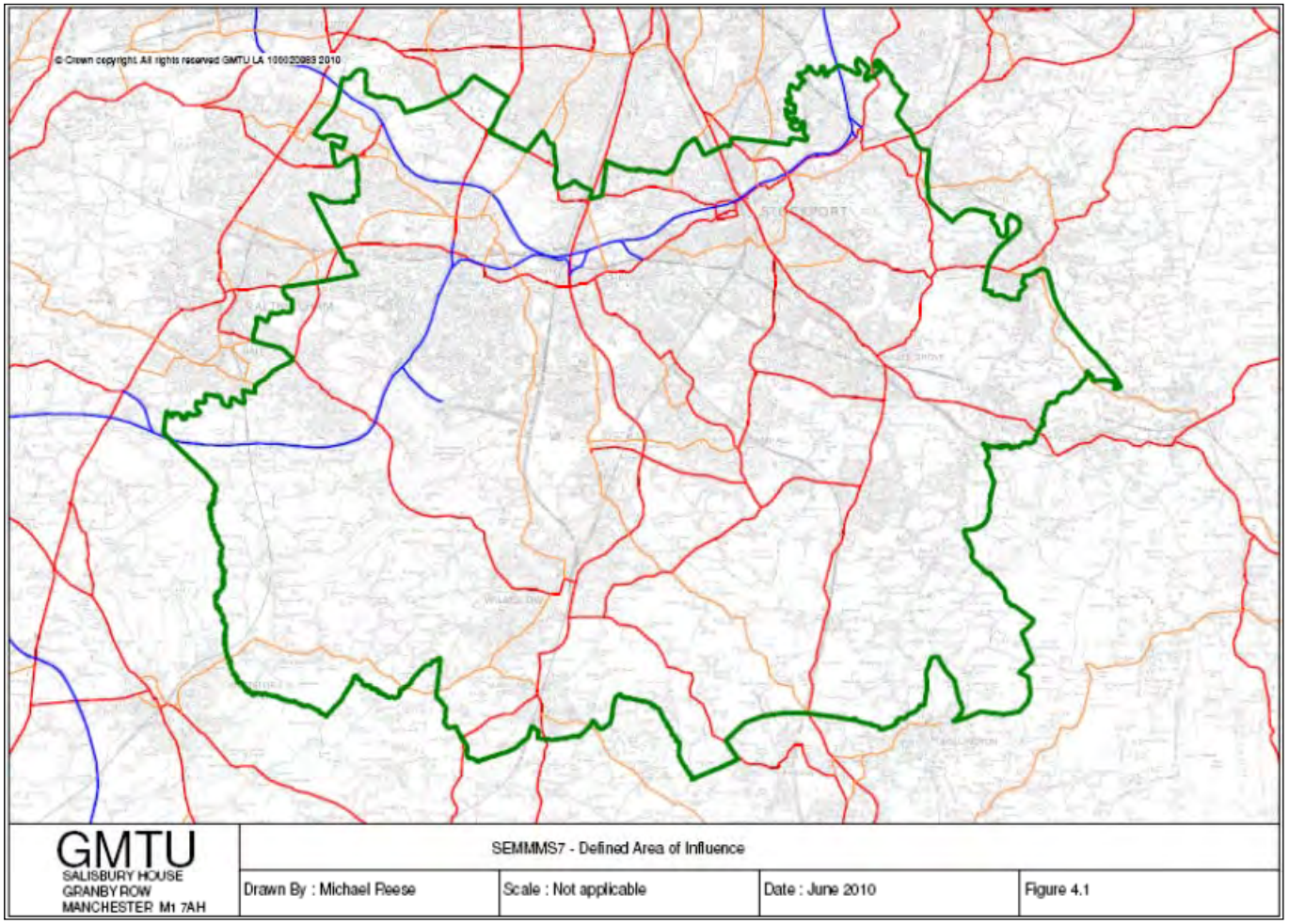
4.24 Crossings not meeting the five minute call criteria in the three time periods were assumed to be called once every 10 minutes.

4.25 The signal timings used were:

- For a five minute call interval, cycle time 300 seconds, green to traffic 277 seconds, inter-green time (green to pedestrians) 23 seconds
- For a 10 minute call interval, cycle time 600 seconds, green to traffic 577 seconds, inter-green time (green to pedestrians) 23 seconds.

4.26 These times are based on best-practice times for a Pelican crossing located on a 10-metre wide carriageway. They also assume that no vehicles proceed through the crossing during the flashing amber period.

4.27 During further calibration of the model, additional adjustments were made to various pedestrian crossings as required to reflect observed journey times.


© Crown copyright All rights reserved GMTU LA 100020983 2010
GMTU
SALISBURY HOUSE
GRANBY ROW
MANCHESTER M1 7AH
SEMMMS7 - Defined Area of Influence
Drawn By : Michael Reese
Scale : Not applicable
Date : June 2010
Figure 4.1

SCOOT/MOVA Controlled Junctions

4.28 Within the Greater Manchester part of the AOI there are a significant number of signals and pedestrian crossings under SCOOT (Split Cycle Offset Optimisation Technique) operation.

4.29 SCOOT is a fully adaptive traffic control system that uses data from vehicle detectors and optimises traffic signal settings to reduce vehicle delays and stops. SCOOT provides a fast response to changes in traffic conditions and enables a response to variations in traffic demand on a cycle-by-cycle basis.

4.30 As the operation of SCOOT sites changes with traffic demand, signal timings at these junctions were obtained from GMUTC for an entire day in October 2009. The timings in each of the peaks were then averaged to give as accurate a representation as possible in the SATURN Network.

4.31 In addition to the SCOOT sites there are a number of signal-controlled junctions that are under MOVA operation. MOVA (Microprocessor Optimised Vehicle Actuation) is a well-established strategy for the control of traffic light signals at isolated junctions - i.e. junctions that are uncoordinated with any neighbouring signals.

4.32 MOVA is designed to cater for the full range of traffic conditions, from very low flows through to a junction that is overloaded. MOVA operates in a delay minimising mode; if any approach becomes overloaded, the system switches to a capacity maximising procedure.

4.33 Again signal timings at MOVA sites are changeable and therefore timings were derived by entering the flows as derived from counts into the SATURN model and optimising the signal times to best represent the most likely green times at each of the junctions.

Checks and Adjustments to Networks

4.34 A series of network checks were done after the network had been built and preliminary trip matrices had been assigned. For example, cases were investigated where the coded capacity was less than the traffic count and/or where modelled delays were above a threshold.

4.35 In addition, coding on journey time routes within the Area of Influence was checked to better simulate observed travel times and delays on the network. Further to this selected trees (routes from a zone (origin) within the A6MARR AOI to other zones (destinations) within the AOI) were followed and checked.

4.36 As part of the update from A6MARR 7B to A6MARR a comprehensive network audit was undertaken focussing particularly on the key areas along the A6 corridor and Manchester Airport. The audit was informed by site visits and detailed inspection of recent aerial photography.

Link Length Crow Fly Checks

4.37 As part of the network build process a sample of crow-fly warning messages (1 in 10) was examined to check that there was no systematic error in link length measurement and to ensure that those errors that were 'flagged' were not significant. No systematic errors were identified and any significant errors were corrected.

4.38 Within the A6MARR Area of Influence the lengths of all simulation links in the final 'built' network were examined by comparison against OS mapping. Those with link length discrepancies in

excess of 30m were checked in detail and the reasons identified. Of the 3,178 links in the AOI that were checked, 2,961 (93%) were within 10m of the mapped link length and only 59 (1.8%) were found to have a discrepancy in excess of 30m. 31 of these links were found to have the correct link length coded, the discrepancy being due to, for example, node coordinates being slightly incorrect. Of the remaining 28 links only 2 were found with an error in excess of 100m, while 8 had an error of 50m or less.

4.39 Details of those links with a coded-measured difference of greater than +/-30m are contained in Appendix 1.

Route Choice

4.40 Route choice tree plots have been analysed for six routes, providing a mix of east-west and north-south routes along/through the A6MARR corridor, namely:

- Bredbury to Manchester Airport
- Chapel-en-le-Frith to Manchester Airport
- Hazel Grove to Manchester Airport
- Stockport town centre to Manchester Airport
- West Altrincham, to Macclesfield; and
- Alderley Edge to Manchester City Centre

4.41 SATURN plots showing the route trees for the three modelled time periods can be found in Appendix 2 of this report. These are summarised briefly below.

4.42 **Bredbury to Manchester Airport (Northeast to West) -** In all time periods the model suggests that all trips would route primarily via the M60 and M56, with route choice limited to where trips join the motorway at Bredbury (either M60 J27 and J25). This seems logical given the directness of the motorway route compared to the "cross country" (via local roads) alternative.

4.43 **Chapel-en-le-Frith to Manchester Airport (Southeast to West) -** In all periods the model suggests that the majority of trips would route via the B5470 through Chapel and then across country, crossing the A523 London Road at Adlington and then via the B5358 Wilmslow Rd, Dean Row Road and Stanneyland Road to join the B5166 Styal Road, adjacent to the Airport. This is the most direct route between the origin and destination (in both directions) although parts of it are of a relatively low standard. However, the alternative routes would be very heavily trafficked, especially during peak periods. It is likely therefore that with a good knowledge of the network, drivers would chose to use the route indicated by the model.

4.44 **Hazel Grove to Manchester Airport (East to West) -** The model suggests that the main east-west route between Hazel Grove and Manchester Airport is via Bramhall Moor Rd, A5143 Bridge Lane and Manor Road to Cheadle Hulme and thence via A5149, Turves Road, Etchells Road, Finney Lane, Styal Rd and Ringway Road to the Airport. This is the dominant route westbound in the morning peak and evening peak and in both directions in the interpeak. Eastbound in the AM and PM peaks the model suggests that a proportion of traffic will route via Finney Lane to join

Wilmslow Road and the A555, before then routing via A5102 through Bramhall to pick up Bramhall Moor Road or via the A5149 and Chester Road to join the A6 at Hazel Grove.

4.45 In reality the density and congested nature of the (urban) network between Hazel Grove and Manchester Airport is such that drivers making this journey and who have a good knowledge of the network will chose their route as they proceed on their journey. It is unlikely that one particular route would be dominant. However, the 'primary' route indicated by the model is the most direct and is likely to be used by the greater number of trips.

4.46 **Stockport Town Centre to Manchester Airport (Central to West) -** The model suggests that in all time periods and in both directions all traffic between Stockport Town Centre and Manchester Airport would route primarily via the motorway network (M60 and M56), route choice being limited to the start/finish of the trip within the town centre.

4.47 **West Altrincham to Macclesfield (West to South-East) -** The model indicates that the dominant route in both directions in the AM peak is via the A56, A556, A50 and A537 through North Cheshire (i.e. via Knutsford). This is also the main route for northbound traffic in the PM peak hour. In the interpeak (both directions) and in the PM Peak southbound the main route indicated is via the A56, M56 and A538 through Wilmslow.

4.48 Both of the primary routes indicated by the model are logical. The route via the A538 is more direct but in the AM peak congestion around M56 junction 6 and in Wilmslow may act as a deterrent to its use.

4.49 **Alderley Edge to Manchester City Centre (South to North) -** In the morning peak hour the model indicates that the prime route for northbound traffic between Alderley Edge and Manchester City Centre is via the A34, A538, M56 and A5103 route. A similar route is indicated southbound but with a diversion via Ringway Road and Styal Rd to join the A34 in Wilmslow. In the interpeak, the prime route is forecast to be the A34, M60 and A5103 in both directions. In the evening peak hour, the model suggests that most southbound traffic will use the A34, albeit with some local multi-routing in the initial stages of the journey near the town centre. Northbound traffic in the evening peak is mainly routed via the A538, M56 and A5103.

4.50 In practice there is likely to be little to choose between the A34 and M56/A5103 routes throughout the day. Both are radial routes which very similar in nature (built up dual or multi-lane single carriageway with frequent traffic signals once off the motorway). It's likely that the proportion using the A34 in preference to A5103 would be higher than is indicated by the model as in reality drivers are unlikely to perceive the two routes as having significantly different journey times. However, routing will be very dependent on which part of the City Centre a driver is accessing or the location of their parking

Bus Data

4.51 Buses are represented in the model as fixed link loads, with routes defined as chains of links in the simulation or buffer networks.

4.52 For the most part, information about bus services and frequencies in the A6MARR model is based on data from the TfGM bus service database, the Northwest Journey Planner website and bus timetables for North Cheshire.

Adjustments to Link Cruise Speeds

4.53 In the SATURN networks as originally coded, the link cruise speeds coded were set to the posted speed limit for the link in question. However, during development of GM-SATURN, the model was found to be running too fast during the early stages of calibration/validation.

4.54 To slow the network down, tests were carried out to assess the impact on speeds of calling all pedestrian crossings (as described above) and reducing link speeds. The rationale behind reducing link speeds was that in the peak periods in particular, there are considerable 'friction' effects acting on the network, such as vehicles loading and unloading, drivers making short stops at local shops, buses stopping more frequently than at other times of the day etc. These activities have an impact on the cruise speed and will tend to reduce it below the speed limit.

4.55 For A6MARR, a number of sensitivity tests were undertaken to determine the appropriate adjustments to link cruise speeds to match observed travel times on the network in the Area of Influence.

4.56 For the morning and evening peak hours, it was found that factoring Regional and District centre speeds by 0.75 and all other simulation links (except those with limits of 60mph or more) regardless of location by 0.80 gave the closest approximation to observed travel times.

4.57 For the inter-peak, it was found that factoring Regional and District centre speeds by 0.85 and all other simulation links (except those with limits of 60mph or more) regardless of location by 0.90 gave the closest approximation to observed travel times.

4.58 No speed adjustments were applied to motorway links.

4.59 It was noted that travel times in the rural network within Cheshire were generally too fast in initial model runs. These roads are generally outside both regional and district centres and built up areas and therefore were not factored via the process described earlier.

4.60 The fast travel times on these roads was attributed to the nature of the network where many roads have sharp bends and where visibility is poor or where friction effects occur. As a result the speeds were reduced using local knowledge of the network and aerial photos to better match observed times on those routes.

Motorway Flow Delay Curves

4.61 In the development of GM-SATURN, it was noticed that speeds on the motorways appeared to be too fast in relation to observed journey times.

4.62 It was decided that flow delay curves would be added to motorway links in order to accurately model delays resulting from a reduction in motorway speeds when the link is reaching capacity

4.63 Motorway flow delay curves were derived from work undertaken by MVA with the Sheffield SATURN Model, using COBA flow delay curves for motorways and suburban roads.

4.64 The standard flow-delay curves are most commonly applied to an 'average' stretch of motorway, with a standard carriageway width, no sharp bends and a distance of greater than 2 miles between junctions.

4.65 The motorway network in Greater Manchester, and in particular the M60 and M56 that pass through the A6MARR AOI, have several 'non-typical' sections of motorway. These sections have one (or more) of the following features;

- A 50mph restriction due to a sharp bend;
- 2 or 3 narrow lanes;
- Several merges / diverges within close proximity; and
- Junctions within approximately 1 mile of each other.

4.66 These characteristics require some sections of motorway to have different flow delay curves from normal, to reflect slower free flow speeds.

4.67 Even following the application of these flow-delay relationships, in the A6MARR SATURN model it was found that particular sections of the motorway network were running too fast. Notably these were in areas with a 50mph restriction for design reasons and/or where junctions are very closely spaced. To better represent the delays on these sections of motorway the free flow speed and speeds at capacity were reduced as part of calibration.

Times in the External Network

4.68 In the SATURN model, travel times on links in the buffer network outside the A6MARR AOI and Greater Manchester are estimated using capacity restraint.

4.69 To determine the capacities the following processes were undertaken:

- All buffer links were coded with link capacities with 99,999 in all three time periods
- The network was converged
- Capacities were reset to be 1.2 times the demand flow using the maximum link flow in any time period which results in a single capacity used for each link across all time periods

4.70 The process of estimating capacities and calculating demand flows was iterative, and was repeated until there was no significant change in the calculated capacities from one assignment to the next. The overall change in link capacities was found to be less than 2% in five iterations.

Generalised Cost Parameters

4.71 The generalised cost parameters used in the assignment process are derived using an Excel spreadsheet prepared by MVA for the TIF study. They are consistent with data taken from TAG Unit 3.5.6 (April 2011).

4.72 User inputs to the spreadsheet consist of:

- Average network speed, used in the calculation of vehicle operating costs

- Proportions of distance travelled by each of three car-based user classes (i.e. commute, employers business and other) as output from a five user class assignment; these are used in the calculation of the cost parameters for the all-car user class (i.e. as a weight).

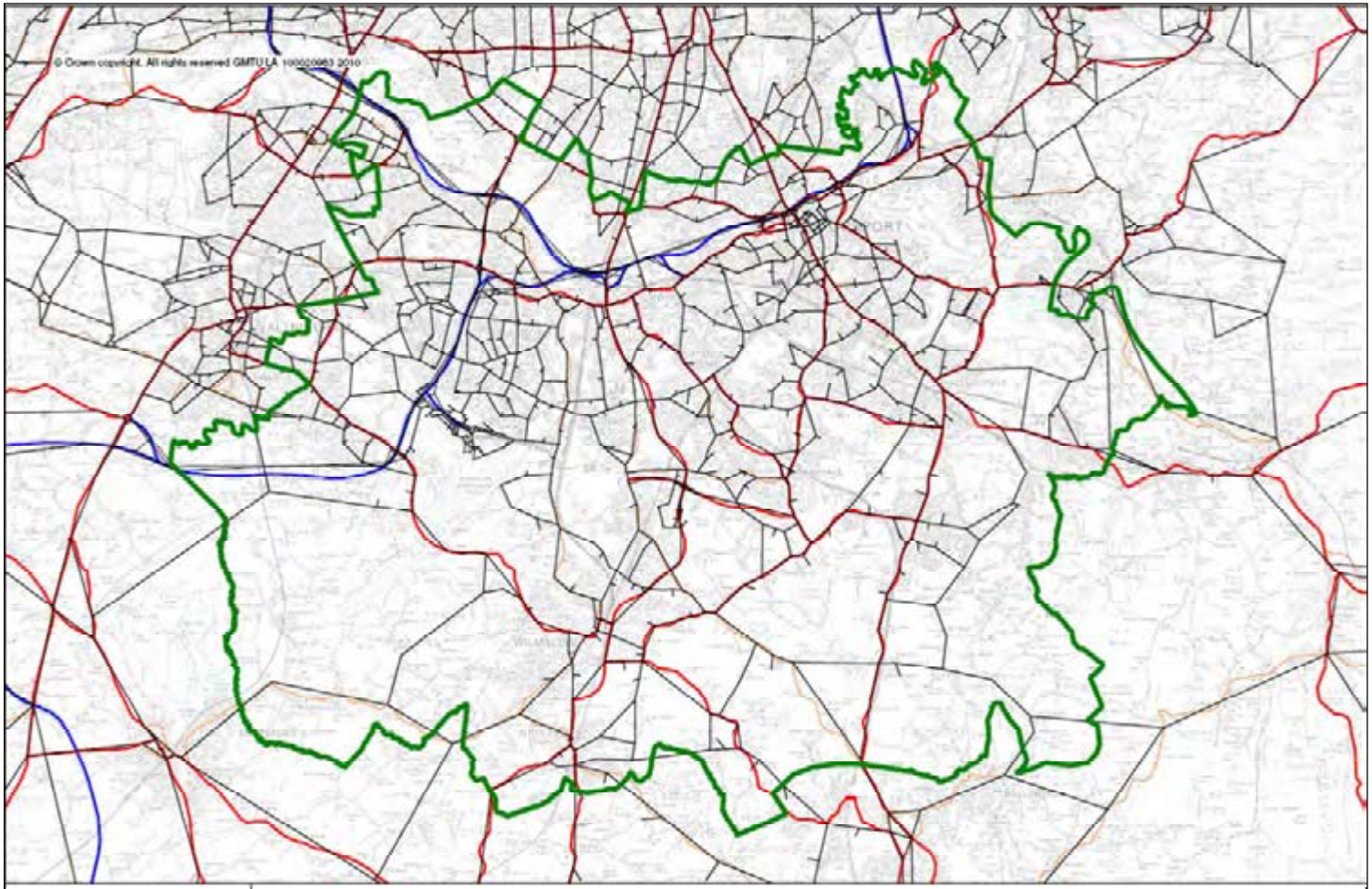
4.73 All other inputs (e.g. values of time, fuel consumption parameters and fuel costs, fuel price growth rates etc) were taken directly from the appropriate section of WebTAG.

4.74 The 2009 values of time (pence per minute – PPM) and distance (pence per kilometre – PPK) as output from the spreadsheet and used in the assignments are shown in Table 4.1 below.

4.75 A worked example showing a generalised cost calculation for PPM & PPK 2009 Employer's Business Car AM Peak Hour has been provided in Appendix 3.

Table 4.1 2009 Generalised Cost Parameters Used in the Assignments

Period	User Class	PPM	PPK
AM Peak Hour	Commuting Car	12.94	6.77
	Employer's Business Car	43.84	14.56
	Other Car	16.66	6.77
	LGV	19.65	15.35
	OGV	19.92	48.39
Inter-Peak Hour	Commuting Car	12.84	6.45
	Employer's Business Car	42.79	13.73
	Other Car	17.33	6.45
	LGV	19.65	14.89
	OGV	19.92	44.91
PM Peak Hour	Commuting Car	12.64	6.76
	Employer's Business Car	42.15	14.53
	Other Car	17.79	6.76
	LGV	19.65	15.34
	OGV	19.92	48.26



GMTU SALISBURY HOUSE GRANBY ROW MANCHESTER M1 7AH	SEMMMS7 - Network Within Area of Influence			
	Drawn By : Michael Reese	Scale : Not applicable	Date : June 2010	Figure 4.2

Network Statistics

4.76 The A6MARR network for the Area of Influence is shown in Figure 4.2. Table 4.2 shows the overall network statistics.

Table 4.2 A6MARR SATURN Model Network Statistics (Version 21)

Nodes	
Type	**Number**
Simulation Nodes	9,591
Of which:	
External Nodes	1734
Priority Nodes	5209
Roundabouts	289
Traffic Signals	2289
Buffer Nodes	1,808

Links		
Type	**Number**	**Total Length (Kms)**
Real Simulation Links	20387	6,369
Spigot Connector Simulation Links	1664	158
Buffer Network Links	5234	11,492
Total Network Length	27,285	18,019

Notes
The figure for priority nodes includes a number of "exploded" roundabouts i.e. large roundabouts broken down into a series of priority junctions.

5. Development of the Prior Matrices

Overview

5.1 The assignment matrices for the SATURN model were built for a base year of 2009, for three time periods:

- The morning peak hour 0800-0900
- The evening peak hour 1700-1800
- An average inter-peak hour for the time period 0930-1600.

5.2 The matrices were formed in two stages:

- First, 'prior' matrices were built using information from the 2001 National Census of Population for commuting car trips, and from the A6MARR roadside interview surveys and other roadside interview surveys that HFAS has undertaken since the completion of the final section of the M60 Manchester Outer Ring Road for other purposes. Other elements of the matrices were 'in filled', using data from the synthetic matrices being developed by MVA for the Variable Demand Model (VDM).

- Next, matrix estimation was used to update the prior matrices and improve the fit between modelled and observed flows.

5.3 Separate matrices were formed for car, Light Goods Vehicle (LGV) and Other Goods Vehicle (OGV) trips. For cars, individual matrices were built for the following 12 journey purposes:

- Home-to-work
- Work-to-home
- Home-to-education
- Education-to-home
- Home-to-shopping
- Shopping-to-home
- Home-to-employer's business
- Employer's business-to-home
- Home-to-other
- Other-to-home
- Non-home-based employer's business
- Non-home-based other.

5.4 For assignment, however, the separate purpose matrices were aggregated to form 5 'user classes' comprising:

- Commuting cars (home-to-work plus work-to-home car trips)

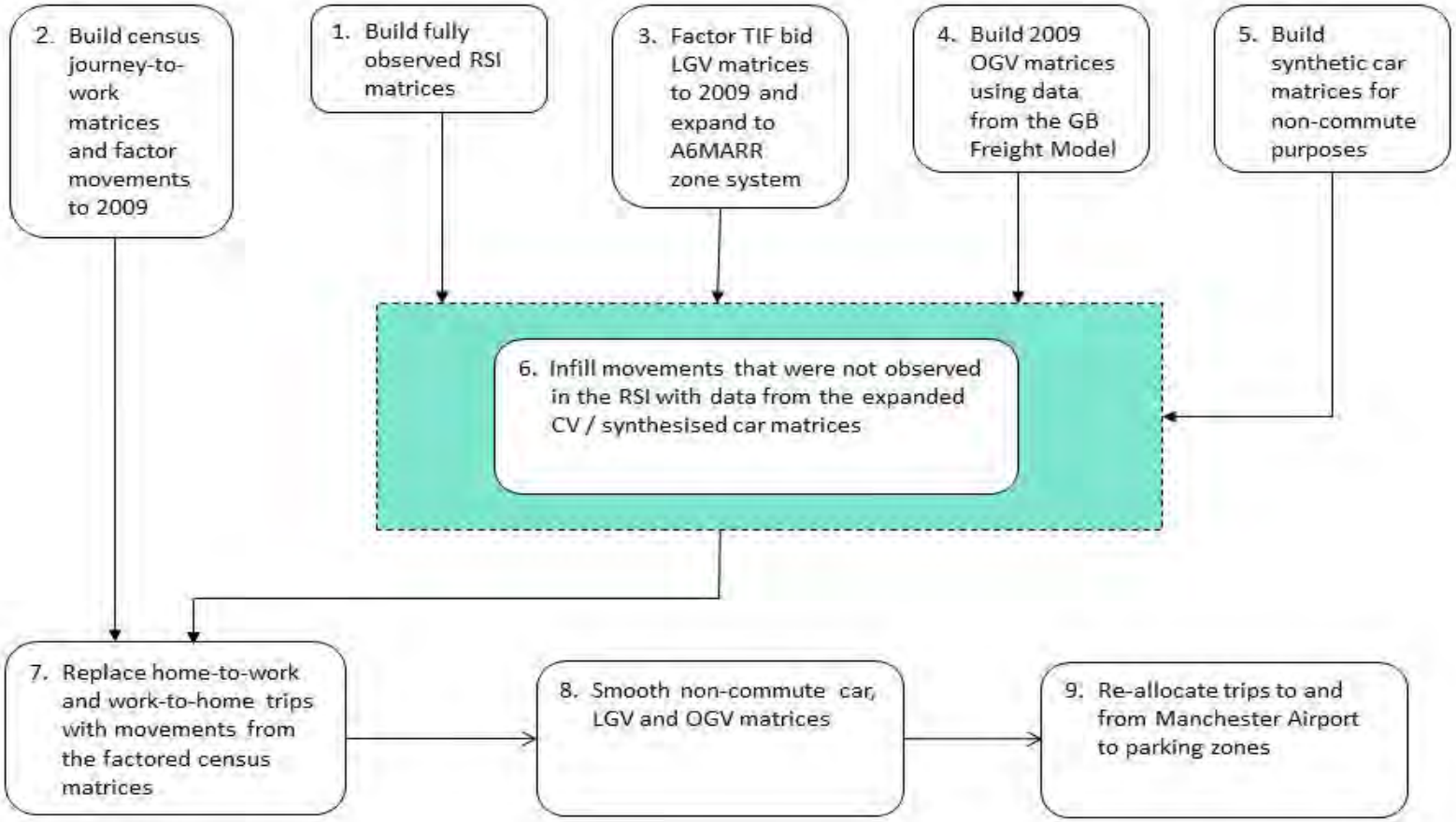
- Employer's business cars (home-based plus non-home-based employer's business car trips)
- Other cars (all other car trips)
- LGVS (all purpose LGV trips)
- OGVS (all purpose OGV trips).

5.5 The prior matrix building procedure is illustrated diagrammatically in Figure 5.1. The process involved 9 main steps, comprising:

- Building fully observed trip matrices from the A6MARR, Cheshire East, JETTS, GMATS and M60 After Study Roadside Interview (RSI) data
- Building car journey-to-work matrices from the 2001 National Census data and factoring the census matrices to 2009
- Building prior LGV matrices
- Building prior OGV matrices
- Building Synthetic car matrices for non-commute purposes
- 'Infilling' movements that were not observed in the RSI using data from the synthetic matrices for car trips, and from the prior LGV and OGV matrices for Commercial Vehicle (CV) trips
- Replacing home-to-work and work-to-home trips with movements from the factored census matrices
- Matrix smoothing
- Re-allocating trips to and from Manchester Airport to parking zones using information about the percentage of parking trips supplied by AECOM (Manchester Airport's consultants).

5.6 The key steps in the matrix building procedure are described in more detail in the sections below. Further details of the synthetic matrix building procedure are provided in Reference 6.

Figure 5.1 A6MARR Saturn Model Prior Matrix Building Procedure



Building Fully Observed Matrices from the A6MARR, Cheshire East, JETTS, GMATS and M60 After Study RSI Data

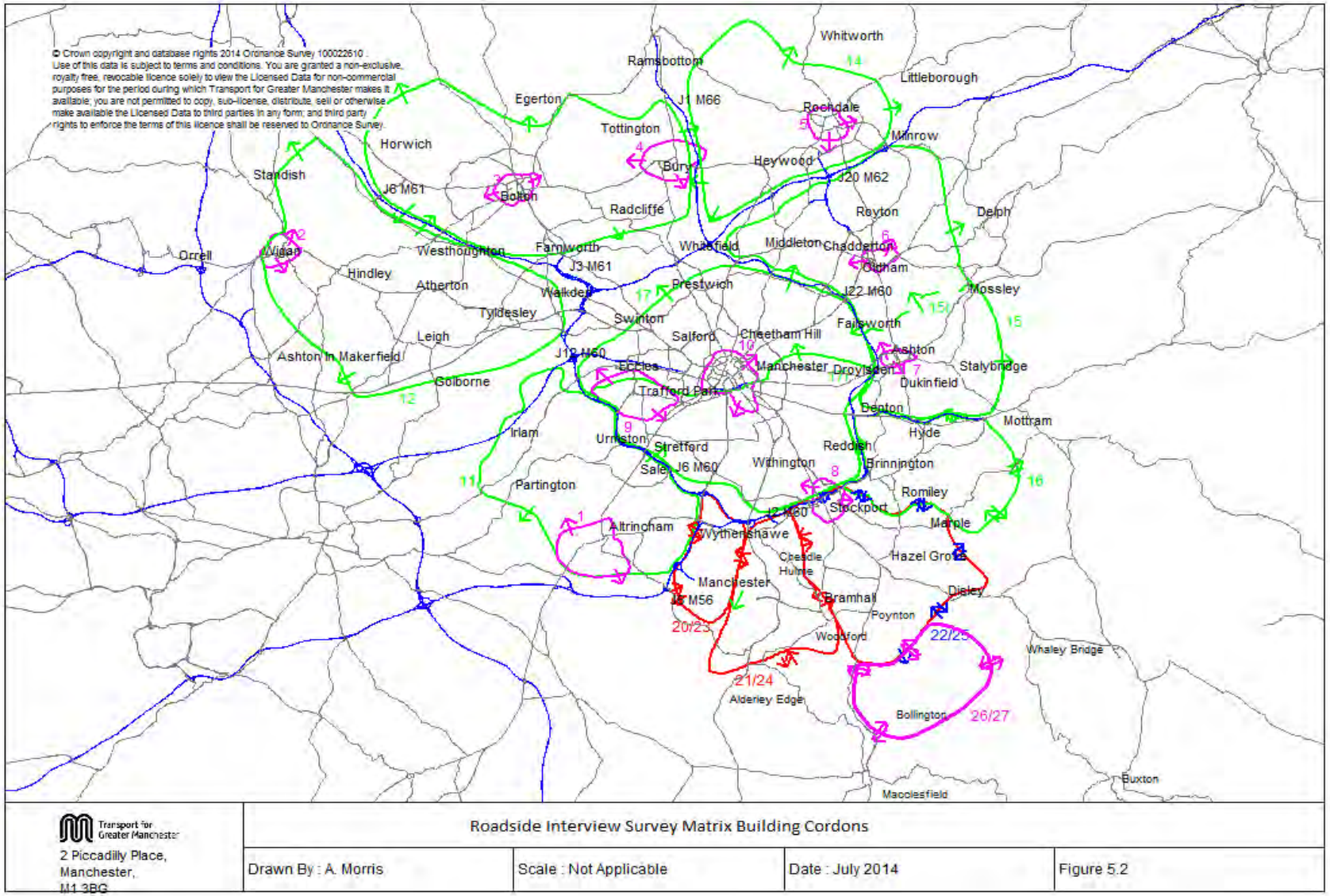
5.7 The fully observed matrices were built using software developed by HFAS. This comprised two programs named:

- MATBLD – which builds matrices of fully observed trips from roadside interview data and uses standard statistical techniques to estimate cell variances; and
- MATMER – which merges movements that have been observed on more than one cordon to give the greatest weight to the movements with the smallest variance.

5.8 The first step in the matrix building procedure was to combine the A6MARR, Cheshire East, JETTS, GMATS and M60 After Study RSI sites to form a series of cordons within the study area, as illustrated in Figure 5.2. The matrix building cordons are described below, in Table 5.1, which also shows the survey dates and interview directions.

Table 5.1 RSI Matrix Building Cordons

Cordon/ Sector Number	Cordon Description	Interview Direction	Survey	Year of Survey
1	Altrincham Town Centre	Outbound	GMATS	2002
2	Wigan Town Centre	Outbound	GMATS	2002
3	Bolton Town Centre	Outbound	GMATS	2002
4	Bury Town Centre	Outbound	GMATS	2002
5	Rochdale Town Centre	Outbound	GMATS	2002
6	Oldham Town Centre	Outbound	GMATS	2003
7	Ashton Town Centre	Outbound	GMATS	2003
8	Stockport Town Centre	Outbound	GMATS/M60	2002/2003
9	Trafford Park	Outbound	GMATS/M60	2003
10	Regional Centre	Outbound	GMATS	2002
11	Trafford Area	Outbound	GMATS/M60	2002/2003
12	Wigan Area	Outbound	JETTS/GMATS	2001/2002/2003
13	Bolton/Bury Area	Outbound	JETTS/GMATS	2001/2002/2003
14	Rochdale Area	Outbound	GMATS	2003
15	Oldham/Ashton area	Outbound	JETTTS/GMATS/M60	2001/2003
16	Stockport Area	Outbound	GMATS/M60/A6MARR	2003/2011
17	Manchester/Salford Area	Outbound	JETTTS/GMATS/M60	2001/2002/2003/2004
18	Oldham/Ashton Area South	Outbound	GMATS/M60	2003
19	Manchester/Salford Area South	Outbound	GMATS/M60	2003/2004
20	A6MARR Cordon1	Outbound	A6MARR	2009
21	A6MARR Cordon 2	Outbound	A6MARR	2009
22	A6MARR Cordon 3	Outbound	A6MARR	2011
23	A6MARR Cordon1	Inbound	A6MARR	2009
24	A6MARR Cordon 2	Inbound	A6MARR	2009
25	A6MARR Cordon3	Inbound	A6MARR	2011
26	Cheshire Cordon 1	Outbound	Cheshire East	2013
27	Cheshire Cordon 1	Inbound	Cheshire East	2013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Whitworth
Ramsbottom
Littleborough
Egerton
J1 M66
Rochdale
Tottington
Milnrow
Horwich
Heywood
Standish
J6 M61
Bolton
J20 M62
Radcliffe
Royton
Delph
Orrell
Wigan
Westhoughton
Farnworth
Whitefield
Middleton
Chadderton
Oldham
Hindley
J3 M61
Atherton
Prestwich
J22 M60
Mossley
Tyldesley
Walkden
Swinton
Failsworth
Leigh
Salford
Cheetham Hill
Ashton
Ashton in Makerfield
J12 M60
Eccles
Manchester
Droylsden
Stalybridge
Golborne
Trafford Park
Dukinfield
Denton
Irlam
Urmston
Hyde
Mottram
Stretford
Reddish
Sale
J6 M60
Withington
Brinnington
Partington
Romiley
Stockport
Altrincham
J12 M60
Marple
Wythenshawe
Hazel Grove
Cheadle Hulme
Manchester
J5 M56
Bramhall
Disley
Poynton
Woodford
Whaley Bridge
Alderley Edge
Bollington
Macclesfield
Buxton
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7
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9
10
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12
14
15
15/
16
17
20/23
21/24
22/25
26/27
Transport for Greater Manchester
2 Piccadilly Place,
Manchester,
M1 3BG
Roadside Interview Survey Matrix Building Cordons
Drawn By : A. Morris
Scale : Not Applicable
Date : July 2014
Figure 5.2

5.9 Prior to building the observed matrices, the expansion factors of the JETTS/GMATS and M60 After Study RSI data were factored to a 2009 October average weekday using local count conversion factors developed by HFAS. This allowed movements from the RSI to be converted to a common date prior to assignment, and also allowed the census journey to work matrices to be converted to 2009, as described later in the chapter. (Note, however, that the A6MARR and Cheshire East RSI data was not factored, as these surveys were carried out on dates close to the base year, and were therefore regarded as representing 2009 traffic flows for matrix building purposes).

5.10 The identification and selection of 'valid' interviews is an important part of the matrix building process. This is carried out automatically by matbld, which is run separately to build fully observed trip matrices for each cordon, journey purpose and time period. (Matbld also forms marker matrices from the survey data, to allow fully observed movements to be easily identified).

5.11 The types of movements that might be observed in a typical roadside interview survey are illustrated below, in Figure 5.3. These comprise

- Fully observed trips
- Partially (or non-observed) trips
- Double counted trips (which cross the same cordon more than once in the same direction)
- Duplicate trips, which are fully observed on more than one cordon.

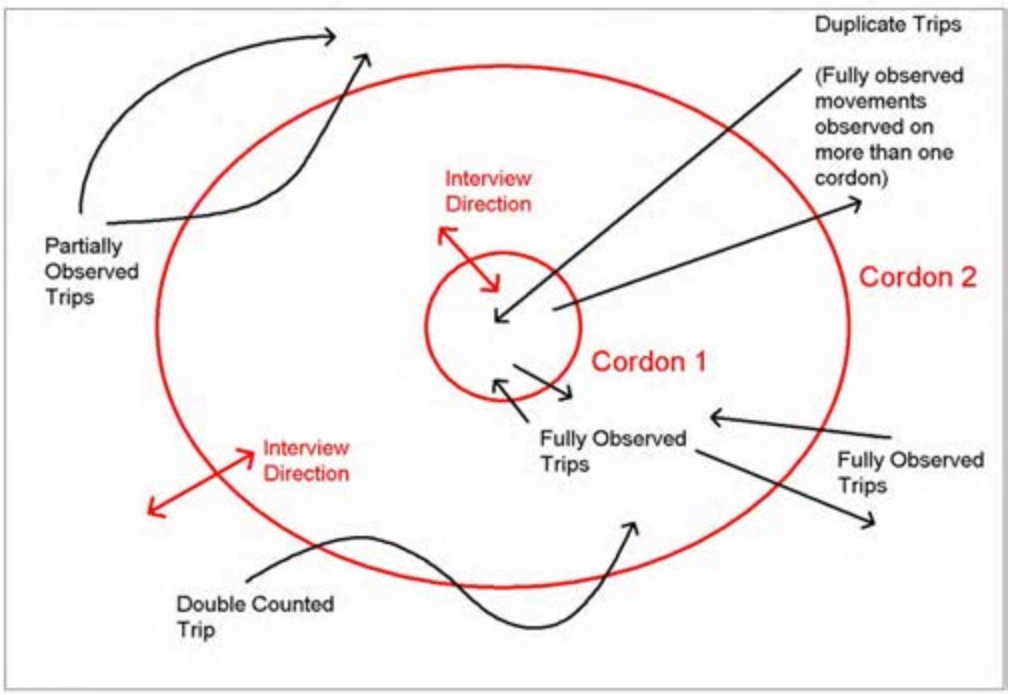


Figure 5.3 Types of Movements Observed in Roadside Interview Surveys

5.12 Normally, only trips between fully observed matrix cells are selected for matrix building. When processing the Cheshire East RSI data, however, it was decided to include selected 'partially observed' movements in the fully observed matrices, as described at the end of this section. This was done to make the best use of the available data, and because it was considered that the locations of the interview sites on the Cheshire cordons would make it highly unlikely that drivers would travel between the selected OD pairs without passing through at least one of the survey stations.

5.13 A movement between two zones is fully observed when interviews are conducted on all of the possible routes between the zones. These trips are identified (in program MATBLD) using site-to-cordon and zone-to-cordon correspondence files that allow the origin and the destination zones of the sampled trips to be automatically checked. Adopting this approach, outbound cordon crossing trips are only selected for matrix building if the origin zone of the trip is wholly inside the cordon and the destination zone of the trip is wholly outside the cordon. Conversely, inbound trips are only selected for inclusion in the survey matrix if the trip origin zone is entirely outside the cordon and the trip destination zone is entirely inside the cordon.

5.14 Movements are partially or non-observed when it is possible to travel between the trip origin and destination zones without passing through one of the interview sites on the survey cordon. These trips can only be partially sampled, therefore, leading to the under-estimation of their actual number in the matrices built from the survey data. Partially observed trips are therefore identified and removed by using the zone-to-cordon correspondence files developed for program MATBLD to exclude interviews with an internal origin and an internal destination zone, or an external origin and an external destination zone.

Treatment of Partial Data from the Cheshire East Surveys

5.15 As described above, it was considered that the locations of the RSI sites and the relatively sparse network in the Cheshire East area would mean that some movements that would normally be regarded as being partially observed in the RSI data could be treated as being fully observed for matrix building purposes. The origins and destinations of these movements were identified manually, by identifying movements where it would be highly be highly unlikely that a drive would travel between the selected OD pairs without passing through at least one of the survey sites.

5.16 The selected movements are shown below in Table 5.2. The origin and destination zones for these journeys were coded into the zone-to-cordon correspondence files used with program MATBLD, so that they could be automatically included in the output trip matrices and the marker matrices for the Cheshire East cordons.

Table 5.2	Partially Observed Movements that were assumed to be Fully Observed in the Cheshire East RSI Data	
Between Zones		
Zone Number(s)	Description	Comments
925	Hayfield	
942	Whaley Bridge	
943	Chinley	
1039	Chapel-en-le-Frith	
1090-1092	Whaley Bridge	
1097	Birch Vale	
and Zones		
Zone Number(s)	Description	Comments
929	Prestbury	
945	Macclesfield	
946	Gawsworth	Excluding zones 925, 943, 1039 and 1097 above
948	Chelford	
1012	Congleton	Excluding zones 925, 943, 1039 and 1097 above
1058-1059	Prestbury North	
1065-1066	Alderley, Capesthorne	
1067-1075	Alderley, Macclesfield	
1076	Macclesfield South	Excluding zones 925, 943, 1039 and 1097 above
1086-1088	Prestbury	
1089	Bollinkton South	
1095-1096	Macclesfield	

Double Counting

5.17 Double counting occurs when a trip in a fully observed matrix cell crosses the same cordon boundary more than once in the same direction. In contrast to partial observation, which leads to the under-estimation of trips between OD pairs, double counting leads to the over-estimation of the number of trips in the survey matrices.

5.18 Several techniques are available for identifying and removing double counted trips. Within MATBLD, double counted trips are identified using route choice data from the SATURN model. This involves using the assignment model to form PIJA files (Percentage of trips from origin zone I to destination zone J crossing cordon A) for each of the survey cordons defined in the study. (The PIJA files are formed by assigning a matrix containing an entry of 1000 in each cell to saved path files from the highway networks. These assignments were undertaken using the 2009 trip matrices developed for use with the A6MARR SATURN model).

5.19 Using this method, fully observed trips that cross a cordon once only will have a PIJA value of 1000. In contrast, movements that cross the cordon more than once will have PIJA values greater than 1000. If, for example, all of the trips from origin zone i to destination zone j cross the cordon twice, then the PIJA value for this movement (on this cordon) will be 2000. If, however, only 50% of the trips cross the cordon twice, then the PIJA value will be 1500. Using this information, therefore, the actual number of trips between the origin zone and the destination zone that cross the cordon (TijA) can be estimated to be:

$$T_{ijA} = (1000 / P_{ijA}) * N_{ijA}$$

Where:

P_{ijA} is the modelled percentage of trips from origin zone i to destination zone j crossing cordon A.

N_{ijA} is the observed (sampled) number of trips from origin zone i to destination zone j crossing cordon A.

This formula is applied for each site on the cordon, with trips being aggregated across sites to build up the matrix for the cordon as a whole.

5.20 The impacts of correcting for double counting were investigated during the production of the highway assignment matrices for the A6MARR8 Saturn model, as documented in GMTU Report 1677 (September 2011). This involved re-building the fully observed trip matrices using 'dummy' PIJA files, with entries of 1000 in all cells, for all cordons. This had the effect of setting the double counting factors equal to 1.000 for all movements, so that double counted trips were not corrected for when building the fully observed matrices.

5.21 The results of the analysis are presented in Appendix 5, Tables A5.1 – A5.3, which show the numbers of trips in the fully observed A6MARR8 trip matrices with and without the double counting factors. Separate results are presented for the AM peak, PM peak and average inter-peak hours, for each journey purpose. The figures in the columns headed 'Percentage Difference' show the percentage change in matrix totals as a result of applying the double counting factors.

5.22 As can be seen, the impacts of applying the double counting factors are relatively small, with the change in matrix totals, (for all trips combined), ranging from a reduction of -0.8 percentage points in the modelled AM peak hour to -1.2 percentage points in the PM peak hour. The changes in matrix totals are similar across purposes, with home-based employer's business trips in the AM peak hour showing the largest change, with a reduction in the overall matrix total of approximately -1.7 percentage points.

5.23 When building the matrices for the A6MARR study, separate matrices were built from data collected in the morning peak period 0700-0930, the evening peak period 1600-1900 and the inter-peak period 0930-1600. Period, rather than hourly matrices were built to alleviate problems of 'lumpiness', (caused by under-sampling of some movements and over-sampling others), which often occur when trip matrices are formed from data collected in a single hour. The period matrices were factored to the AM peak hour 0800-0900, the PM peak hour 1700-1800 and the average inter-peak hour using adjustment factors calculated from the interview record expansion factors, separately for car, LGV and OGV trips, for each of the interview sites.

Matrix Merging

5.24 The locations of the survey sites mean that some movements are fully observed on more than one cordon. A trip from Hazel Grove to Manchester Airport, for example, will be observed in the outbound direction on A6MARR cordon 3 (cordon number 22) and in the inbound direction on A6MARR cordon 1 (cordon number 23). The data for these duplicated cells therefore has to be 'merged', to prevent double counting and to give the best estimate of the actual number of trips making the movement. Rather than simply averaging the estimated cell values, the DMRB recommends that the procedure for 'merging' matrix cells should take into account the respective accuracies of the different data sources.

5.25 The matrices were merged (using program MATMER), using a similar approach to that used in the Department for Transport's trip record database and matrix building suite, ERICA. This involved estimating the variance of the fully observed cells for each of the matrix building cordons, and using the estimated variance to calculate an index of dispersion, which can then be used to combine multiple observations in such a way that the greatest weight is given to the observation with the smallest cell variance. The procedure is described in detail in Appendix 4.

Transposing Inter-Peak Movements

5.26 The final step of the RSI matrix building procedure involved transposing the fully observed inter-peak hour movements to estimate movements in the non-observed (reverse) direction. The AM peak and PM peak matrices were not, however, transposed, following advice given in the DMRB which recommends that it is not advisable to transpose critical movements in one peak period to estimate unobserved movements in the other peak period.

5.27 It is important to bear in mind, however, that the critical movements for the A6MARR scheme had been observed in both directions on the A6MARR RSI cordons, so that these movements did not require transposition.

Building Journey-to-Work Matrices from the 2001 National Census Data

5.28 The 2001 National Census provides information about the usual mode of travel to work at 'Output Area' level, based on a 100% sample. (Output areas are the smallest unit for which census data is available, and typically comprise approximately 125 households). The output areas can be grouped to form wards, or user defined zoning systems, so that the census provides full matrix data for all car driver work trips. Before the census matrices could be used with the SATURN model, however, they needed to be converted from the 2001 daily matrices (represented by the census), to 2009 period-specific matrices for each of the modelled hours represented by the SATURN model.

5.29 To help convert the census matrices, the household interview survey (HIS) which formed part of the 2001-2003 Greater Manchester Area Transportation Surveys (GMATS) included a question about people's usual mode of travel to their main place of work. This question was designed to be consistent with the census, so that the census and HIS data could be easily compared, and so that factors could be generated from the household interview data to estimate home to work and work to home trips by mode, for selected time periods.

5.30 One issue of concern when transforming the census data is that the spatial distribution of work trips can vary by time of day. (It was thought, for example, that there might be more part time work trips in the inter-peak period, which might have a different trip length distribution to full time trips). To allow for this, therefore, the matrices were segmented by trip length, (using the average crow-fly distance between zones), with short and longer distance car driver trips being factored separately when estimating the work trips for each time-period.

5.31 In more detail, the method was to:

- Determine the crow-fly distance (in kilometres) between home and the usual place of work, for each employed person
- Allocate these distances to one of four travel bands: a) less than 2km, b) 2.00- 4.99km, c) 5.00-9.99km, d) 10.00km or more
- Tabulate from the GMATS HIS (where Greater Manchester residents were surveyed) the numbers of work trips by car-drivers for each travel band, both for daily trips and for trips made during each of the three modelling periods, for home to work trips and work to home trips
- Calculate factors by dividing, for each distance band, the number of work trips made in the modelled hour by the number of work trips made during the day, there being 24 factors (four distance bands, three time periods, two directions (to or from work)
- Transpose the home-work census matrix to form a work-home file
- Apply the factors to the two census matrices, thereby generating home to work and work to home car driver matrices by travel distance band
- Sum the separate travel distance matrices for each time period.

5.32 For example, the GMATS household interview data showed 97,200 average weekday car-driver trips from home to work with a trip length up to 2km – a further 495,600 home-work trips were longer than 2km. In the morning peak hour, 24,300 car-driver trips of less than 2km were

recorded in household interview survey, implying that 25% of the daily car-driver journey to work trips of less than 2km took place in this period. A factor of 0.25 was therefore applied to the matrix of 2001 census car-driver trips of less than 2km to generate the matrix of morning peak hour vehicle trips for this travel band.

5.33 The procedure described above provided a first estimate of journey to work trips in each of the modelled hours. To ensure that the validation of modelled and observed traffic flows is as good as possible, however, it is important that the numbers of trips in the census matrices accurately match the numbers of commuting car trips observed crossing the interview cordons defined for the RSI matrix building work, described above. Once the first set of matrices had been formed, therefore, the movements in the home to work and work to home census matrices were compared with fully observed trips for these purposes in the matrices built from the RSI data. This allowed adjustment factors to be calculated, which enabled the total number of trips in the census matrices to be constrained to match the numbers of home to work and work to home trips observed in the RSI, at a cordon level. (These factors also allowed the census matrices to be converted from the 2001 base represented by the census to the 2009 base represented by the RSI matrices, for an average weekday).

5.34 Separate factors were calculated for each RSI cordon and modelled time period, with row factors being applied for outbound trips and column factors for inbound trips. Trips that were wholly within cordons, (which were not observed in the RSI), were factored using the row factors for the cordon, to ensure that all intra-cordon trips were adjusted. Trips from zones wholly outside the RSI cordons were adjusted using area-wide factors, calculated from comparisons of fully observed trip totals for the census and RSI matrices as a whole.

5.35 Table 5.3 compares the fully observed commuting car trips from the RSI (for the three cordons in the A6MARR area) with trips in the equivalent cells of the commuting car matrix derived from the census data. As can be seen, there is a good agreement between the trip totals in all time periods.

Table 5.3 Comparison of Fully Observed trips from the RSI and Census Matrices By Cordon and Time Period

Cordon	AM Peak		Inter-Peak		PM Peak	
	RSI	Census	RSI	Census	RSI	Census
A6MARR 1 Out	1,954	1,949	728	717	2,474	2,467
A6MARR 2 Out	4,412	4,416	840	822	3,803	3,808
A6MARR 3 Out	4,982	4,967	949	915	3,660	3,610
A6MARR 1 In	3,370	3,375	608	608	1,562	1,560
A6MARR 2 In	5,053	5,057	847	848	3,624	3,614
A6MARR 3 In	5,232	5,227	1,066	1,072	4,445	4,443
All	25,002	24,991	5,037	4,981	19,567	19,500

Estimation of Non-Observed Movements for Commercial Vehicle Trips

5.36 Two data sources were available to estimate non-observed movements in the commercial vehicle matrices:

- For Light Goods Vehicle (LGV) trips, movements that were not observed in the RSI were estimated using data from the 2005 prior matrices developed for the Greater Manchester TIF bid
- For Other Goods Vehicle (OGV) trips, non-observed movements were estimated using data from the Great Britain Freight Model (GBFM), which provides information about heavy goods vehicle movements within Great Britain for a 2007 base.

Light Goods Vehicle Trips

5.37 Processing the LGV matrices involved two steps comprising:

- Growthing the 2005 TIF bid matrices to 2009
- Expanding the 2009 matrices to the A6MARR zoning system.

These steps are described below.

5.38 The base year trip matrices that were built for the TIF SATURN model were formed for a 2005 October average weekday. For the A6MARR study, however, matrices were required for a 2009 base. The 2005 TIF bid matrices were therefore factored to 2009 using changes in zone-based travel demand estimated from the GMSPM2 over the period 2006 to 2011 for the TIF Reference Case. These factors are based on growth factors derived from the National Transport Model, (NTM), with separate factors being calculated for each time period (3).

5.39 The TIF SATURN matrices were built to a 993-zone system, comprising 864 zones inside Greater Manchester and 129 zones outside the county. It was necessary, therefore, to expand the TIF matrices to the 1097 zone system that has been developed for A6MARR SATURN model, which incorporated a more detailed zoning system in the Stockport, Cheshire and Derbyshire areas.

5.40 The TIF matrices were converted to the A6MARR zoning system using a simple disaggregation technique, by dividing trips between TIF zones amongst their constituent A6MARR zones using the numbers of journey to work trips beginning and ending in each of the A6MARR zones as ‘weights’. This was done using a GIS procedure to first determine the correspondence between the two zone systems. The trip end totals from the daily home-to-work matrices described above were then used as a proxy for the level of activity in each zone, to derive the weights. The zonal weights for each TIF OD pair were then multiplied together, to give the proportion of trips in the TIF matrix cell to be allocated to the constituent A6MARR matrix cells. An example calculation is presented below in Table 5.4.

Table 5.4 LGV Matrix Disaggregation Technique

Suppose that there are 150 LGV trips from TIF zone TZ_i to TIF zone TZ_j, and that TZ_i comprises two SEMMMS zones SZ_{1i} and SZ_{2i}. Suppose, also, that 30 percent of the home-to-work car trips that begin/end in TZ_i begin/end in SZ_{1i} and that 70 percent of the home-to-work car trips that begin/end in TZi begin/end in SZ_{2i}.

Adopting the same notation, suppose that TZ_j also comprises two SEMMMS zones SZ_{1j} and SZ_{2j}, with 40 percent of work trips beginning/ending in TZ_j beginning/ending in SZ_{1j} and 60 percent beginning/ending in SZ_{2j}.

The disaggregation is accomplished by apportioning the 150 LGV trips from TZ_i to TZ_j as follows:

SZ_{1i} to SZ_{1j} = (30/100) * (40/100) * 150 = 18.0

SZ_{2i} to SZ_{1j} = (70/100) * (40/100) * 150 = 42.0

SZ_{1i} to SZ_{2j} = (30/100) * (60/100) * 150 = 27.0

SZ_{1i} to SZ_{2j} = (70/100) * (60/100) * 150 = 63.0

A cumulative rounding procedure is adopted to preserve matrix totals.

Other Goods Vehicle Trips

5.41 OGV movements that were not observed in the roadside interview surveys were 'in filled' using data from the Great Britain Freight Model, (GBFMv5), which is maintained by MDS Transmodal, and has been adopted by the Department for Transport as part of the NTM. The outputs from the GBFM provide information about annual origin-to-destination OGV trips at postcode district level, for a 2007 base.

5.42 The procedure for converting the GBFM matrices to SATURN format involved four steps, as follows:

- Disaggregating the matrices from postcode district level to the detailed zoning system used with the SATURN model
- Factoring movements from the annual trips represented by the GBFM to the modelled hours represented by the SATURN model
- Factoring movements from 2007 to 2009
- Infilling intra-postcode district trips (which were not available from the GBFM).

5.43 The method for disaggregating the matrices to the SATURN zoning system was similar to that developed for the LGV matrices, described above. The main difference related to the choice of zone weights, which were calculated from tripend totals from the expanded TIF OGV matrices, (which were created at the same time as the LGV matrices), since it was thought that journey-to-work tripends would be less suitable as a measure of zonal activity for apportioning OGV movements.

5.44 The factors to convert the annual trips represented by the GBFM to the hours represented by the SATURN model were calculated using 2009 Automatic Traffic Count (ATC) data at approximately 80 motorway sites in Greater Manchester from the Highways Agency's TRADS (Traffic Information) database. Motorways were selected for the analysis, as it was thought that these roads would carry the majority of HGV trips, and would provide the most reliable factors. Data was only selected for sites that had been operational for a minimum of 320 days per year, and for a minimum of 20 days per month, to prevent sites that had been operational for unrepresentative periods biasing the results.

5.45 The factors to convert movements from 2007 to 2009 were also calculated from TRADS data, for sites within Greater Manchester that had been surveyed in both 2007 and 2009. The 2007 to 2009 conversion factor was calculated to be 0.91, which matches the national figure reported in the Transport Statistics Bulletin for Road Traffic and Congestion in Great Britain, (Quarter 4, 2009).

5.46 Intra-postcode district trips were not available from the GBFM. As an alternative, therefore, these movements were estimated using data from the prior OGV matrices developed for the Greater Manchester TIF bid. This involved 5 steps, as follows:

- First, the 2005 TIF OGV matrices were factored to 2009 and expanded to the A6MARR zoning system using the method adopted for the LGV matrices and described above
- Next, a GIS procedure was used to determine the correspondence between postcode districts and A6MARR zones

- Next, the zone correspondence file was used to form a marker matrix to identify A6MARR zones within the same postcode district, which were only partially observed in the GBFM matrices. (Movements between A6MARR zones i and j are partly observed if any part of i or j is in the same postcode district).
- Finally, the marker matrix was used to zeroise the cells of partially observed trips (in the expanded GBFM matrices), and to update these cells with movements from the expanded TIF matrices

Production of the Synthetic Car Matrices

5.47 The synthetic car matrices for non-commute purposes were produced by MVA using gravity model techniques, as follows:

Home Based Purpose Trip Ends

- Derive trip rates from the GMATS Household Interview Survey (HIS) by 32 household categories, 10 home based purposes and for each of the 4 modelled time periods included in A6MARR VDM.
- Derive production trip end estimates for each home based purpose and time period by combining the trip rates with zonal population extracted from the 2001 Census at OA output area, disaggregated to the A6MARR 1097 zone system using Code-Point data and converted to a 2009 forecast using growth factors extracted from TEMPRO v6.1.
- Derive attraction trip end estimates by splitting total home based productions for each purpose and time period using purpose/time period specific attraction weights. Attraction weights are derived by disaggregating TEMPRO zone attraction data (from TEMPRO v6.1) to the A6MARR7B 1097 zone system using purpose specific land-use data.

Non-Home Based Purpose Trip Ends

- Derive appropriate trip rates from GMATS HIS to calculate total non-home based trips by purpose and time period.
- Total non-home based trips by purpose and time period are disaggregated symmetrically to origin and destination trip ends at the A6MARR7B 1097 zone level, using a set of weights. These weights are derived from home based trip attractions by purpose, themselves weighted to reflect the propensity of a non-home based trip to be undertaken following a particular home based purpose. These home based to non-home based purpose relationships were derived using trip chain data extracted from GMATS HIS.

Distributions

- Gravity models have been calibrated separately by mode and purpose using Citilabs MVGRAM software in 'forecasting' mode whilst controlling forecasts to target trip ends. Parameters were manipulated on a trial and error basis in order to produce mean trip lengths that are broadly comparable to those suggested by Transport Statistics Great Britain.

- K-factors have been calculated for the RIS sector-to-sector matrix and used in a second synthesis to improve the match of the observed and synthetic demands for cells of the matrix for which demand has been observed.
- The second synthetic demand forecast for the whole matrix is made, controlling forecasts to target trip ends and demands at the RIS sector-to-sector level using the K-factors.
- The fully observed cells in the second synthetic demand forecast are then overwritten with the fully observed data from the RIS.

5.48 Further details of the methodology are provided in Appendix of Reference 6.

Assembling the Trip Matrices

5.49 Movements that were not observed in the roadside interview surveys were in filled using information from the other data sources as follows:

- For non-commuting car trips, the non-observed cells were replaced with movements from the synthetic car matrices built by MVA. This work was carried out by MVA, using a procedure that allowed the tripend totals from the gravity models to be maintained in the merged matrices.
- For LGV trips, the non-observed movements were estimated using data from the expanded LGV matrices built for the TIF bid.
- For OGV trips, the non-observed cells were replaced with data from the HGV matrices built from the GBFM data.

5.50 The commuting car matrices were derived entirely from the census data, which provides full matrix data for car driver work trips:

- Within Greater Manchester and Cheshire East
- Between all parts of the above areas and other parts of Great Britain

5.51 Between areas outside of Greater Manchester and Cheshire East, for those external-to-external movements that are fully represented in the VDM.

Summary of Highway Matrix Elements

5.52 The contributions of the different data sources to the final matrix are illustrated below, in **Tables 5.5 – 5.7**, which show the percentage of trips with an origin or destination in the A6MARR Area of Influence, (AOI), which were fully observed in the RSI. This provides an indication of the extent to

which trips in the AOI are based on observed movements, and to what extent movements were derived from other data sources.

5.53 **Table 5.5** shows the results of the analysis for the AM peak hour. These indicate that approximately 58% of car trips are in cells that were fully observed in the RSI. The corresponding figures for LGVS and OGVS are somewhat higher, being 64% and 84% respectively.

5.54 **Table 5.6** shows the results for the inter-peak matrices. These are slightly better than those for the AM peak hour, with approximately 63% of car trips being in cells that were fully observed in the RSI, with equivalent figures 82% and 87% for LGV and OGV trips respectively.

5.55 The results for the PM peak hour are presented in **Table 5.7**. As can be seen, approximately 68% of car trips are in cells that were fully observed in the RSI. As was the case for the other time periods, the corresponding figures for the LGV and OGV matrices are slightly higher, with equivalent figures of 78% and 91% respectively.

Table 5.5 Comparison of AM Peak Hour Prior Matrix Trip Totals for Movements with an Origin or Destination in the A6MARR AOI (Vehicle Trips)

Journey Purpose/Vehicle Type	All Trips (Prior Matrix)	Trips in Fully Observed Cells	Percentage Fully Observed
Home to Work Car	26,158	20,025	76.6
Work to Home Car	946	637	67.3
Home to Education Car	5,554	1,621	29.2
Education to Home Car	368	344	93.4
Home to Shopping Car	1,514	851	56.2
Shopping to Home Car	293	199	68.1
Home to Employer's Business Car	2,038	1,066	52.3
Employer's Business to Home Car	122	72	58.7
Home to Other Car	10,408	3,767	36.2
Other to Home Car	2,959	1,457	49.2
All Home Based Car	**50,360**	**30,038**	**59.6**
Non-Home Based Employers Business Car	928	805	86.7
Non-Home Based Other Car	7,591	3,334	43.9
All Non-Home Based Car	**8,519**	**4,138**	**48.6**
All Car	**58,880**	**34,177**	**58.0**
Light Goods Vehicles	**4,737**	**3,790**	**80.0**
Other Goods Vehicles	**1,439**	**1,255**	**87.2**
Total	**65,055**	**39,222**	**60.3**

Table 5.6 Comparison of Inter-Peak Hour Prior Matrix Trip Totals for Movements with an Origin or Destination in the A6MARR AOI (Vehicle Trips)

Journey Purpose/Vehicle Type	All Trips (Prior Matrix)	Trips in Fully Observed Cells	Percentage Fully Observed
Home to Work Car	2,586	1,980	76.5
Work to Home Car	3,041	2,227	73.2
Home to Education Car	400	348	87.1
Education to Home Car	1,093	380	34.8
Home to Shopping Car	3,811	2,805	73.6
Shopping to Home Car	3,619	2,555	70.6
Home to Employer's Business Car	581	525	90.3
Employer's Business to Home Car	629	513	81.6
Home to Other Car	7,278	4,200	57.7
Other to Home Car	6,777	3,430	50.6
All Home Based Car	**29,815**	**18,962**	**63.6**
Non-Home Based Employers Business Car	3,094	2,859	92.4
Non-Home Based Other Car	9,857	5,328	54.1
All Non-Home Based Car	**12,951**	**8,187**	**63.2**
All Car	**42,767**	**27,148**	**63.5**
Light Goods Vehicles	**4,664**	**3,840**	**82.3**
Other Goods Vehicles	**1,380**	**1,204**	**87.3**
Total	**48,810**	**32,192**	**66.0**

Table 5.7 Comparison of PM Peak Hour Prior Matrix Trip Totals for Movements with an Origin or Destination in the A6MARR AOI (Vehicle Trips)

Journey Purpose/Vehicle Type	All Trips (Prior Matrix)	Trips in Fully Observed Cells	Percentage Fully Observed
Home to Work Car	1,569	1,022	65.1
Work to Home Car	18,855	15,323	81.3
Home to Education Car	400	356	88.9
Education to Home Car	942	696	73.9
Home to Shopping Car	1,582	1,243	78.6
Shopping to Home Car	2,779	2,075	74.7
Home to Employer's Business Car	363	251	69.2
Employer's Business to Home Car	2,003	1,305	65.1
Home to Other Car	6,068	3,462	57.0
Other to Home Car	9,918	5,102	51.4
All Home Based Car	**44,479**	**30,834**	**69.3**
Non-Home Based Employers Business Car	1,215	1,057	87.0
Non-Home Based Other Car	8,443	4,859	57.5
All Non-Home Based Car	**9,658**	**5,916**	**61.3**
All Car	**54,138**	**36,750**	**67.9**
Light Goods Vehicles	**3,919**	**3,036**	**77.5**
Other Goods Vehicles	**645**	**586**	**90.8**
Total	**58,702**	**40,372**	**68.8**

Matrix Smoothing

5.56 A significant proportion of the trips in the updated matrices were based on movements observed in the RSI. It was considered, therefore, that the updated matrices would be too 'lumpy' to provide realistic traffic assignments, and that a matrix smoothing procedure would have to be used to compensate for sampling errors and day-to-day variations in traffic flows observed in the RSI.

5.57 The matrices were smoothed using the matrix smoothing procedure developed by GMTU for smoothing the 1999 trip matrices used with the Sub-Regional Highways Model, (SRHM), and also used during the production of the 2005 TIF bid matrices. The procedure involves two steps, as follows:

- First, the prior matrix is compressed, to form an aggregated matrix representing travel patterns between larger areas
- Next, the compressed (aggregated) matrix is expanded back to the original zoning system, with the row and column totals from the prior matrix being used as 'weights' to disaggregate the compressed zone-to-zone movements on a proportional basis.

5.58 The procedure has the following properties:

- The number of zero cell values in the input matrix is reduced, depending on the size of the aggregation zones
- Zone-to-zone movements from the input matrix are maintained in the smoothed matrix, at the aggregated zone level
- The trip length distribution of the output (smoothed) matrix is similar to that of the input matrix, provided that the smoothing zones are not too large
- The row and column totals from the input matrix are maintained in the output matrix, at the input matrix zone level.

5.59 The smoothing procedure was run separately for the matrices for each journey purpose, vehicle type and time period, with the exception of the home-to-work and work-to-home matrices, which were based on a 100% sample from the census and did not, therefore, require smoothing.

5.60 The 'smoothing zones' (aggregation areas) were based on the zoning system developed for the GMSPM2, to ensure that only zones with similar trip making characteristics were aggregated. For zones within Greater Manchester and Cheshire East, therefore, each smoothing zone contained approximately 4 SATURN zones. (The input matrix travel patterns between the constituent GMSPM zones were therefore maintained in the output matrices for trips within Greater Manchester and Cheshire). As a rule, zones outside of Greater Manchester and Cheshire East were not aggregated, as the larger external zones were likely to have different travel patterns and characteristics, and were too large to be sensibly combined.

Re-allocating Trips to and From Manchester Airport to Parking Zones

5.61 The trips from the roadside interview survey (and also in the synthetic car matrices and the matrices built from the census journey-to-work data) were coded to their final destination.

Whilst this is acceptable for most trips, it is less satisfactory for trips to and from Manchester Airport, where car drivers and passengers can choose to park in one of the car parks associated with the airport and to complete their journeys by some other mode such as walk or shuttle bus.

5.62 The following method was therefore used for re-zoning trips to and from Manchester Airport to car parks, to improve the representation of traffic flows within the airport site. (Note that this procedure is unlikely to affect the routing of trips to and from the airport, or the modelled flows on the A6MARR scheme. It does, however, produce improved loadings at the airport car park sites, and better representations of local traffic flows).

5.63 The procedure is as follows:

- Identify zones (comprising terminals 1, 2 and 3) where drivers who are travelling to and from the zones may choose to park elsewhere and complete their journeys by some other mode
- Divide car trips to and from these zones into two types, comprising drop-off/pick-up trips, which can be coded to their final destination as usual, and parking trips, to be allocated to one of the long stay/short stay car parks at the airport site. (The proportion of air passengers who park will be estimated using information from the MAG Transport Strategy).
- Re-allocate parking trips to parking zones using zone weights based on car park entry and exit volumes supplied by AECOM.

5.64 When implementing the procedure it was assumed that:

- All employees (home-to-work and work-to-home car trips) park in one of the employee car parks
- All LGVs and OGVs park at their final destination.

6. Matrix Estimation

Introduction

6.1 HFAS's experience with large 'strategic' models has been that it is very difficult to meet the DMRB link flow validation criteria using a "prior" matrix except in limited parts of the network. Some degree of matrix estimation is always required.

6.2 The validation results for the prior PCU matrices indicated that only about 24% of the counted links across Greater Manchester had a GEH value of less than 5 in the AM peak hour. The corresponding figures for the PM peak and inter-peak hours were 23% and 21% respectively, indicating that matrix estimation using counts would have to be used if the assignment validation was to be significantly improved.

6.3 Separate matrix estimation runs were carried out for the car, LGV and OGV matrices for each of the modelled time periods. A total of four rounds of matrix estimation were carried out for each run, to ensure that the updated matrices did not change significantly between successive iterations, and that he procedure was satisfactorily converged. The method was as follows:

- Assign the prior matrix to the highway network to produce paths
- Run matrix estimation to produce a revised (estimated) demand matrix
- Assign the estimated demand matrix to produce revised paths
- Re-run matrix estimation using the prior matrix and the revised paths from above to produce a further estimate of the demand matrix
- Repeat
- Matrix Estimation stops once a degree of matrix 'stability' is reached

Traffic Count Data

6.4 The traffic count data for the matrix estimation runs was obtained from five sources:

- Manual classified counts from HFAS's traffic counts database (GMCounts)
- Automatic Traffic Counts (ATC) from HFAS's counts database
- ATC counts from the Highways Agency's TRADS database
- ATC and manual counts supplied by Cheshire East Council; and
- Entry and exit counts for car parks at Manchester Airport supplied by AECOM.

6.5 All counts were checked to exclude counts affected by known 'unusual' events such as accidents, road works, adverse weather conditions, holidays etc.

6.6 Where manual counts were used, separate counts were obtained for car, LGV, OGV and PCU flows for each of the modelled hours. Where ATC counts were used, all vehicle flows were obtained. These were converted into separate car, LGV, OGV and bus flows using vehicle composition factors calculated from manual counts at the same locations.

6.7 The counts were allocated to links in the highway network using an automatic count matching procedure developed by HFAS, based on the count OSGRs and the coordinates of the link polylines. The count and link direction and the count and link road class and number were also used as additional match criteria, to minimise the possibility of transcription errors.

6.8 For matrix estimation and validation purposes, all of the counts that were used in the validation were factored to a 2009 October average weekday using locally derived factors.

Count Checks

6.9 Matrix estimation procedures require accurate and consistent traffic counts if they are to work successfully. As matrix estimation strategies were developed, inconsistent counts were identified and eliminated from this process. Reasons for counts being eliminated included:

- Day-to-day variations in traffic flows
- Enumerator errors; and
- Other errors, such as count transcription errors, where counts are allocated to the wrong links or the wrong direction on a link.

6.10 Inconsistent counts were also identified through an automatic checking procedure within the SATURN programme, where counts violated 'Kirchoff's rule'. (These violations occur, for example, when two counts that are physically separated by intervening links are not equal, but where the assignment pattern indicates that all flows that pass through the first count site must also pass through the second).

6.11 Where it was thought that the discrepancies may have been caused by a counting error, or where the count might have been affected by unusual events that had not been picked up in the filtering exercise described above, then the counts were discarded. In situations where the inconsistencies were small, (such as might be caused by day-to-day variations in traffic flows), the counts were automatically averaged using the AVERK option in SATURN's SATPIJA program.

Cordons and Screenlines

6.12 To provide reassurance that the validation of the base year model was acceptable over a wider area counts on cordons and screenlines across Greater Manchester were included in the validation process. Overall, 908 counts were selected for matrix estimation and validation purposes across Greater Manchester. For the purposes of this report only cordons and screenlines within the A6MARR Area of Influence have been reported in detail but results for other cordons and screenlines within Greater Manchester are available on request from HFAS.

6.13 In total, 426 of these counts were in the A6MARR AOI comprising of 342 counts input to the matrix estimation runs and 82 counts providing an independent check on the calibrated model. The counts at the A6MARR RSI sites were used as constraints during matrix estimation, to prevent the fully observed movements becoming inconsistent with the counts at these locations because of changes to the matrix to match counts at other sites.

6.14 Where possible, the matrix estimation counts were combined to form a series of cordons and screenlines within the study area, to intercept movements between local centres, and in those areas where the scheme benefits are most likely to occur.

6.15 In total, 16 (two-way) cordons and screenlines in the A6MARR AOI were formed for use in matrix estimation, as illustrated in Figure 6.1 with descriptions of the crossing points outlined in Table 6.1. An additional screenline was also formed running parallel to the A34, (screenline 6), that was not used in matrix estimation, but which was set aside to provide an independent check on the calibrated model.

6.16 The remaining counts that were not used to form cordons and screenlines were divided into three groups comprising:

- TRADS counts on motorways for use in matrix estimation (approximately 40)
- Independent TRADS counts on motorways, (that were not used in matrix estimation), which were set aside to provide an independent check on the calibrated model (8); and
- Other Independent (ad hoc) counts on local roads in the study area, that were also set aside to provide an independent check on the calibrated model (approximately 60).

Point Zone Counts

6.17 In addition to the 'standard' zones representing areas with similar land use and travel patterns, the A6MARR SATURN model also includes a number of 'point zones', representing developments such as large superstores, hospitals and industrial estates.

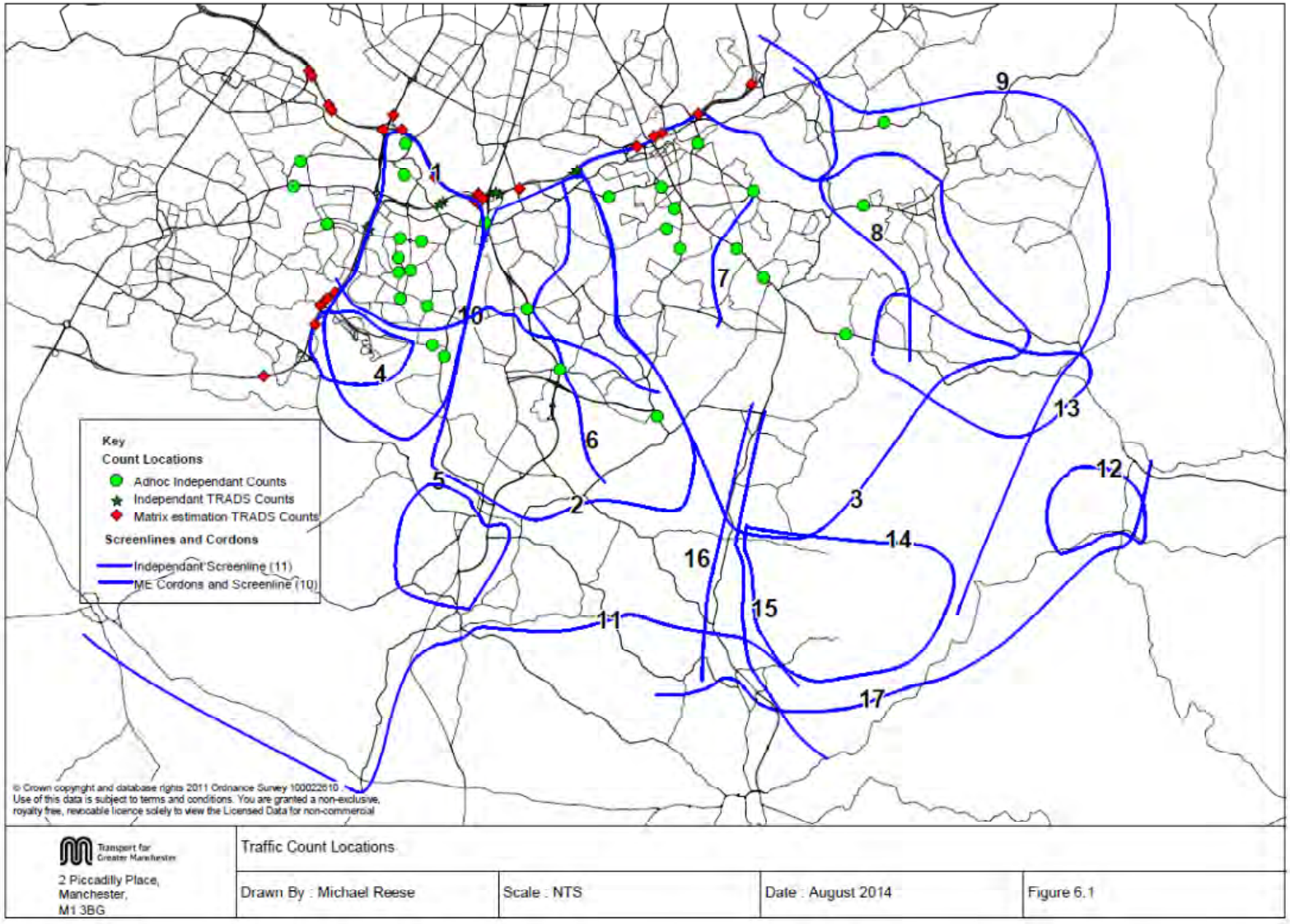
6.18 Where point zone counts were available, the entry and exit flows at the point zone sites were used as zonal constraints in the matrix estimation runs.

6.19 Point zones within the Area of Influence include:

- Car Parks at Manchester Airport
- Retail Parks such as Cheadle Royal and Handforth Dean
- Individual superstores such as TESCO in Didsbury; and
- Business Parks/Trading Estates such as Stockport Trading Estate.

Manchester Airport Car Park Counts

6.20 The Manchester Airport car park counts were also used as zonal constraints in the matrix estimation runs, to ensure that movements within the airport site were modelled as accurately as possible.


Key
Count Locations
Adhoc Independant Counts
Independant TRADS Counts
Matrix estimation TRADS Counts
Screenlines and Cordons
Independant Screenline (11)
ME Cordons and Screenline (10)
1
2
3
4
5
6
7
8
9
10
11
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17
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Transport for Greater Manchester
2 Piccadilly Place, Manchester, M1 3BG
Traffic Count Locations
Drawn By : Michael Reese
Scale : NTS
Date : August 2014
Figure 6.1

Table 6.1	**Descriptions of Crossing Points for Cordons and Screenlines**						
1 .A6MARR Cordon 1		**3. A6MARR Cordon 3**		**7. Stockport-Hazel Grove Screenline**		**11. Wilmslow/Macclesfield Screenline**	
1	A560 Gatley Road	1	A523 London Road	1	Bramhall Moor Lane	1	A6017 Ashton Road
2	Brown Lane	2	A5149 Chester Road	2	A6 Buxton Road	2	A560 Hyde Road
3	B5167 Palatine Road	3	A5102 Bramhall Lane South	2	A6 Buxton Road	3	A627 Otterspool Road
4	Finney Lane	4	Manor Road	4	A626 Marple Road	4	A626 Marple Road
5	B5166 Styal Road	5	Adswood Road	5	A5143 Jacksons Lane	5	Windlehurst Road
6	Thorley Lane	6	B5465 Edgeley Rd	**8. Romiley-Hazel Grove Screenline**		6	A6 Buxton Road
7	M56 T2 onslip/offslip	7	A560 Stockport Rd	1	A6017 Ashton Road	7	B6104 Stockport Road
8	M56 T1 onslip/offslip	8	A5145 Hollywood Way	2	A560 Hyde Road	8	B5090 Wellington Road
9	Simonsway	9	A5145 Travis Brow	3	A627 Otterspool Road	**12. Whaley Bridge & Horwich End Cordon**	
10	A560 Altrincham Road	10	A6 Wellington Road North	4	A626 Marple Road	1	Buxton Old Road
11	B5167 Palatine Road	11	B6167 Lancashire Hill	5	Windlehurst Road	2	A5004 Buxton Road
12	Hollyhedge Road	12	A626 St Mary's Way	6	A6 Buxton Road	3	B5470 Manchester Road
2 .A6MARR Cordon 2		13	B6104 Carrington Road	7	B6104 Stockport Road		
1	A560 Gatley Road	14	B6104 Stockport Rd West	**9. Romiley New Mills Screenline**		4	A5004 Buxton Road
2	Brown Lane	15	A626 Marple Road	1	A560 Hyde Road	5	B5470 Macclesfield Road
3	Manchester Road	16	A626 Brabyns Row	2	Sandy Lane	**13. Disley & Newton Cordon Inbound**	
4	Hollin Link	17	B6101 Haguebar Rd	3	A626 Glossop Rd	1	Buxton Old Road
5	A34 Kingsway	18	A6 Buxton Road	4	A6015 Church Road	2	Mudhurst Lane
6	Finney Lane	19	Roundy Lane	5	A6 Buxton Road	3	A6 Buxton Road
7	B5166 Styal Road	20	A523 London Rd	6	B5470 Macclesfield Road	4	Windlehurst Road
8	A34 Wilmslow Bypass	21	A5149 Chester Rd	7	Buxton Old Road	5	Wybersley Road
9	B5358 Lees Lane	**4.Manchester Airport Cordon**		**10. Manchester Airport**		6	A6015 Albion Road
10	A5149 Chester Road	1	A538 Avro Way	1	Shadowmoss Road	7	A6 Buxton Rd
11	A5102 Bramhall Lane South	2	Sydney Avenue	2	B5166 Styal Road	**6. A34 Screenline- Independent**	
12	Robins Lane	3	World Way	3	Finney Lane	1	B5094 Stanley Road

13	Manor Road	4	Outwood Lane	4	St' Anns Road	2	A555 MAELR
14	Adswood Road	5	Ringway Road	5	Finney Lane	3	A560 Stockport Road
15	B5465 Edgeley Road	**5.Wilmslow Cordon**		6	B5358 Wilmslow Road	4	A5149 Cheadle Road
16	A560 Stockport Road	1	A538 Manchester Road	7	Gill Bent Road	5	Etchells Road
17	M60 Cheadle Spur	2	B5085/6 Knutsford Road	8	B5094 Moss Lane	6	A5102 Wilmslow Road
18	B5095 Manchester Road	3	A538 Prestbury Link Road	9	A5102 Woodford Road	7	Councillor Lane
19	Chancel Lane	4	A34 Wilmslow Road	10	A34 Kingsway Cheadle Hulme		
20	A5102 Adlington Road			11	M56 Junctions 4 - 5		
				12	Bailey Lane		

14. Bollington / Adlington Cordon			**16. A523 East Screenline**		**17. A523 West Screenline**		**18. Prestbury To Whaley Bridge Screenline**
1	Bakestonedale Road	1	Park Lane	1	A5149 Chester Road	1	Macclesfield Road
2	Blaze Hill Rd	2	Street Lane	2	Mill Lane	2	A538 Heybridge Lane
3	B5090 Henshall Rd	3	Brookledge Lane	3	B5358 Bonis Hall Lane	3	B5091 London Road
4	Holehouse Lane	4	Holehouse Lane	4	A538 Prestbury Lane	4	B5090 Tytherington Lane
5	Brookledge Lane	5	B5091 Flash Lane	5	Clifford Road	5	A523 The Silk Road
6	Roundy Lane	6	B5090 Bollington Road			6	B5470
		7	Dickens Lane			7	A5004 Buxton Road
						8	B5470 Chapel Rd
						9	A6
						10	B6062

Matrix Estimation Results

6.21 Table 6.2 shows the total trips in the estimated matrices and the percentage change from the prior matrices by vehicle type and time period for trips with an origin or destination in the A6MARR Area of Influence.

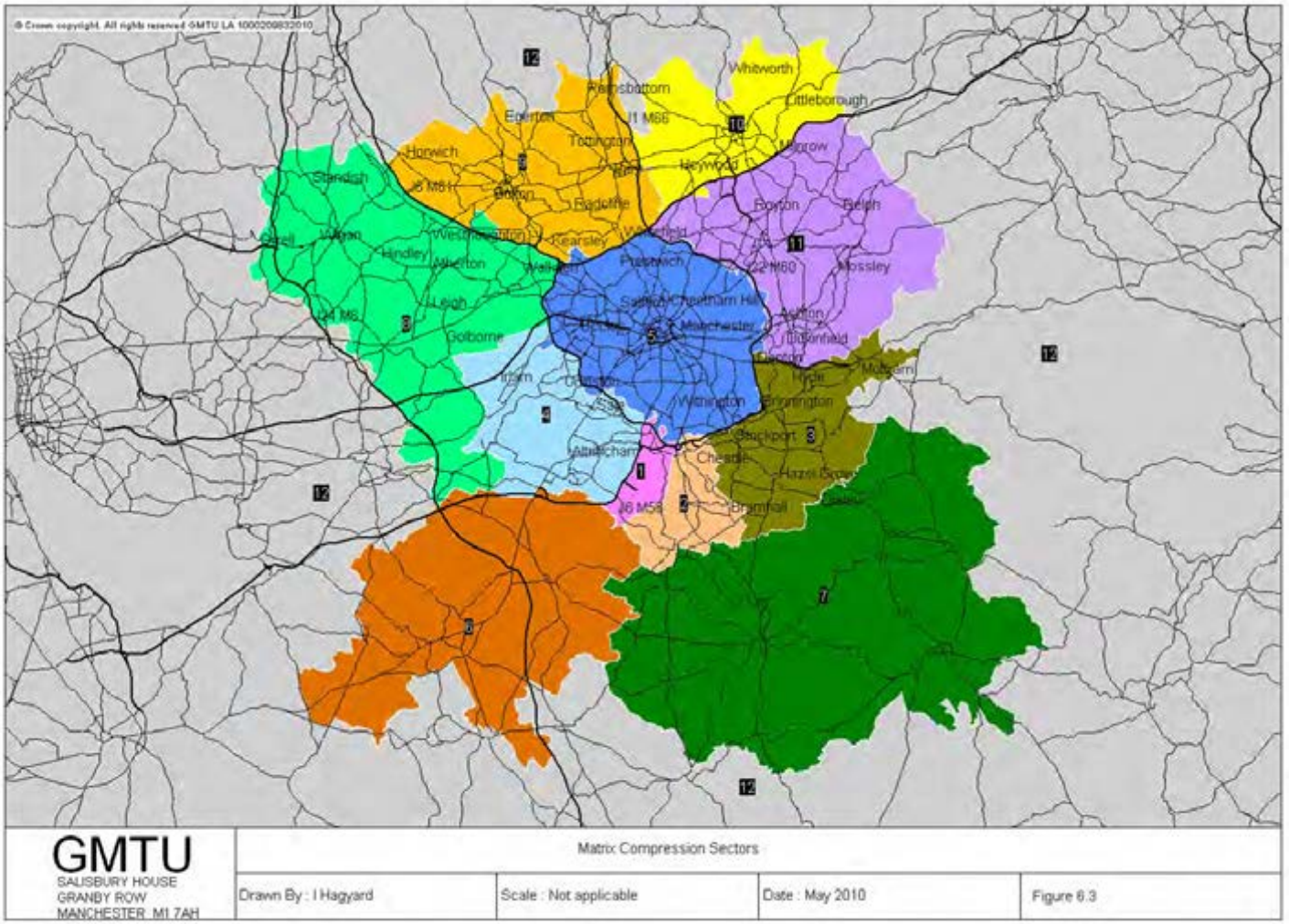
Table 6.2 Total Trips in Estimated Matrices and Percentage Change from Prior Matrices for Movements with an Origin or Destination in AOI

Vehicle Type	Time Period					
	AM Peak		Inter-Peak		PM Peak	
	Trips	% Change	Trips	% Change	Trips	% Change
Car	56,263	-5.80%	43,165	-2.75%	52067	-0.54%
LGV	4,975	19.90%	4,725	15.59%	3,997	11.54%
OGV	2,323	-3.50%	2,715	0.57%	955	-12.95%
Total (PCUS)	63,561	-4.20%	50,605	-1.21%	57,019	-0.04%

6.22 For cars, the total numbers of trips have reduced in all three time periods, by approximately 6% in the AM peak hour, 3% in the inter-peak and 0.5% in the PM peak hour. For LGVs the total trips have increased in all three time periods, ranging from an approximate 20 % increase in LGV trips in the AM peak hour to an approximate 11% increase in OGV trips in the PM peak hour. For OGVs the total trips have decreased in the AM and PM peak hour ranging from an approximate 4% decrease in OGV trips in the AM peak hour to an approximate 13% decrease in OGV trips in the PM peak hour whilst the inter-peak is broadly neutral. The percentage change in PM peak OGV trips represents an actual increase of only about 130 trips, however, which is relatively modest for a model of this size.

6.23 Overall, the total change in PCU trips is relatively small, ranging from a reduction of approximately 4% in the AM peak hour to a slight decrease of 0.04% in the PM peak hour.

6.24 Appendix 6 gives a more detailed comparison of the prior and estimated matrices based on the aggregation of the 1097 A6MARR zones to the 12 sectors shown in Figure 6.2. In addition, it gives an indication of the degree of convergence of the matrix estimation procedure by comparing the penultimate and final estimated matrices at the sector level.


Whitworth
Littleborough
Ramsbottom
Eccles
J1 M66
Tottington
Horwich
Heywood
Milnrow
Standish
J6 M61
Bolton
Radcliffe
Royton
Failsworth
Wrightington
Westhoughton
Kearsley
Wardle
Pilsworth
J12 M60
Mossley
Orrell
Upholland
Hindley
Atherton
Walkden
Salford
Prestwich
Ashton
Leigh
J24 M6
Eccles
Manchester
Droylsden
Golborne
Irlam
Urmston
Sale
Wilmslow
Partington
Wilmington
Stockport
Altrincham
Cheadle
Hazel Grove
J6 M56
Bramhall
GMTU
SALISBURY HOUSE
GRANBY ROW
MANCHESTER M1 7AH
Matrix Compression Sectors
Drawn By : I Hagyard
Scale : Not applicable
Date : May 2010
Figure 6.3

6.25 Tables 6.3 to 6.5 show GEH[1] frequency distributions from the assignment of the prior and estimated matrices for the AM peak, inter-peak and PM peak hours. The tables give an indication of the way in which the estimated matrices improve the assignment validation. Separate results are presented for the independent counts, the matrix estimation counts and for all counts combined.

6.26 Considering the results for the AM [1]peak hour, approximately 47% of the counted links have a GEH value of less than 6 for the prior matrix, for all counts combined. This figure increases to almost 91% for the updated matrix, demonstrating how matrix estimation has improved the assignment validation.

Table 6.3 AM Peak Hour GEH Cumulative Frequency Distributions for the Prior and Estimated Matrices

GEH Range	Prior Matrix			Estimated Matrix		
	Independent Counts	Matrix Estimation Counts	All Counts	Independent Counts	Matrix Estimation Counts	All Counts
0 - 2	22.6	19.0	19.8	23.8	68.7	57.4
0 - 4	37.0	30.1	31.6	63.1	84.6	80.3
0 - 6	59.3	42.0	46.7	82.1	90.2	90.5
0 - 8	68.7	54.4	59.1	94.5	93.7	93.9
0 - 10	76.1	65.0	66.8	100.0	95.6	97.7

6.27 The results for the inter-peak and PM peak hours follow a similar pattern, with approximately 47% of the counted links for the inter-peak prior matrix having a GEH value of less the 6, and an equivalent figure of 50% for the PM peak matrix. The link flow comparisons for the updated matrices indicate that approximately 93% of the counted links have a GEH value of less than 6 for the inter-peak hour and the PM peak hour.

[1] GEH is an error statistic incorporating both relative and absolute errors. The form of the statistic is defined in Paragraph 7.9 of this report.

Table 6.4 Inter-Peak Hour GEH Cumulative Frequency Distributions for the Prior and Estimated Matrices

GEH Range	Prior Matrix			Estimated Matrix		
	Independent Counts	Matrix Estimation Counts	All Counts	Independent Counts	Matrix Estimation Counts	All Counts
0 - 2	24.1	15.3	17.3	29.76	82.12	70.7
0 - 4	44.0	32.8	35.9	72.62	90.95	85.8
0 - 6	57.8	43.4	47.3	83.33	94.48	91.8
0 - 8	74.2	60.2	64.2	95.24	96.03	96.2
0 - 10	88.1	74.3	78.1	100	97.24	98.9

Table 6.5 PM Peak Hour GEH Cumulative Frequency Distributions for the Prior and Estimated Matrices

GEH Range	Prior Matrix			Estimated Matrix		
	Independent Counts	Matrix Estimation Counts	All Counts	Independent Counts	Matrix Estimation Counts	All Counts
0 - 2	16.95	20.7	20.2	37.5	71.4	62.4
0 - 4	38.88	37.1	34.7	70	85.8	81.2
0 - 6	52.6	47.5	49.9	87.6	94.2	92.5
0 - 8	67.31	60.8	57.9	92.5	96.2	95.2
0 - 10	81.9	68.1	67.2	96.4	97.6	97.4

6.28 Table 6.6 compares mean trip lengths for movements with an origin or destination in the A6MARR Area of Influence in the prior and estimated matrices by vehicle type and time period.

6.29 For cars, the mean trip lengths have reduced in all time periods, with a reduction of approximately 4% in the AM peak hour, 5% in the inter-peak hour and 8%

6.30 The LGV matrices exhibit decreases in mean trip lengths in all three time periods, ranging from approximately 6% (from 18.04km to 16,97km) in the AM peak hour to 10% (from18.81km to 17.01km) in the PM peak hour.

6.31 However, the numbers of LGV trips are relatively small, so that these changes are modest in terms of overall network kilometres.

Table 6.6 Comparison of Mean Trip Lengths in the Prior and Estimated Matrices for Trips with an Origin or Destination in the A6MARR Area of Influence

Vehicle Type	Time Period					
	AM Peak		Inter-Peak		PM Peak	
	Mean (km)	% Change	Mean (km)	% Change	Mean (km)	% Change
Car	16.23	-4.20%	12.86	-5.43%	15.71	-8.52%
LGV	17.10	-5.98%	17.20	-9.65%	17.75	-8.38%
OGV	27.2	14.83%	24.85	14.40%	37.31	42.15%

6.32 The OGV matrices exhibit the greatest changes in mean trip lengths, with increases in all three time periods, ranging from approximately 14.8% in the AM peak hour to 42% in the PM peak hour. As noted earlier, however, the numbers of OGV trips are relatively small, so that these changes are modest in terms of overall network kilometres.

6.33 In summary, the changes to car and LGV trip lengths in all periods are fairly small. Changes in OGV trip lengths are more significant, particularly in the inter-peak and PM peak hours when the numbers of longer distance trips increase. However, the numbers of OGV trips are relatively small. We therefore consider the changes to be acceptable.

7. Traffic Flow Validation

Introduction

7.1 This section presents the link flow validation results for the updated matrices output from the matrix estimation procedure. It summarises the level of network convergence and compares assigned and observed link flows for each of the three modelled time periods using the criteria set out in the DMRB. Separate results are presented for the matrix estimation counts, for the independent counts and for all counts combined.

Network Convergence

7.2 The DMRB states that 'convergence is the key to robust economic appraisal' because, with a poorly converged base and/or test network, it is impossible to distinguish scheme effects from assignment 'noise'. Consequently, particular efforts were made to ensure that the networks were as highly converged as possible. This was achieved, but at the cost of protracted run times.

7.3 The DMRB criteria for an acceptable level of network convergence are that:

- Delta should be less than 1% on the final assignment; and
- More than 90% of links should have a flow that changes by less than 5% on the final 4 iterations. Note, however, that HFAS normally adopt stricter criteria, that more than 99% (98.5% prior to rounding) of links should have a flow change of less than 2% on the final four iterations.

7.4 Table 7.1 shows the above values for each of the modelled hours. The table indicates that the model meets DMRB convergence criteria, and that the model was well converged in all time periods, with Delta values well below 1% and the percentage of links with flows changing by less than 2% being over 98% in all cases.

Table 7.1 2009 A6MARR SATURN Model Network Convergence Statistics

Criterion	Target	AM Peak	Inter Peak	PM Peak
Delta	<1%	0.0100	0.0047	0.0113
Percentage of links with <2% flow change on final iteration	>99%	99.4	99.6	99.6
Final iteration –1		99.0	99.6	99.6
Final iteration –2		99.3	99.6	99.6
Final iteration –3		98.8	99.3	99.6

Assignment Validation Guidelines

7.5 The DMRB Volume 12 (reference 1) Table 4.2 sets out validation guidelines for comparing modelled and observed traffic flows based on the level of flow in vehicles per hour (vph). These are:

- **For observed flows less than 700 vph,** at least 85% of model flows should be within 100 vph of observations
- **For observed flows of between 700 and 2700 vph,** at least 85% of model flows should be within 15% of observations; and
- **For observed flows greater than 2700 vph,** at least 85% of model flows should be within 400 vph of observations

These criteria are referred to as the DMRB flow criteria in the text, and as 'All DMRB' in the tables.

7.6 Given that SATURN matrices are generally in units of PCUs per hour, the above criteria are assumed to apply to PCU flows.

7.7 In addition to the flow criteria described above, the DMRB also refers to the GEH statistic, where the guideline is that greater than 85% of counted links should have a GEH value of less than 5.

7.8 DMRB also requires that for any cordons and screenlines, the GEH value calculated over the cordon or screenline as a whole should be less than 4 in nearly all cases.

7.9 Finally, the DMRB requires that, taking all counts together, the slope of the best fit regression line should lie in the range 0.9 to 1.1, and the corresponding R-squared value should be greater than 0.95.

GEH Statistic

The GEH error statistic is a form of the Chi squared statistic incorporating both relative and absolute errors. The DMRB Volume 12 (reference 1) refers to the GEH statistic, where;

$$GEH = \sqrt{\frac{(M-C)^2}{(M+C)\ /2}}$$

and, M is the modelled flow

C is the observed flow (count).

Link Flow Comparisons for Matrix Estimation Counts

7.10 This section presents the assignment validation results for the sites in the A6MARR AOI that were used during matrix estimation. Separate results are presented for the sites comprising the 10 cordons and screenlines that were used as constraints during the matrix estimation runs, and for the adhoc (TRADS) sites on the M56 and M60 Motorways.

Matrix Estimation Cordons and Screenlines

7.11 In total, counts on 16 (two-way) cordons and screenlines were used during matrix estimation, as illustrated in Figure 6.1 and described below in Table 7.2.

Table 7.2 Matrix Estimation Cordons and Screenlines

Cordon/Screenline Number/Name		Direction	Number of Sites
1	A6MARR RSI Cordon 1	Inbound Outbound	12 13
2	A6MARR RSI Cordon 2	Inbound Outbound	20 20
3	A6MARR RSI Cordon 3	Inbound Outbound	21 21
4	Manchester Airport Cordon	Inbound Outbound	5 5
5	Wilmslow Cordon	Westbound Eastbound	4 4
6	Stockport – Hazel Grove Screenline	Westbound Eastbound	5 5
7	Romiley - Hazel Grove Screenline	Northbound Southbound	7 7
8	Romiley / New Mills Screenline	Westbound Eastbound	7 7
9	North-of-Scheme screenline Northbound	Northbound Southbound	12 12
10	Wilmslow / Macclesfield Screenline	Northbound Southbound	8 8
11	Whaley Bridge & Horwich End	Inbound Outbound	5 5
12	Disley & Newton Cordon	Inbound Outbound	7 7
13	Bollington / Adlington Cordon	Inbound Outbound	6 6
14	A523 East Screenline	Eastbound Westbound	7 7
15	A523 West Screenline	Eastbound Westbound	5 5
16	Prestbury To Whaley Bridge Screenline	Northbound Southbound	10 10
Total sites		-	281

Notes:

The Wilmslow cordon is only partially complete due to a lack of suitable counts.

7.12 The validation results for the matrix estimation cordons and screenlines are shown below in Tables 7.3 to 7.5. Results are presented for each of the three time periods for all vehicle types combined as PCUs. For each screenline and direction of travel, the tables show the number of count sites, the total observed flow, the total modelled flow, the difference between the modelled and observed flows and the percentage difference between the modelled and observed flows. The tables also show the screenline GEH value, which the DMRB recommends should be less than 4 in nearly all cases. The percentage of all individual count sites with a GEH value of less than 5 is shown at the bottom of the tables, together with the percentage of sites meeting either the DMRB1, DMRB2 or DMRB3 link flow criteria.

7.13 Table 7.3 compares modelled and observed flows in the AM peak hour. 22 out of 32 (two way) cordons/screenlines having a screenline GEH value of less than 4. Cordon number 5, (the Wilmslow Cordon), has the highest GEH value with a figure of 6.9 but it should be noted that the Wilmslow cordon is only partially complete due to a lack of suitable counts and is therefore light of traffic.

7.14 At the site level, approximately 90% of the sites have a GEH value of less than 5, and meet the combined DMRB link flow criteria, which satisfies the DMRB requirements.

Table 7.3 Comparison of AM Peak Hour Modelled and Observed Cordon and Screenline Crossing Flows for Counts used During Matrix Estimation (Actual Flows, All Vehicle Types)

Cordon	Direction	Number Of Sites	Observed Flow	Modelled Flow	Difference	% Difference	Screenline GEH
1	In	12	10684	10774	90	0.8%	0.9
	Out	13	8616	8339	-277	-3.2%	3.0
2	In	20	17778	16832	-946	-5.3%	7.2
	Out	20	17176	16779	-397	-2.3%	3.0
3	In	21	14913	14311	-602	-4.0%	5.0
	Out	21	14307	13759	-548	-3.8%	4.6
4	In	5	2642	2621	-21	-0.8%	0.4
	Out	5	1757	1672	-85	-4.8%	2.1
5	West	4	3259	3199	-60	-1.8%	1.1
	East	4	3526	3130	-396	-11.2%	6.9
6	West	5	4522	4288	-234	-5.2%	3.5
	East	5	4399	4260	-139	-3.2%	2.1
7	North	7	5081	4909	-172	-3.4%	2.4
	South	7	3906	3787	-119	-3.1%	1.9
8	West	7	2948	2906	-42	-1.4%	0.8
	East	7	2250	2171	-79	-3.5%	1.7
9	North	12	13583	12857	-726	-5.3%	6.3
	South	12	13668	13093	-575	-4.2%	5.0
10	North	9	5311	5160	-151	-2.8%	2.1
	South	9	5454	5078	-376	-6.9%	5.2
11	In	5	1514	1377	-137	-9.1%	3.6
	Out	5	1149	1402	253	22.0%	7.1
12	In	7	2429	2313	-116	-4.8%	2.4
	Out	7	2765	2669	-96	-3.5%	1.8
13	In	6	815	806	-9	-1.1%	0.3
	Out	6	951	917	-34	-3.6%	1.1
14	East	7	1349	1463	114	8.5%	3.0
	West	7	2178	2318	140	6.4%	3.0
15	East	5	1932	1916	-16	-0.8%	0.4
	West	5	2381	2607	226	9.5%	4.5
16	North	10	4623	4292	-331	-7.2%	5.0
	South	10	4601	4197	-404	-8.8%	6.1

Notes:

Percentage of all sites with GEH < 5 = 90.1
Percentage of all sites meeting DMRB flow criteria = 92.3

7.15 Table 7.4 compares modelled and observed screenline crossing flows in the inter-peak hour in PCUs.

7.16 Overall, the comparisons are very good, with 30 out of 32 (two way) cordons/screenlines having a screenline GEH value of less than 4 with North of Scheme having the highest value (4.8). At the site level, approximately 93% of sites have a GEH value of less than 5 and meet the combined DMRB link flow criteria, which is well within the DMRB guidelines.

Table 7.4 Comparison of Inter Peak Hour Modelled and Observed Cordon and Screenline Crossing Flows for Counts used During Matrix Estimation (Actual Flows, All Vehicle Types)

Cordon	Direction	Number Of Sites	Observed Flow	Modelled Flow	Difference	% Difference	Screenline GEH
1	In	12	7167	7226	59	0.8%	0.7
	Out	13	7307	7136	-171	-2.3%	2.0
2	In	20	12083	11993	-90	-0.7%	0.8
	Out	20	11710	11595	-115	-1.0%	1.1
3	In	21	11877	11510	-367	-3.1%	3.4
	Out	21	12171	11735	-436	-3.6%	4.0
4	In	5	1734	1742	8	0.5%	0.2
	Out	5	1850	1882	32	1.7%	0.7
5	West	4	2382	2229	-153	-6.4%	3.2
	East	4	2385	2254	-131	-5.5%	2.7
6	West	5	3259	3225	-34	-1.0%	0.6
	East	5	3560	3541	-19	-0.5%	0.3
7	North	7	3916	3867	-49	-1.3%	0.8
	South	7	3785	3693	-92	-2.4%	1.5
8	West	7	2193	2194	1	0.1%	0.0
	East	7	2127	2120	-7	-0.3%	0.2
9	North	12	10342	10127	-215	-2.1%	2.1
	South	12	10221	9746	-475	-4.7%	4.8
10	North	9	3329	3217	-112	-3.4%	2.0
	South	9	3143	3019	-124	-4.0%	2.2
11	In	5	1010	974	-36	-3.6%	1.1
	Out	5	1000	966	-34	-3.4%	1.1
12	In	7	2192	2138	-54	-2.5%	1.2
	Out	7	2124	2082	-42	-2.0%	0.9
13	In	6	530	523	-7	-1.3%	0.3
	Out	6	539	541	2	0.4%	0.1
14	East	7	1606	1562	-44	-2.7%	1.1
	West	7	1591	1517	-74	-4.7%	1.9
15	East	5	1352	1370	18	1.3%	0.5
	West	5	1325	1357	32	2.4%	0.9
16	North	10	2914	2715	-199	-6.8%	3.8
	South	10	2862	2684	-178	-6.2%	3.4

Notes:

Percentage of all sites with GEH < 5 = 93.2
Percentage of all sites meeting DMRB flow criteria = 94.6

7.17 Table 7.5 compares modelled and observed screenline crossing flows in the PM peak hour for all vehicles combined as PCUs.

7.18 In total, 25 out of 32 of the (two way) cordons/screenlines have a GEH value of less than 4. Inbound flows on cordon 1, (the A6MARR RSI cordon encompassing Wythenshawe and Manchester Airport), have the highest GEH value, with a figure of 7.0.

7.19 At the site level, approximately 91% of the sites have a GEH value of less than 5, with 93% of the sites meeting the combined DMRB link flow criteria.

Table 7.5 Comparison of PM Peak Hour Modelled and Observed Cordon and Screenline Crossing Flows for Counts used During Matrix Estimation (Actual Flows, All Vehicle Types)

Cordon	Direction	Number Of Sites	Observed Flow	Modelled Flow	Difference	% Difference	Screenline GEH
1	In	12	9255	8591	-664	-7.2%	7.0
	Out	13	9958	9525	-433	-4.4%	4.4
2	In	20	17531	17010	-521	-3.0%	4.0
	Out	20	16051	15945	-106	-0.7%	0.8
3	In	21	14707	14906	199	1.4%	1.6
	Out	21	15586	15353	-233	-1.5%	1.9
4	In	5	1625	1602	-23	-1.4%	0.6
	Out	5	2410	2373	-37	-1.5%	0.8
5	West	4	3073	3078	5	0.2%	0.1
	East	4	3312	3065	-247	-7.5%	4.4
6	West	5	3929	3875	-54	-1.4%	0.9
	East	5	4325	4308	-17	-0.4%	0.3
7	North	7	4340	4379	39	0.9%	0.6
	South	7	5685	5738	53	0.9%	0.7
8	West	7	2533	2542	9	0.4%	0.2
	East	7	3471	3433	-38	-1.1%	0.6
9	North	12	12901	12646	-255	-2.0%	2.3
	South	12	14032	13359	-673	-4.8%	5.8
10	North	9	5141	5038	-103	-2.0%	1.4
	South	9	4735	4706	-29	-0.6%	0.4
11	In	5	1456	1436	-20	-1.4%	0.5
	Out	5	1674	1375	-299	-17.9%	7.7
12	In	7	2960	2916	-44	-1.5%	0.8
	Out	7	2425	2438	13	0.5%	0.3
13	In	6	922	916	-6	-0.7%	0.2
	Out	6	914	917	3	0.3%	0.1
14	East	7	2339	2292	-47	-2.0%	1.0
	West	7	1542	1545	3	0.2%	0.1
15	East	5	1926	1888	-38	-2.0%	0.9
	West	5	1809	1811	2	0.1%	0.0
16	North	10	4407	4132	-275	-6.2%	4.2
	South	10	3998	3671	-327	-8.2%	5.3

Notes:

Percentage of <u>all sites</u> with GEH < 5 = 91.3
Percentage of <u>all sites</u> meeting DMRB flow criteria = 93.4

Matrix Estimation Motorway Sites

7.20 Table 7.6 compares modelled and observed flows for the matrix estimation sites on the M56 and M60 motorways for all vehicles combined as PCUs, for each of the modelled time periods. The table shows the number of sites, the total observed flow, the total modelled flow, the difference between the modelled and observed flows and the percentage difference between the modelled and observed flows. The table also shows the percentage of sites with a GEH value of less than 5. The figures in the column headed 'All DMRB' give the percentage of counted links that meet either the DMRB1, 2 or 3 link flow criteria.

7.21 In general, the comparisons are very good, with greater than 91.7% of the sites having a GEH value of less than 5 in all time periods. The comparisons against the DMRB link flow criteria are also very good, with 91.7% of sites achieving the required standard in the AM peak hour, and 100.0% of the sites meeting the standard in the inter-peak and PM peak hours respectively.

Table 7.6 Link Flow Comparisons for Motorway Counts used During Matrix Estimation (Actual Flows, All Vehicles)

Time Period Period	Number Of Sites	Observed Flow	Modelled Flow	Difference	% Difference	% GEH < 5	% All DMRB
AM Peak	36	126273	121467	-4806	-3.8%	91.7	91.7
Inter Peak	36	94207	92115	-2092	-2.2%	100.0	100.0
PM Peak	36	122856	120395	-2461	-2.0%	100.0	100.0

Link Flow Comparisons for All Matrix Estimation Counts

7.22 Table 7.7 compares modelled and observed flows for all of the matrix estimation counts for each of the modelled time periods. These counts comprise the matrix estimation cordon and screenline counts plus the 36 TRADS counts on the M56 and M60 motorways in the A6MARR area. It should be noted that where a cordon or screenline uses the same count, that count is only included once in the overall number of sites.

7.23 As a whole, the comparisons are very good, with 91% of the sites having a GEH value of less than 5 in the AM peak hour, and 93% of sites meeting the DMRB flow criteria. The results for the inter-peak hour are slightly better, with approximately 94% of sites having a GEH value of less than 5 and 97% meeting the DMRB flow criteria. The PM peak hour has approximately 92% of sites having a GEH value of less than 5 and approximately 95% meeting the DMRB flow criteria.

7.24 At an aggregate level, the modelled flows are within 3.8% of the counted flows in the AM peak and inter-peak hours, and are within approximately 2.0% of the counted flows in PM peak hour.

Table 7.7 Link Flow Comparisons for All Matrix Estimation Counts (Actual Flows, All Vehicles)

Time Period Period	Number Of Sites	Observed Flow	Modelled Flow	Difference	% Difference	% GEH < 5	% All DMRB
AM Peak	285	289749	278672	-11077	-3.8%	91.2	92.6
Inter-Peak	285	214609	209465	-5144	-2.4%	94.4	96.8
PM Peak	285	282835	276737	-6098	-2.2%	92.3	94.7

Link Flow Comparisons for Independent Counts

7.25 This section presents the assignment validation results for the independent counts that were reserved to check the accuracy of the calibrated model. Separate results are presented for the A34 screenline, the adhoc counts in the Area of Influence of the scheme and for all counts combined.

A34 Screenline

7.26 Table 7.8 compares modelled and observed flows for the A34 screenline, which runs to the east of A34 to intercept movements between Bramhall/Cheadle Hulme and Handforth/Wythenshawe/Manchester Airport. Results are presented for all vehicles combined ad PCUs, for each of the modelled time periods.

7.27 The table shows a reasonable agreement between modelled and observed flows.

7.28 The percentage difference between the modelled and observed flows ranges from +0.4% in the westbound direction in the AM peak hour to –12.5% in the eastbound direction in the afternoon-peak hour.

Table 7.8 Link Flow Comparisons for the A34 Screenline (Actual Flows, All Vehicles)

Time Period	Direction	Observed Flow	Modelled Flow	Difference	% Difference	Screenline GEH
AM Peak	Westbound	6931	6957	26	0.4%	0.3
	Eastbound	4657	4650	-7	-0.2%	0.1
Inter-Peak	Westbound	4299	4021	-278	-6.5%	4.3
	Eastbound	4256	3975	-281	-6.6%	4.4
PM Peak	Westbound	4948	5236	288	5.8%	4.0
	Eastbound	6949	6081	-868	-12.5%	10.8

Adhoc Counts

7.29 Table 7.9 compares modelled and observed flows at the adhoc sites for each of the modelled time periods. These counts comprise the independent TRADS counts on the M56 and M60 motorways plus the adhoc counts on the local road network in the A6MARR area.

7.30 In general, the comparisons are reasonable, with approximately 76% of sites having a GEH value of less than 5.0 in each of the time periods. The percentage of sites meeting the DMRB link flow criteria ranges approximately 74% in the PM peak hour to 81% in the inter-peak hour.

Table 7.9 Link Flow Comparisons for AdHoc Independent Counts (Actual Flows, All Vehicles)							
Time Period Period	Number Of Sites	Observed Flow	Modelled Flow	Difference	% Difference	% GEH < 5	% All DMRB
AM Peak	62	53682	51476	-2206	-4.1%	75.8	79.0
Inter-Peak	62	43246	40823	-2423	-5.6%	82.3	80.6
PM Peak	62	52740	50295	-2445	-4.6%	69.4	74.2

All Independent Counts

7.31 Table 7.10 compares modelled and observed flows for all of the independent sites combined. Separate figures are presented for each of the modelled hours, for all vehicle flows expressed in PCUs.

Table 7.10 Link Flow Comparisons for All Independent Counts (Actual Flows, All Vehicles)							
Time Period Period	Number Of Sites	Observed Flow	Modelled Flow	Difference	% Difference	% GEH < 5	% All DMRB
AM Peak	84	110689	106090	-4599	-4.2%	72.6	75.0
Inter-Peak	84	85879	81842	-4037	-4.7%	81.0	79.8
PM Peak	84	106341	102950	-3391	-3.2%	71.4	75.0

7.32 Overall, the comparisons are fair, with the percentage of sites with a GEH value of less than 5 ranging from 81% in the interpeak period to approximately 72% in the remaining time periods.. The percentage of links meeting the combined DMRB link flow criteria ranges from 75% in the AM and PM peak hours to 80% in the inter-peak. The percentage differences between the modelled and observed flows are small, ranging from a slight under-assignment of less than 5% in the AM peak and interpeak hours, to and under-assignment of approximately 3% in the PM peak hour.

7.33 Although the validation of the model against the independent counts just fails to achieve the standard required by the DMRB, the validation is nevertheless reasonable, and is considered to be satisfactory.

Link Flow Comparisons for All Independent and Matrix Estimation Counts

7.34 Table 7.11 compares modelled and observed flows for all sites combined, comprising all of the matrix estimation counts plus all of the independent counts that were set aside to provide an independent check on the validated model.

7.35 The table shows that the overall validation is very good, with the percentage of sites with a GEH value of less than 5 being greater than 87% in all time periods. The percentage of sites meeting the DMRB link flow criteria ranges from 88.6% in the AM peak hour to 93% in the inter-peak hour.

7.36 On the whole, traffic flows are reproduced very well, with the percentage difference between the modelled and observed flows being less than 4% in all time periods, demonstrating that present day traffic levels are modelled correctly.

Table 7.11 Link Flow Comparisons for All Counts (Actual Flows, All Vehicles)

Time Period	Number Of sites	Observed Flow	Modelled Flow	Difference	% Difference	% GEH < 5	% All DMRB
AM Peak	369	400438	384762	-15676	-3.9%	87.0	88.6
Inter-Peak	369	300488	291307	-9181	-3.1%	91.3	93.0
PM Peak	369	389176	379687	-9489	-2.4%	87.5	90.2

7.37 Detailed assignment validation results for cordons & screenlines within the Area of Influence are included in Appendix 7.

Regression Analysis

7.38 The regression parameters for the line y=ax are shown in Table 7.12. As noted in earlier, the DMRB recommends that the slope of the line should lie in the range 0.9 to 1.1, and the corresponding R-squared value should be greater than 0.95.

7.39 The table shows that the slopes of the regression lines and the R-squared values are comfortably within the guideline ranges specified in the DMRB for all three time periods.

Table 7.12 Regression Line Statistics for All Counted Links (All Vehicles)

Time Period	Parameter	Y=x	Within DMRB Range
AM Peak Hour	Slope	0.958	Yes
	R-squared	0.995	Yes
Inter-Peak Hour	Slope	0.973	Yes
	R-squared	0.996	Yes
PM Peak Hour	Slope	0.978	Yes
	R-squared	0.993	Yes

7.40 Regression Plots of modelled versus observed flow for the matrix estimation and the independent count set are shown in Figures 7.1 to 7.6.

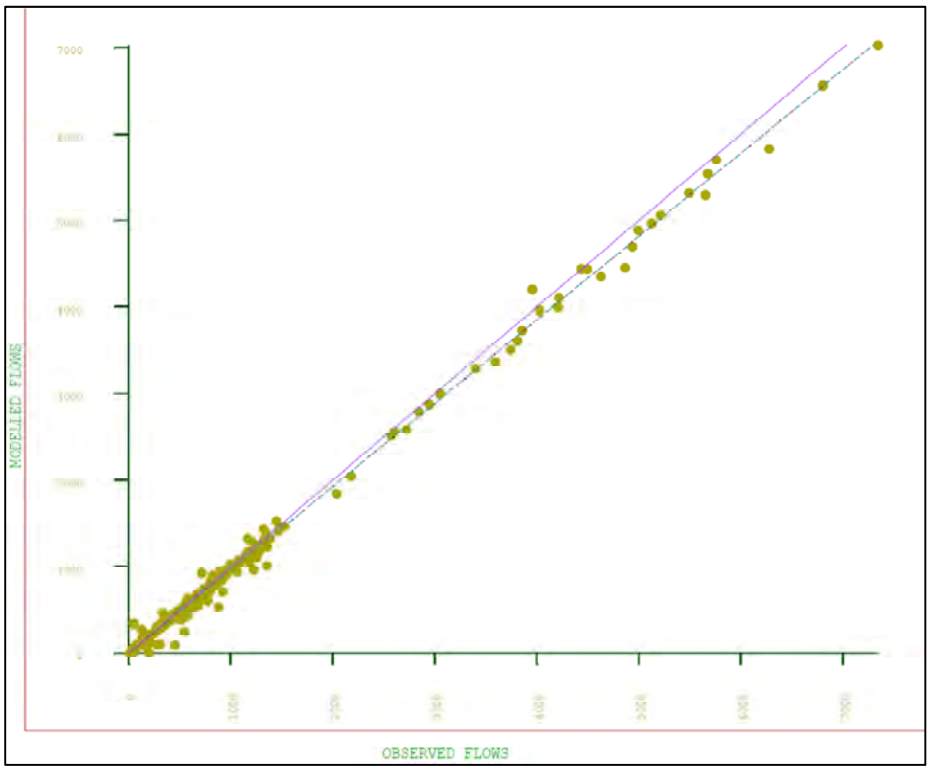


Figure 7.1: AM Peak Regression Analysis of Modelled Versus Observed Flow – Matrix Estimation Count Set

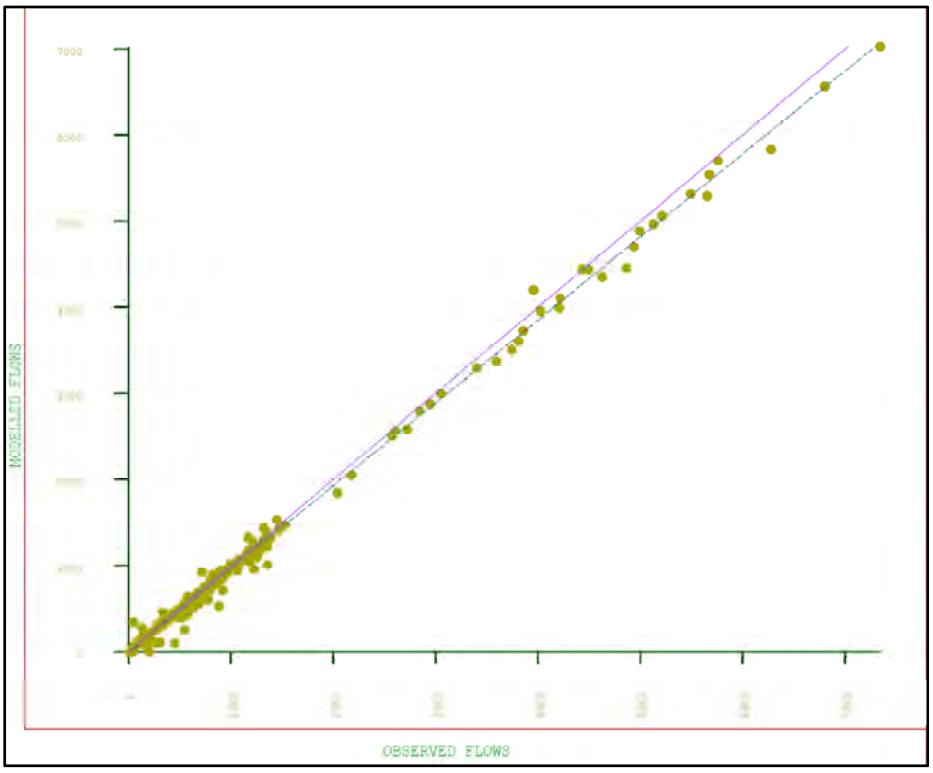


Figure 7.2: AM Peak Regression Analysis of Modelled Versus Observed Flow – Independent Count Set

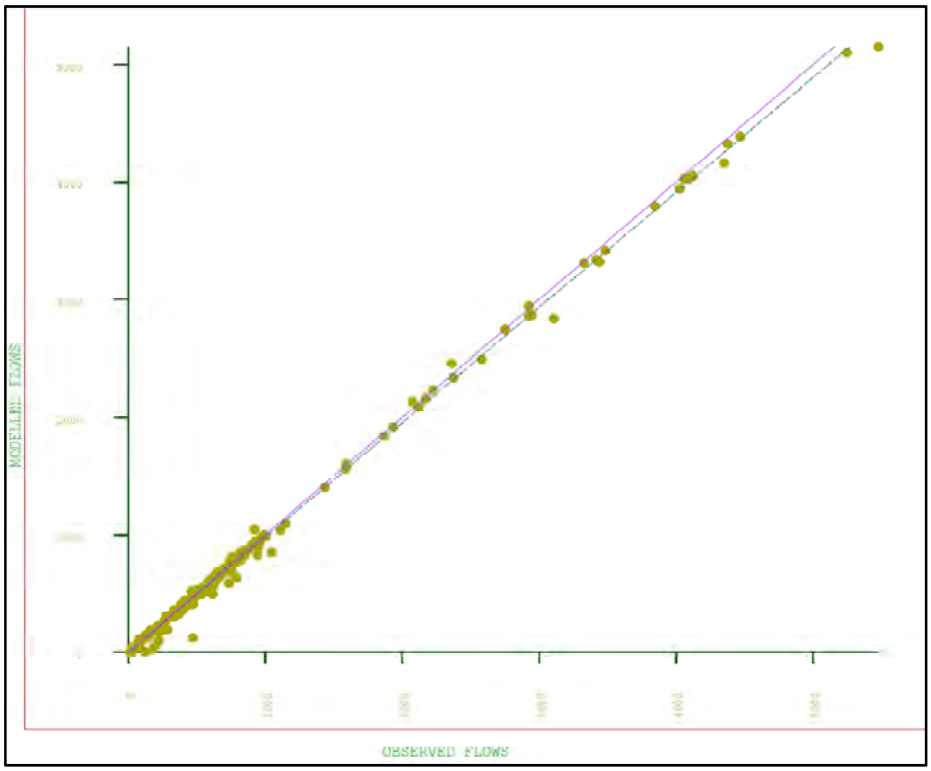


Figure 7.3: Inter-peak Peak Regression Analysis of Modelled Versus Observed Flow – Matrix Estimation Count Set

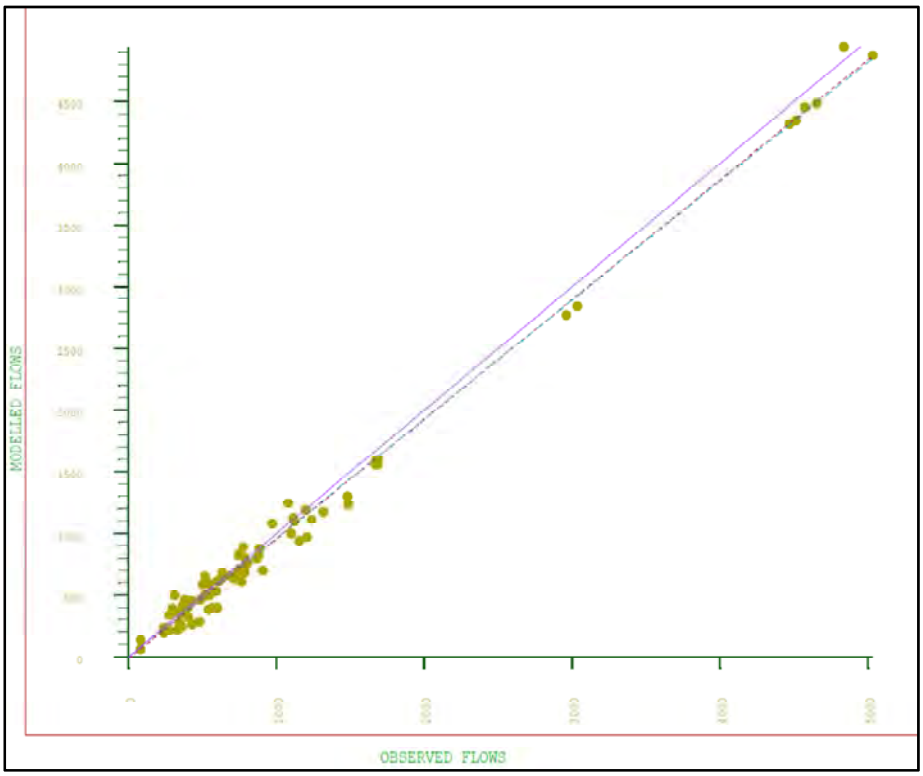


Figure 7.4: Inter-peak Peak Regression Analysis of Modelled Versus Observed Flow – Independent Count Set

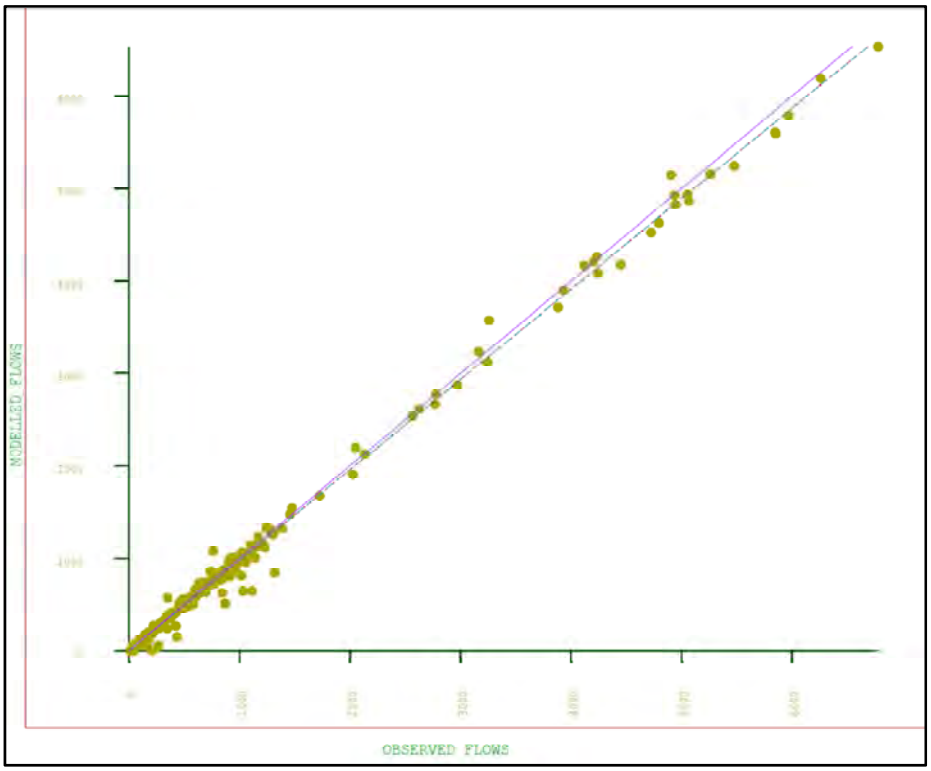


Figure 7.5: PM Peak Regression Analysis of Modelled Versus Observed Flow – Matrix Estimation Count Set

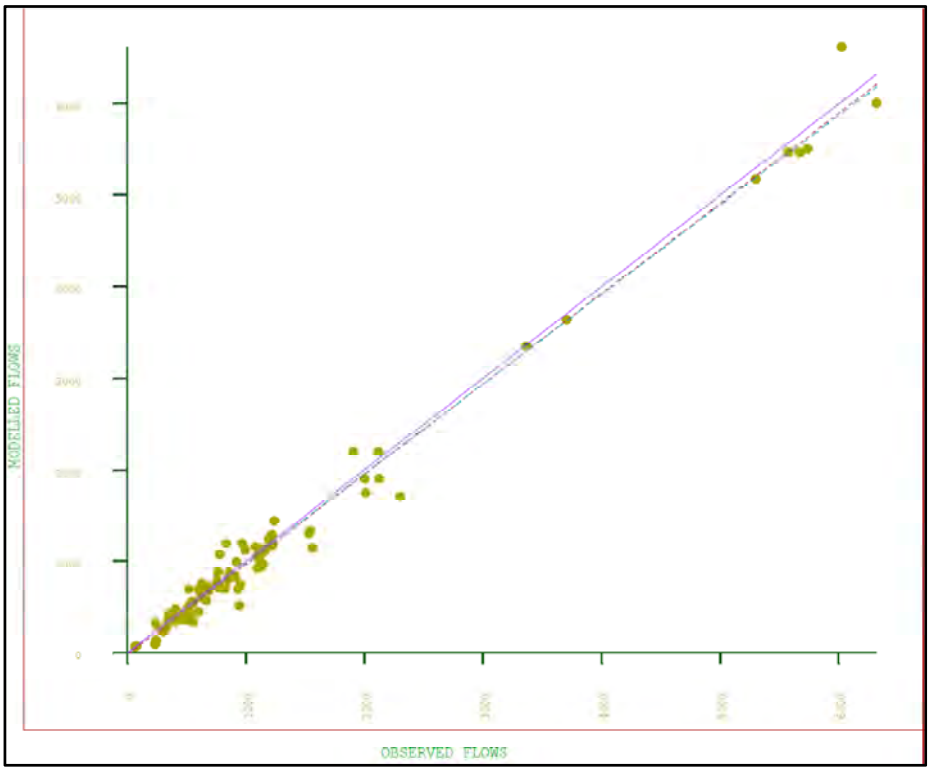


Figure 7.6: PM Peak Regression Analysis of Modelled Versus Observed Flow – Independent Count Set

8. Journey Time Validation

Introduction

8.1 Modelled and observed journey times have been compared on a selection of radial and orbital routes within the study area, as shown in Table 8.1 and illustrated in Figure 8.1. The routes are designed to replicate typical journeys within the Area of Influence of the scheme.

8.2 The observed journey times have been estimated using GPS data for 2009 from the Trafficmaster database. This information is collected on behalf of the Department for Transport by Trafficmaster PLC, and provides information about average vehicle speeds on roads across the UK for vehicles fitted with GPS devices. The information in the database has been processed by HFAS to exclude observations collected during school and national holidays, and to calculate average times for non-stopping vehicles (i.e. excluding buses and taxis) for standardized time periods. For the purpose of this analysis, the modelled times have been compared with observed times collected during for the morning peak hour 0800-0900, the evening peak hour 1700-1800 and the inter-peak period 0930-1430.

8.3 Taken together, the journey time routes cover approximately 330km of the highway network in the A6MARR Area of Influence.

Journey Time Validation Guidelines

8.4 The DMRB requirement for journey time validation is that modelled times should be within 15% (or 1 minute if this is higher) of the observed time on more than 85% of routes.

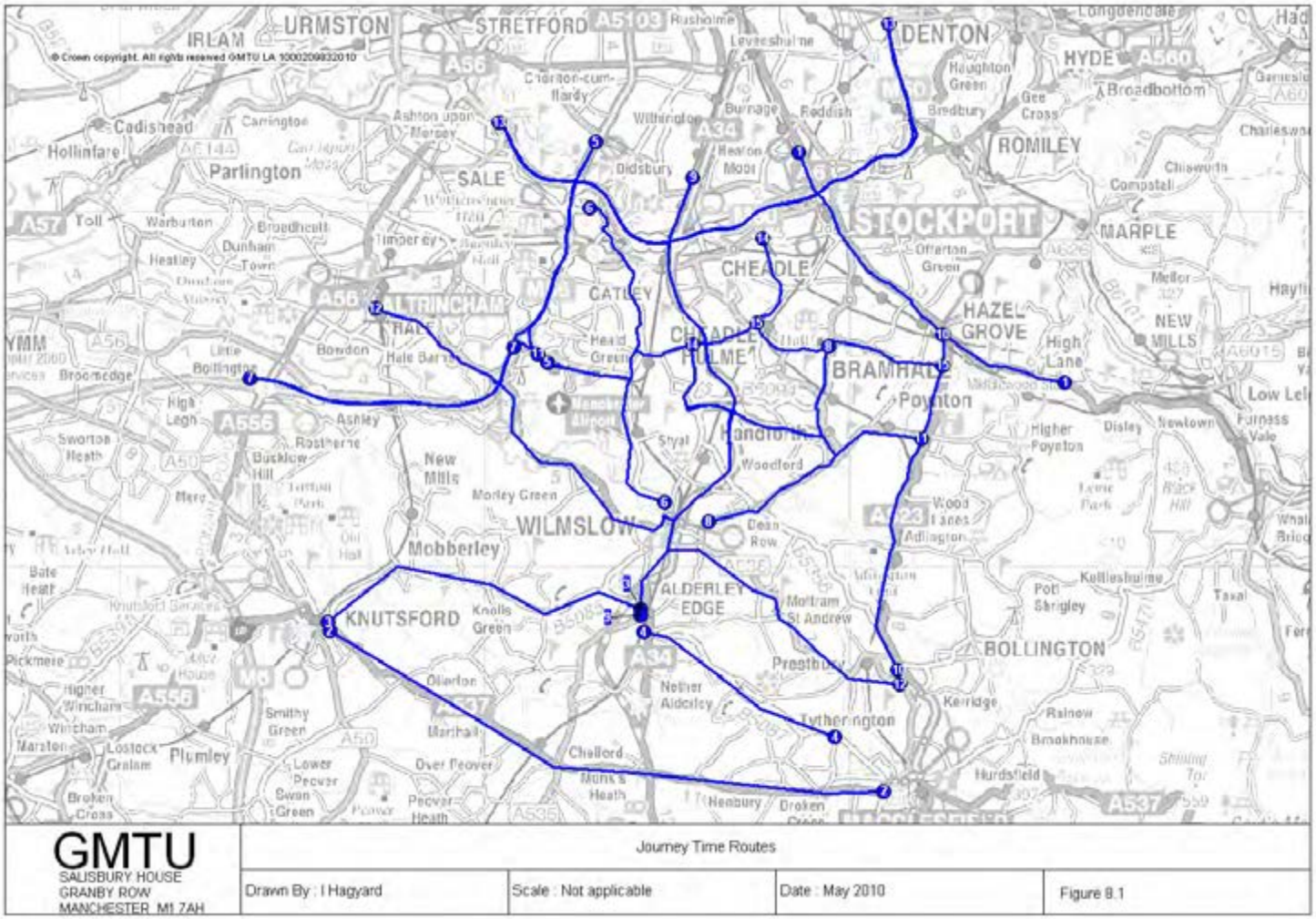
8.5 It should be noted, however, that paragraph 11.4.9 of the Traffic Appraisal Manual Volume 12) (reference 1) states:

"In congested conditions, where the journey times are flow dependent, the assignment package will provide estimates of link speeds and journey times for different times of day. These are not as accurate as the predictions of flows, as they are based on theoretical speed/flow relations that may not be the most appropriate for all parts of the network, and the standards for acceptance will generally be lower. Research has shown that, as long as the estimation of total travel time is unbiased, an empirically determined 95% confidence interval of +/- 20% can be taken to signify that the journey times are adequately modelled."

This range is also used for comparison in the following paragraphs.

8.6 Finally, it should also be noted that the modelled times represent the sum of the link travel times comprising each route, and therefore include flow-weighted delays for each of turns at the downstream ends of the constituent links. As a consequence, the route times do not necessarily represent the time taken to travel from the start point of the route to the routes end point, (as would be calculated using the SATURN 'Joy Ride' facility, for example), as this would only include the turn delays for a specific set of movements. Any differences should, however, be small. (This approach has been adopted for compatibility with the Trafficmaster data, and its procedure for allocating turning delays to links.)

Table 8.1 Journey Time Route Descriptions			
Route No.	**Description**	**Direction**	**Route Length (Modelled km)**
1	A6 Chapel to Heaton Moor	NW	8.7
	A6 Heaton Moor to Chapel	SE	8.7
2	A537 Knutsford to Macclesfield	E	16.4
	A537 Macclesfield to Knutsford	W	16.4
3	B5085 Knutsford to Alderley Edge	E	10.2
	B5085 Alderley Edge to Knutsford	W	10.2
4	B5087 Macclesfield to Alderley Edge	NW	6.6
	B5087 Alderley Edge to Macclesfield	SE	6.6
5	M56 Manchester Airport to West Didsbury	N	7.3
	M56 West Didsbury to Manchester Airport	S	6.8
6	B5166 Wilmslow to Northenden	N	10.0
	B5166 Northenden to Wilmslow	S	10.0
7	M56 J8 to J5	E	8.4
	M56 J5 to J8	W	8.4
8	A5102 Wilmslow to Bramhall	NE	7.6
	A5102 Bramhall to Wilmslow	SW	7.6
9	A34 Alderley Edge to East Didsbury	N	14.4
	A34 East Didsbury to Alderley Edge	S	14.3
10	A523 Prestbury to Hazel Grove	N	10.1
	A523 Hazel Grove to Prestbury	S	10.0
11	A555 MAELR Poynton to Manchester Airport	W	14.4
	A555 MAELR Manchester Airport to Poynton	E	14.4
12	A538 Prestbury to Hale	NW	22.1
	A538 Hale to Prestbury	SE	22.1
13	M60 J6 to J24	AC	17.0
	M60 J24 to J6	CW	17.2
14	Heald Green to Cheadle Heath	NE	5.2
	Cheadle Heath to Heald Green	SW	5.2
15	A5149/3 Cheadle Hulme to Hazel Grove	E	5.8
	A5143/9 Hazel Grove to Cheadle Hulme	W	5.8
16	Buxton Old Road / Higher Lane	SB	6.0
	Buxton Old Road / Higher Lane	NB	6.0
17	B5470 Chapel To Macclesfield	SB	16.5
	B5470 Macclesfield To Chapel	NB	16.5
18	B5090 / Bakestonedale Rd	WB	8.1
	B5090 / Bakestonedale Rd	EB	8.1
19	Bakestonedale Rd / Brookledge Lane / Mill Lane	WB	9.7
	Bakestonedale Rd / Brookledge Lane / Mill Lane	EB	9.7
20	B5358	NB	8.9
	B5358	SB	8.9
21	Roundy Lane / Middlewood Rd / Waterloo Rd	NB	7.3
	Roundy Lane / Middlewood Rd / Waterloo Rd	SB	7.3


URMSTON
IRLAM
STRETFORD
DENTON
HYDE
ROMILEY
STOCKPORT
MARPLE
CHEADLE
HAZEL GROVE
BRAMHALL
NEW MILLS
SALE
TRAFFORD PARK
TRINCHAM
Parlington
Cadishead
Hollinfare
Warburton
Broadheath
Dunham Town
Heatley
Timperley
Didsbury
Reddish
Burnage
Levenshulme
Ashton upon Mersey
Chorlton-cum-Hardy
Withington
Heaton Moor
Broadbottom
Bredbury
Gee Cross
Compstall
Marple
Offerton
Heald Green
Hale Barns
Bowdon
Little Bollington
Broomedge
Ashley
Rostherne
Bucklow Hill
Sworton Heath
Higher Poynton
Poynton
Lower Poynton
Disley
Newtown
Woodford
Morley Green
New Mills
WILMSLOW
Mobberley
Wood Lanes
Adlington
Dean Row
Mottram St Andrew
Pott Shrigley
Kettleshulme
ALDERLEY EDGE
KNUTSFORD
Knolls Green
Pickmere
Higher Wincham
Wincham
Marston
Lostock Gralam
Plumley
Smithy Green
Marthall
Over Peover
Lower Peover
Swan Green
Peover Heath
Chelford
Nether Alderley
Prestbury
BOLLINGTON
Kerridge
Rainow
Brookhouse
Tytherington
Hurdsfield
Heaviley
Broken Cross
GMTU
SALISBURY HOUSE
GRANBY ROW
MANCHESTER M1 7AH
Journey Time Routes
Drawn By : I Hagyard
Scale : Not applicable
Date : May 2010
Figure 8.1

AM Peak Hour Journey Time Validation Results

8.7 Table 8.2 compares modelled and observed journey times in the AM peak hour along the 42 journey time routes. In total, journey times on 39 out of 42 (or approximately 93%) of the routes meet DMRB journey time criteria that modelled times should be within 15% of observed times. The greatest differences between modelled and observed times are for routes 5 (northbound) and 13 (anticlockwise) on the M56 and M60, where the modelled times are too high on the M60 and too low on the M56.

8.8 Considering all of the routes together, the total modelled time is approximately 1.8% lower than the total observed time, which is within the DMRB criteria, but suggests that the modelled speeds are slightly too high in general.

Table 8.2 Modelled Versus Observed AM Peak Hour Journey Times (Minutes)						
Route Number	**Direction**	**Observed Time**	**Modelled Time**	**Modelled-Observed**	**% Error**	**Within DMRB**
1	NW	50.1	48.4	-1.7	3.5%	Y
	SE	43.0	47.6	4.5	10.6%	Y
2	E	22.7	22.1	-0.5	2.4%	Y
	W	21.7	20.7	-1.0	4.6%	Y
3	E	13.8	14.7	0.8	6.1%	Y
	W	13.8	13.4	-0.4	2.7%	Y
4	NW	7.7	7.1	-0.6	7.7%	Y
	SE	7.4	6.8	-0.6	8.2%	Y
5	N	12.3	6.7	-5.6	45.5%	N
	S	5.2	6.0	0.8	15.7%	N
6	N	16.5	16.3	-0.2	0.9%	Y
	S	16.6	18.3	1.7	10.3%	Y
7	E	6.7	6.3	-0.4	6.0%	Y
	W	5.2	5.8	0.6	12.6%	Y
8	NE	11.6	12.2	0.6	5.5%	Y
	SW	14.0	12.3	-1.7	12.1%	Y
9	N	24.0	20.8	-3.2	13.3%	Y
	S	24.2	22.9	-1.3	5.3%	Y
10	N	16.3	18.6	2.3	14.4%	Y
	S	17.7	18.0	0.3	1.5%	Y
11	W	24.7	23.3	-1.3	5.4%	Y
	E	23.2	24.3	1.1	4.8%	Y
12	NW	38.9	34.0	-4.8	12.5%	Y
	SE	38.8	36.2	-2.6	6.8%	Y
13	AC	11.2	14.4	3.3	29.6%	N
	CW	16.3	14.7	-1.6	9.7%	Y
14	NE	14.6	13.8	-0.8	5.4%	Y
	SW	14.1	13.1	-1.0	7.0%	Y
15	E	10.4	11.0	0.6	6.0%	Y
	W	14.9	13.6	-1.3	8.7%	Y
16	SB	7.9	7.6	-0.3	4.2%	Y
	NB	7.6	7.5	-0.1	1.5%	Y
17	SB	21.7	20.9	-0.8	3.9%	Y
	NB	21.7	20.4	-1.3	6.0%	Y
18	WB	12.4	11.8	-0.6	4.5%	Y
	EB	12.2	11.7	-0.5	4.1%	Y
19	WB	12.8	13.9	1.1	8.5%	Y
	EB	12.6	13.0	0.4	3.4%	Y
20	NB	13.2	14.0	0.8	6.0%	Y
	SB	15.7	15.8	0.1	0.5%	Y
21	NB	12.7	14.5	1.8	14.1%	Y
	SB	11.6	12.2	0.6	4.8%	Y
Total		**719.6**	**706.9**	**-12.7**	**1.8%**	
Number of routes satisfying DMRB Criteria = 39 out of 42 (93%)						

Inter-Peak Hour Journey Time Validation Results

8.9 Table 8.3 compares modelled and observed journey times in the inter-peak hour along the 42 journey time routes.

8.10 Overall, the comparisons are excellent, with 41 out of 42 (98%) of the routes meeting the DMRB criteria of +/-15%. Considering all of the routes together, the total modelled time is 2.1% higher than the observed time, which is within the DMRB criteria, but suggests that the modelled speeds are slightly slower in general.

Table 8.3 Modelled Versus Observed Inter Peak Hour Journey Times (Minutes)						
Route Number	**Direction**	**Observed Time**	**Modelled Time**	**Modelled-Observed**	**% Error**	**Within DMRB**
1	NW	38.8	42.5	3.7	9.4%	Y
	SE	38.1	42.7	4.6	12.2%	Y
2	E	18.5	20.0	1.6	8.4%	Y
	W	18.0	20.0	2.0	11.0%	Y
3	E	13.2	12.7	-0.4	3.3%	Y
	W	13.1	12.3	-0.8	5.7%	Y
4	NW	7.5	6.6	-0.9	11.9%	Y
	SE	7.2	6.4	-0.8	10.5%	Y
5	N	5.5	5.8	0.3	6.0%	Y
	S	5.0	5.2	0.2	4.3%	Y
6	N	15.5	14.4	-1.1	7.2%	Y
	S	14.6	13.4	-1.2	8.1%	Y
7	E	4.6	4.8	0.2	4.9%	Y
	W	4.8	4.9	0.1	2.6%	Y
8	NE	10.8	10.2	-0.7	6.0%	Y
	SW	11.3	10.2	-1.1	9.3%	Y
9	N	15.8	15.7	-0.1	0.6%	Y
	S	16.4	15.8	-0.6	3.8%	Y
10	N	14.8	14.7	-0.1	0.4%	Y
	S	13.4	14.2	0.8	6.0%	Y
11	W	19.1	19.5	0.5	2.6%	Y
	E	20.5	20.9	0.3	1.6%	Y
12	NW	30.3	30.4	0.0	0.1%	Y
	SE	30.8	31.4	0.7	2.1%	Y
13	AC	9.8	11.9	2.0	20.7%	N
	CW	10.4	11.8	1.4	13.2%	Y
14	NE	10.6	10.1	-0.5	5.1%	Y
	SW	10.6	11.3	0.7	6.6%	Y
15	E	9.6	9.3	-0.3	3.4%	Y
	W	9.8	9.7	0.0	0.5%	Y
16	SB	7.9	7.6	-0.4	4.5%	Y
	NB	7.6	7.5	-0.1	1.2%	Y
17	SB	20.7	20.3	-0.4	2.0%	Y
	NB	21.0	20.2	-0.7	3.6%	Y
18	WB	11.9	11.8	-0.1	1.1%	Y
	EB	11.8	11.7	-0.1	1.0%	Y
19	WB	12.5	13.2	0.7	5.9%	Y
	EB	12.5	13.0	0.6	4.8%	Y
20	NB	12.1	12.5	0.4	3.4%	Y
	SB	12.0	13.5	1.5	12.8%	Y
21	NB	11.9	11.8	-0.1	0.6%	Y
	SB	11.2	11.7	0.5	4.4%	Y
Total		**601.3**	**613.8**	**12.5**	**2.1%**	
Number of routes satisfying DMRB Criteria = 41 out of 42 (98%)						

PM Peak Hour Journey Time Validation Results

8.11 Table 8.4 compares modelled and observed journey times in the PM peak hour for the 42 journey time routes.

8.12 For most routes the comparisons are very good, with 39 out of 42 (93%) of the routes meeting the DMRB criteria of +/-15%.

8.13 Considering all of the routes together, the total modelled time is approximately the same as the the total observed time, which is within the DMRB criteria, and suggests a good fit.

Table 8.4 Modelled Versus Observed PM Peak Hour Journey Times (Minutes)						
Route Number	**Direction**	**Observed Time**	**Modelled Time**	**Modelled-Observed**	**% Error**	**Within DMRB**
1	NW	40.6	46.5	5.9	14.5%	Y
	SE	47.1	48.2	1.2	2.5%	Y
2	E	20.1	20.6	0.5	2.4%	Y
	W	19.5	20.8	1.4	7.1%	Y
3	E	13.2	14.4	1.3	9.6%	Y
	W	13.3	13.5	0.2	1.6%	Y
4	NW	7.4	7.0	-0.4	4.9%	Y
	SE	7.1	6.8	-0.3	4.0%	Y
5	N	7.9	6.6	-1.3	16.6%	N
	S	6.1	6.2	0.1	2.1%	Y
6	N	17.2	16.6	-0.6	3.8%	Y
	S	16.5	15.3	-1.2	7.2%	Y
7	E	5.6	5.4	-0.3	4.9%	Y
	W	6.6	6.2	-0.4	6.0%	Y
8	NE	13.2	11.6	-1.6	12.2%	Y
	SW	13.2	11.7	-1.5	11.4%	Y
9	N	21.6	20.6	-1.1	5.0%	Y
	S	21.2	18.9	-2.3	10.8%	Y
10	N	18.0	16.9	-1.2	6.5%	Y
	S	14.0	15.8	1.7	12.4%	Y
11	W	21.2	21.3	0.1	0.4%	Y
	E	27.8	27.7	0.0	0.2%	Y
12	NW	32.5	33.3	0.8	2.4%	Y
	SE	37.5	35.0	-2.6	6.8%	Y
13	AC	16.1	15.5	-0.6	3.7%	Y
	CW	11.5	13.6	2.1	17.9%	N
14	NE	14.8	12.8	-2.0	13.8%	Y
	SW	13.8	13.4	-0.4	3.1%	Y
15	E	13.5	11.2	-2.4	17.6%	N
	W	11.0	11.5	0.4	4.0%	Y
16	SB	7.8	7.6	-0.2	2.7%	Y
	NB	7.8	7.5	-0.2	3.1%	Y
17	SB	20.6	20.7	0.1	0.7%	Y
	NB	21.4	20.0	-1.4	6.5%	Y
18	WB	11.8	11.8	0.0	0.4%	Y
	EB	11.5	12.0	0.5	4.5%	Y
19	WB	13.1	13.3	0.2	1.9%	Y
	EB	12.2	13.5	1.3	10.9%	Y
20	NB	12.2	13.9	1.7	13.6%	Y
	SB	15.3	15.4	0.1	0.6%	Y
21	NB	12.0	11.4	-0.6	5.3%	Y
	SB	10.9	10.5	-0.4	3.6%	Y
Total						
Number of routes satisfying DMRB Criteria = 39 out of 42 (93%)						

Commentary on Journey Time Outliers

8.14 In all three time periods the major outliers are the motorway-based routes along the M56/A5103 from Junction 5 to West Didsbury and the M60 from Junction 6 to Junction 24. These journey time routes display significant degrees of variability in times. For example:

- Route 5 (M56/A5103) northbound has 5th percentile time of nearly 7 minutes and a 95th percentile time of 12 minutes with a Coefficient of Variation of 30%
- Route 13 (M60) anticlockwise has a 5th percentile time of 10 minutes and a 95th percentile time of 44 minutes, with a COV of 50%.

8.15 The variability in times reflects:

- The wider range of possible speeds on the motorway network (given the speed limit of 70mph);
- the closely spaced junctions along these sections of motorways and the resulting weaving, merging and shock wave effects; and
- the variations in flow on the motorway network that can result from 'strategic' diversion of traffic.

8.16 The frequency of junctions and associated weaving, merging, lane-drops/gains etc impact on driver behaviour and on lane chose e.g. lanes 1 and 2 may move much slower than lanes 3 and 4 causing drivers to switch lanes.

8.17 Flows (and therefore times/speeds) can vary significantly as a result of incidents elsewhere on the SRN which can cause traffic to divert. For example, an incident on the M62 west of Manchester can result in traffic diverting to the M56. Many of these incidents can be some distance from the section of motorway being observed and may not be identified when 'filtering' data for use in analysis.

8.18 Note that SATURN as a modelling package cannot model lane use, lane switching or driver behaviour to the same extent as microsimulation or mesoscopic models. Working with the Highways Agency and Leeds ITS, HFAS has undertaken extensive testing to improve the representation of motorways within the GMSM and SATURN models in general. Further changes are being made to SATURN software (for example, the introduction of link specific parameters which will reflect the willingness of vehicles to move out of the nearside lane to permit merging vehicles to join) which may improve the representation of urban motorways in the future.

Conclusions of Journey Time Validation

8.19 The results presented above indicate that the journey time validation fully meets DMRB requirements in all three time period.

8.20 The percentages of routes within 15% of the observed time ranges are 93%, 98% and 93% in the AM peak hour, inter-peak hour and PM peak hour respectively.

8.21 Graphs of observed versus modelled journey times are included in Appendix 8.

9. References

1. Traffic Appraisal of Road Schemes – Traffic Appraisal Advice, Design Manual for Roads and Bridges, Volume 12, Highways Agency, May 1996

2. Manchester Airport Master Plan to 2030, Manchester Airport, 2007

3. Manchester Airport Ground Transport Plan, Manchester Airport, 2007

4. The Need for Land – Manchester Airport Company's Response to Manchester City Council's LDF Option Development, Manchester Airport, December 2009

5. A6MARR (A6 to Manchester Airport) Relief Road Area of Influence, Greater Manchester Transportation Unit, A6MARR Briefing Note 24

6. A6MARR A6 to Manchester Airport Relief Road Technical Node 13, Highway Demand Matrices, MVA, July 2010

Appendix 1 SATURN Links within the AOI with Length Discrepancies of > 30m

Table 1.1 : SATURN Links in SEMMMS AOI with Link Length Discrepancies of Greater Than 30m						
SATURN Link	**Anode**	**Bnode**	**Saturn Distance**	**Measured Distance**	**Saturn - Measured**	**Reason**
31112:31113	31112	31113	193	159	34	31112 coordinate wrong. Saturn distance correct
31113:31112	31113	31112	193	159	34	31112 coordinate wrong. Saturn distance correct
7295:15272	7295	15272	930	895	35	15272 coordinate wrong. Saturn distance correct
15272:7295	15272	7295	930	895	35	15272 coordinate wrong. Saturn distance correct
13258:15329	13258	15329	220	174	46	15329 coordinate wrong. Saturn distance correct
15329:13258	15329	13258	220	174	46	15329 coordinate wrong. Saturn distance correct
14505:14506	14505	14506	322	274	48	14506 coordinate wrong. Saturn distance correct
14506:14505	14506	14505	322	274	48	14506 coordinate wrong. Saturn distance correct
13293:13294	13293	13294	95	39	56	Nodes in correct position. Saturn distance incorrect.
15501:15504	15501	15504	279	215	64	Nodes in correct position. Saturn distance incorrect.
15504:15501	15504	15501	279	215	64	Nodes in correct position. Saturn distance incorrect.
15321:15322	15321	15322	817	750	67	Nodes in correct position. Saturn distance incorrect.
15322:15321	15322	15321	817	750	67	Nodes in correct position. Saturn distance incorrect.
15507:15508	15507	15508	1654	1575	79	Nodes in correct position. Saturn distance incorrect.

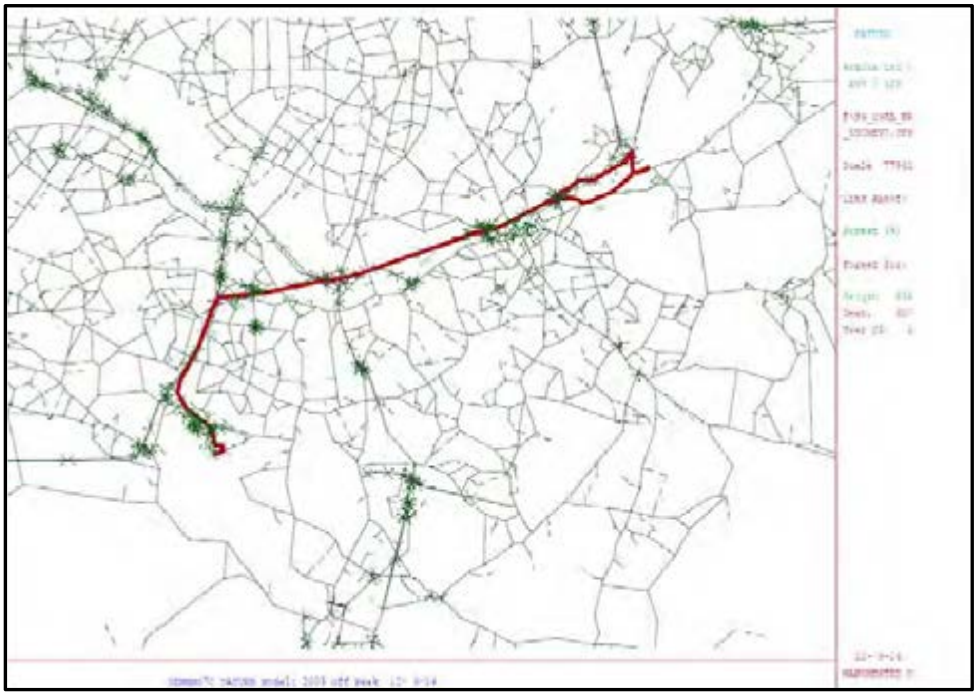
SATURN	**Anode**	**Bnode**	**Saturn**	**Measured**	**Saturn -**	**Reason**

Link			Distance	Distance	Measured	
15508:15507	15508	15507	1654	1575	79	Nodes in correct position. Saturn distance incorrect.
8840:15293	8840	15293	264	164	100	15293 coordinate wrong. Saturn distance correct
15293:8840	15293	8840	264	164	100	15293 coordinate wrong. Saturn distance correct
14536:3900	14536	3900	444	343	101	Saturn distance incorrect.
13904:15337	13904	15337	182	71	111	15337 coordinate wrong. Saturn distance correct
15337:13904	15337	13904	182	71	111	15337 coordinate wrong. Saturn distance correct
13893:13894	13893	13894	312	177	135	Saturn distance incorrect.
13908:15320	13908	15320	266	57	209	15337 coordinate wrong. Saturn distance correct
15320:13908	15320	13908	266	57	209	13908 coordinate wrong. Saturn distance correct
1922:15268	1922	15268	408	87	321	15268 coordinate wrong. Saturn distance correct
15268:1922	15268	1922	408	87	321	15268 coordinate wrong. Saturn distance correct
2445:15268	2445	15268	20	341	-321	15268 coordinate wrong. Saturn distance correct
15268:2445	15268	2445	20	341	-321	15268 coordinate wrong. Saturn distance correct
13241:13908	13241	13908	20	216	-196	13908 coordinate wrong. Saturn distance correct
13908:13241	13908	13241	20	216	-196	13908 coordinate wrong. Saturn distance correct
13293:15337	13293	15337	41	151	-110	15337 coordinate wrong. Saturn distance correct

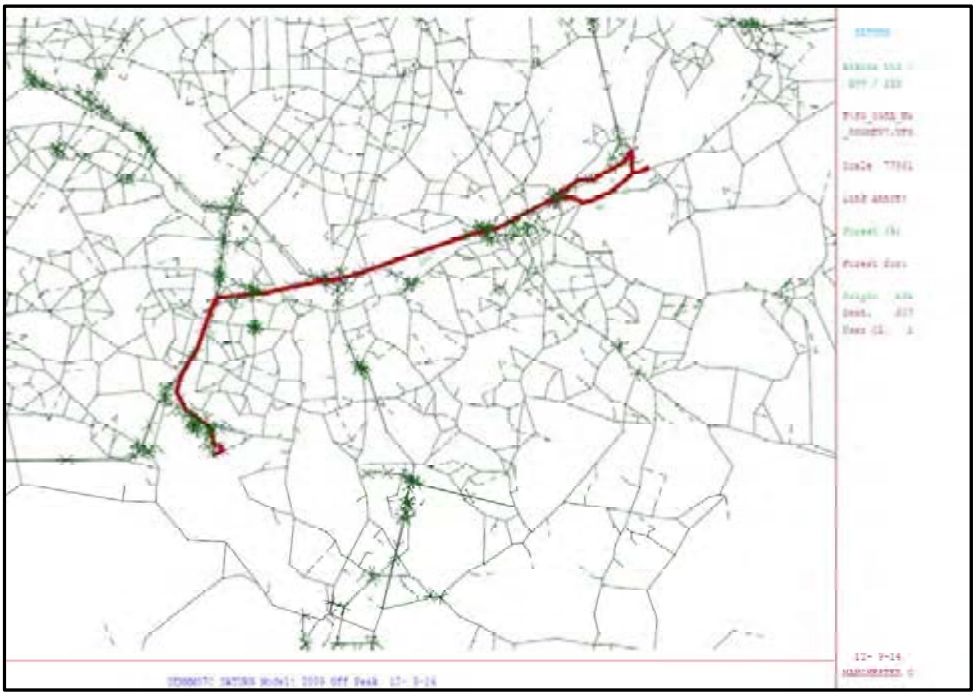
SATURN Link	Anode	Bnode	Saturn Distance	Measured Distance	Saturn - Measured	Reason
15337:13293	15337	13293	41	151	-110	15337 coordinate wrong. Saturn distance correct
2188:15293	2188	15293	40	141	-101	15293 coordinate wrong. Saturn distance correct
15293:2188	15293	2188	40	141	-101	15293 coordinate wrong. Saturn distance correct
14531:14537	14531	14537	88	174	-86	Saturn distance incorrect.
14537:14531	14537	14531	88	174	-86	Saturn distance incorrect.
14505:14534	14505	14534	149	232	-83	Saturn distance incorrect.
14534:14505	14534	14505	149	232	-83	Saturn distance incorrect.
13502:13503	13502	13503	1942	2017	-75	13502 coordinate wrong. Saturn distance also incorrect.
13503:13502	13503	13502	1942	2017	-75	13502 coordinate wrong. Saturn distance also incorrect.
15506:15507	15506	15507	220	293	-73	Nodes in correct positions. Saturn distance incorrect.
15507:15506	15507	15506	220	293	-73	Nodes in correct positions. Saturn distance incorrect.
13246:15322	13246	15322	15	81	-66	Nodes in correct positions, Saturn distance incorrect.
15322:13246	15322	13246	15	81	-66	Nodes in correct positions, Saturn distance incorrect.
15275:15277	15275	15277	600	650	-50	Nodes in correct positions, Saturn distance incorrect.
15277:15275	15277	15275	600	650	-50	Nodes in correct positions, Saturn distance incorrect.

SATURN Link	Anode	Bnode	Saturn Distance	Measured Distance	Saturn - Measured	Reason
3795:8969	3795	8969	128	173	-45	Staggered Jct. Saturn distances correct
8969:3795	8969	3795	128	173	-45	Staggered Jct. Saturn distances correct
13201:15522	13201	15522	975	1018	-43	Saturn distance incorrect.
15522:13201	15522	13201	975	1018	-43	Saturn distance incorrect.
13259:15329	13259	15329	20	57	-37	Saturn distance incorrect.
15329:13259	15329	13259	20	57	-37	Saturn distance incorrect.
14510:14590	14510	14590	50	86	-36	Saturn distance incorrect.
14590:14510	14590	14510	50	86	-36	Saturn distance incorrect.
1918:15272	1918	15272	55	89	-34	Saturn distance incorrect.
15272:1918	15272	1918	55	89	-34	Saturn distance incorrect.
13476:13296	13476	13296	50	83	-33	Saturn distance correct
13202:15524	13202	15524	240	270	-30	Saturn distance correct
15524:13202	15524	13202	240	270	-30	Saturn distance correct

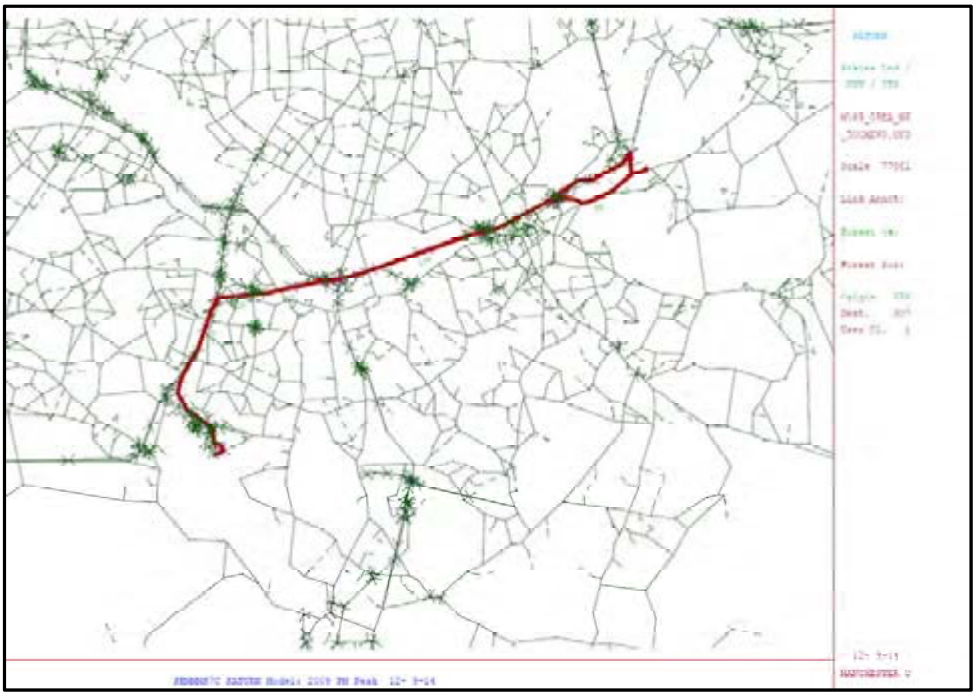
Appendix 2 SATURN Route Choice Tree Plots



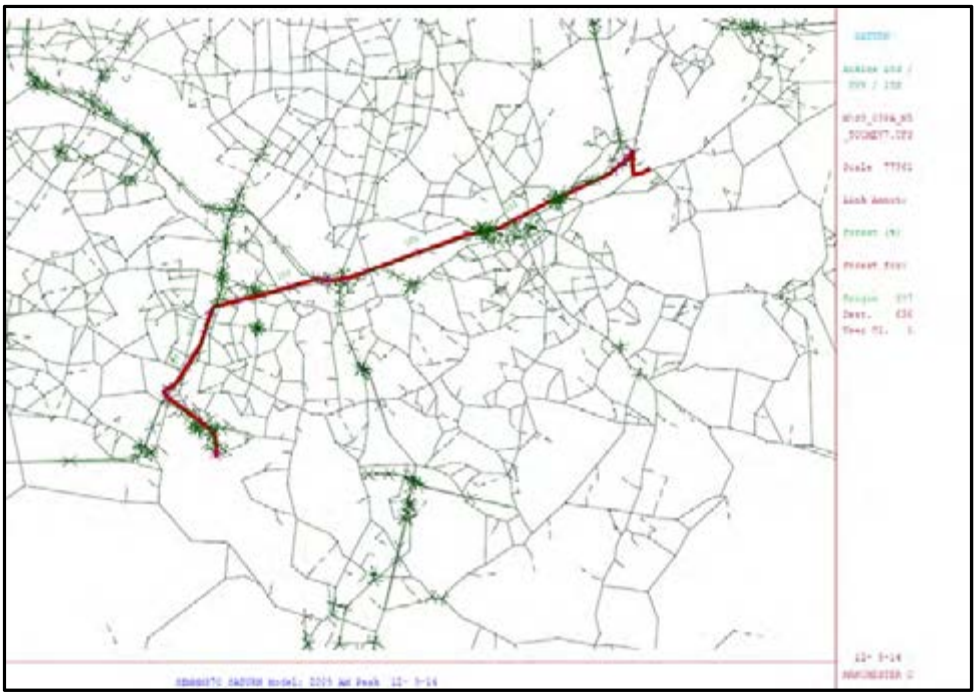
Bredbury to Manchester Airport – AM



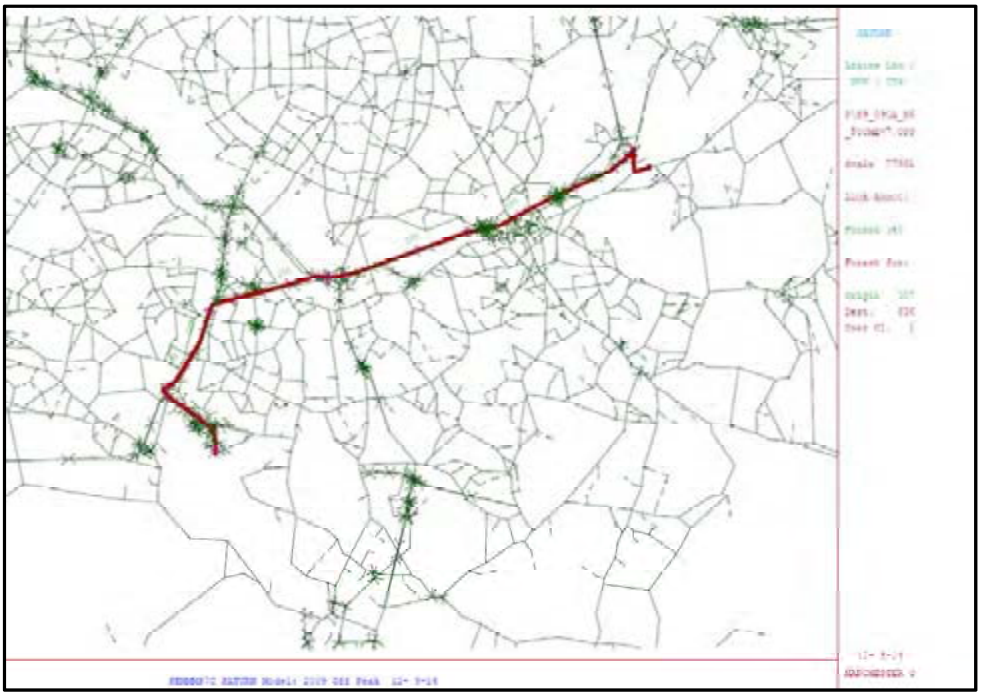
Bredbury to Manchester Airport - IP



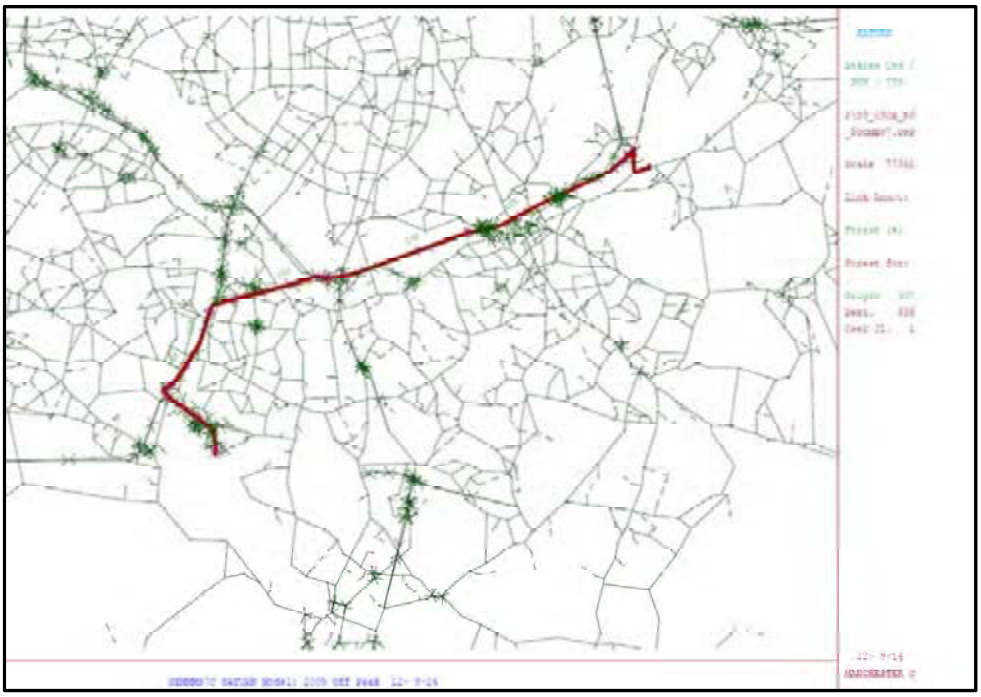
Bredbury to Manchester Airport - PM



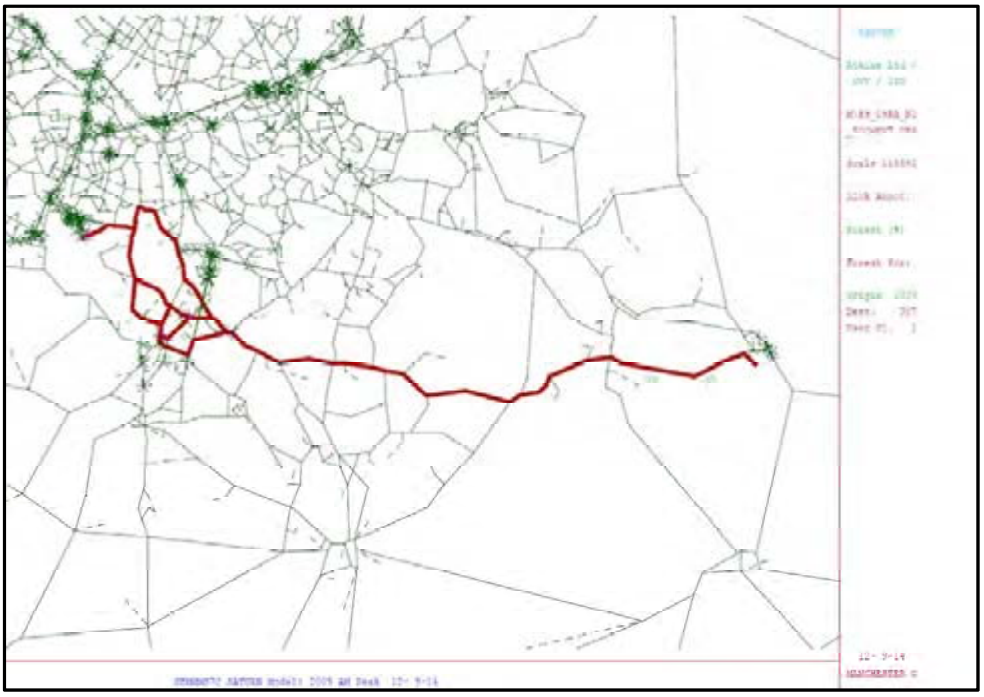
Manchester Airport to Bredbury – AM Peak Route



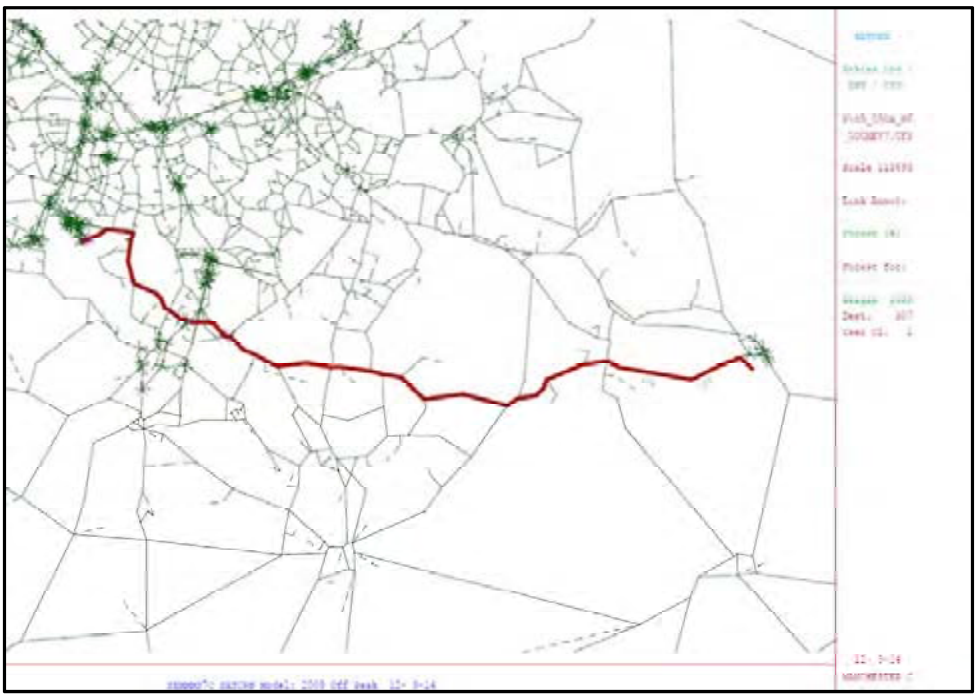
Manchester Airport to Bredbury – Inter Peak Route



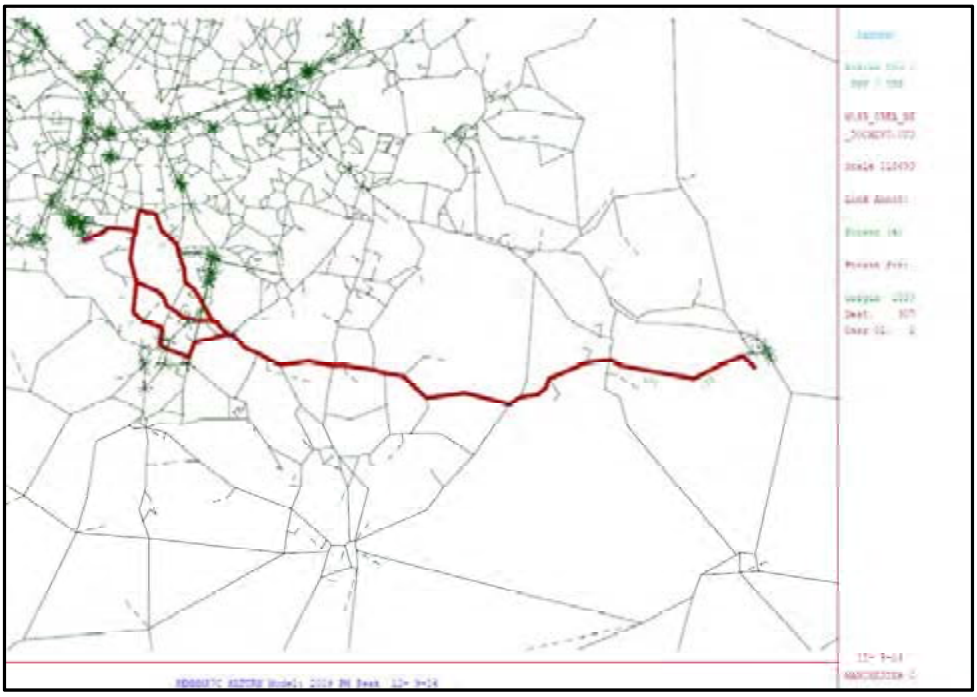
Manchester Airport to Bredbury –PM Peak Route



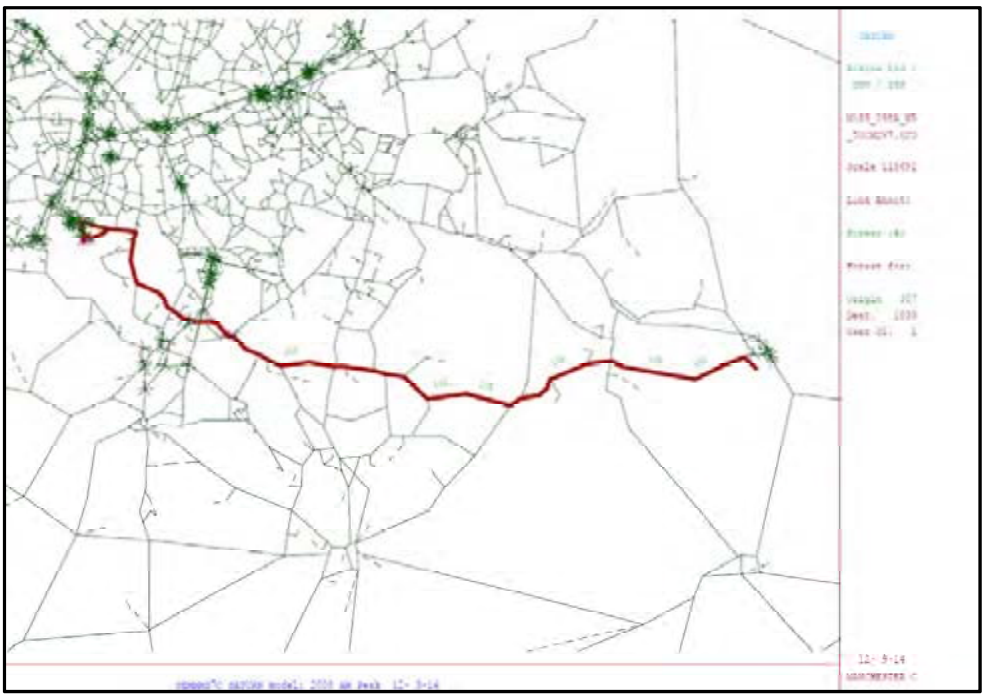
Chapel-en-le-Frith to Manchester Airport – AM Peak



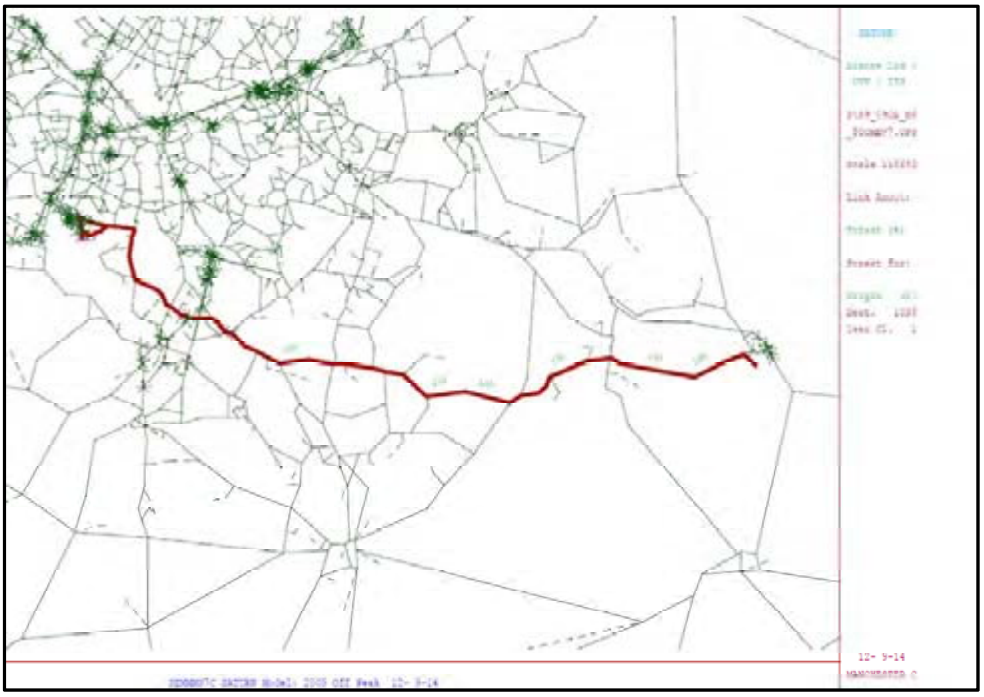
Chapel-en-le-Frith to Manchester Airport – Inter Peak



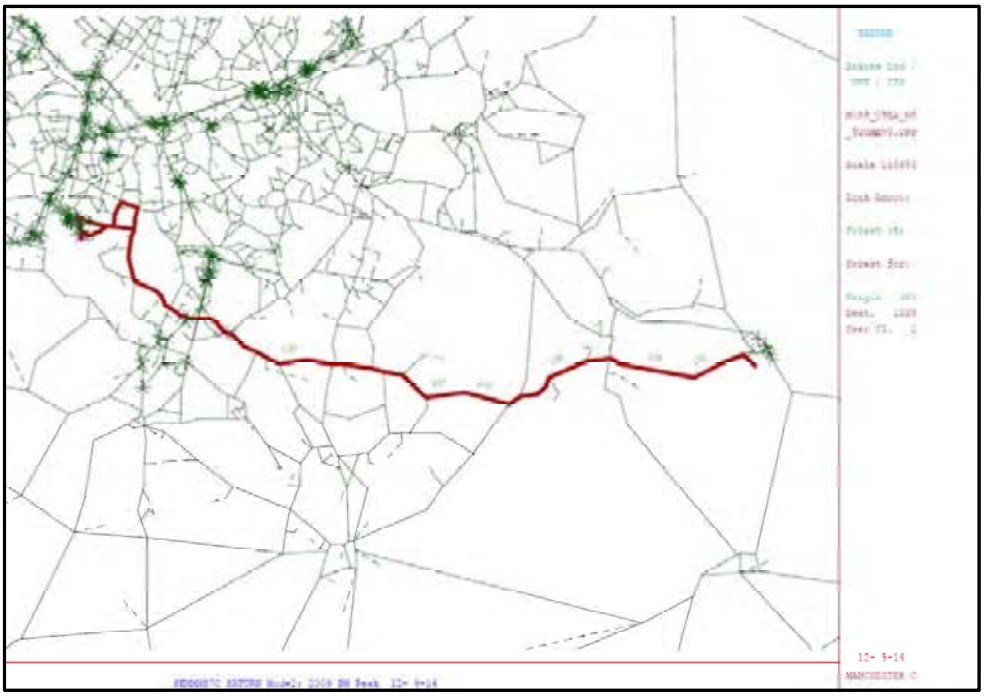
Chapel-en-le-Frith to Manchester Airport – PM Peak



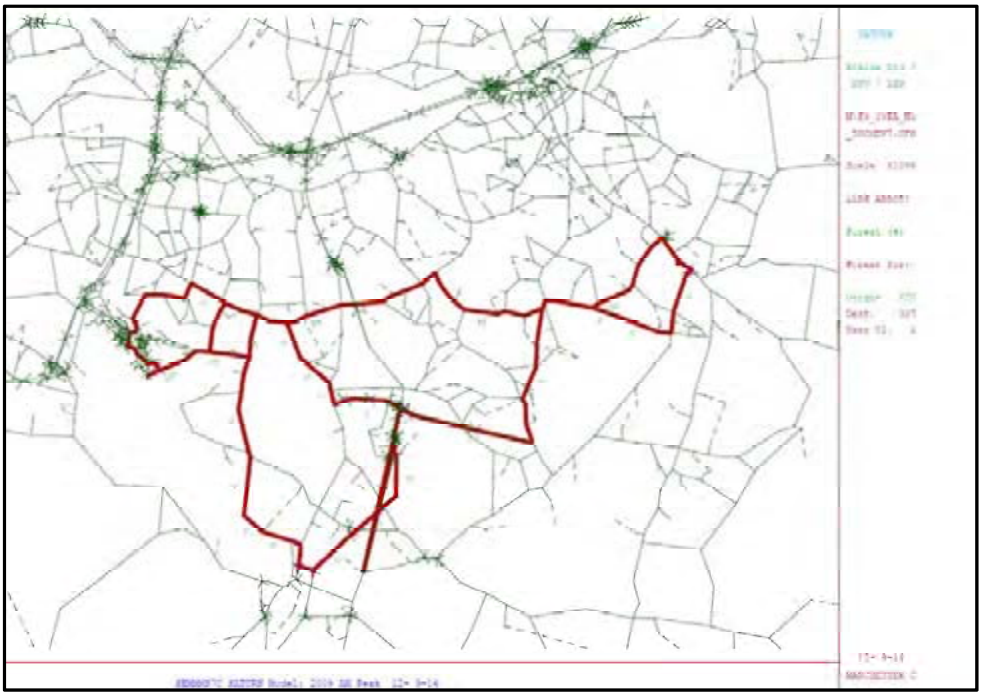
Manchester Airport to Chapel-en-le-Frith – AM Peak



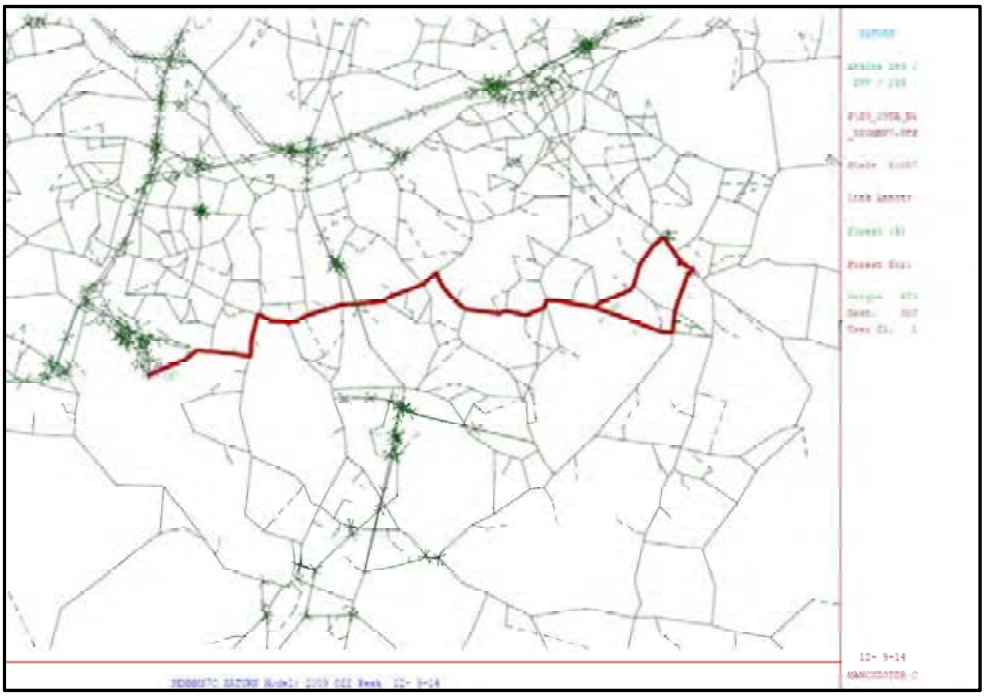
Manchester Airport to Chapel-en-le-Frith – Interpeak



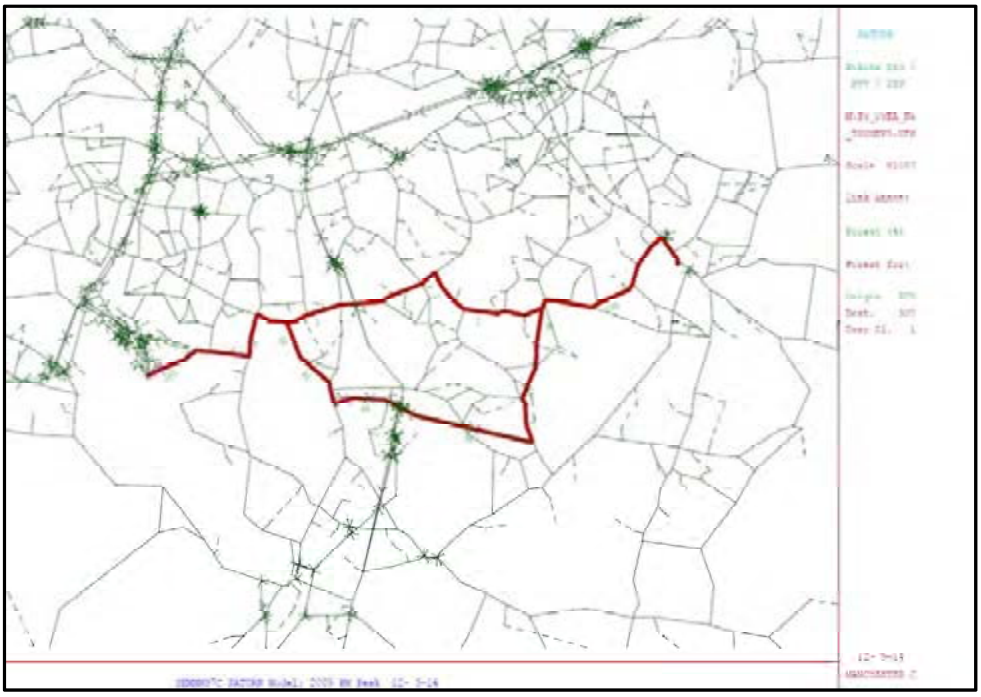
Manchester Airport to Chapel-en-le-Frith – PM Peak



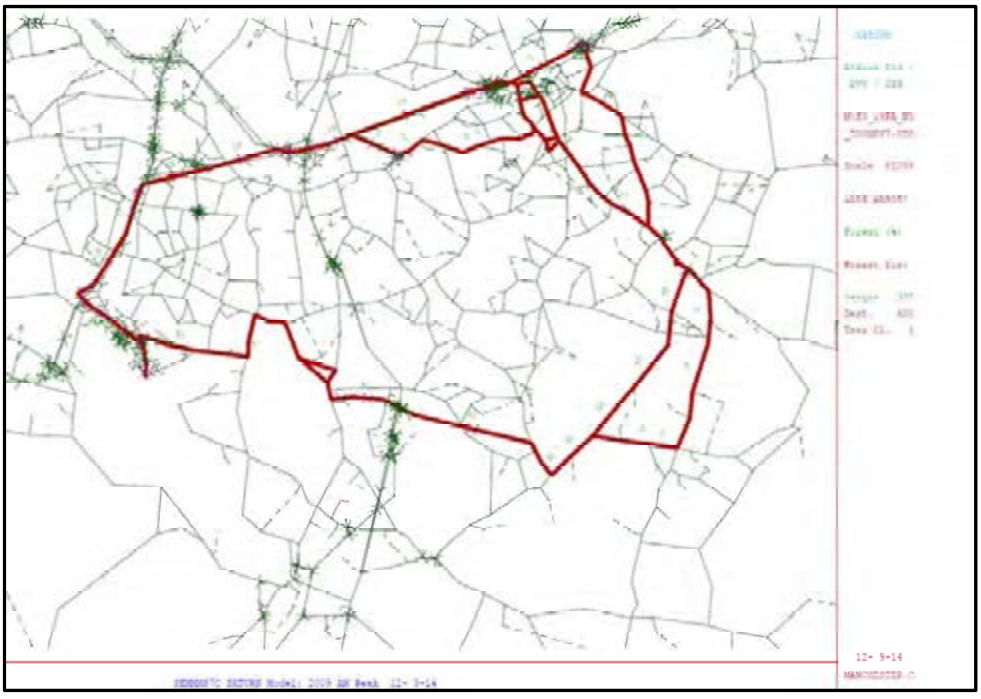
Hazel Grove to Manchester Airport – AM Peak



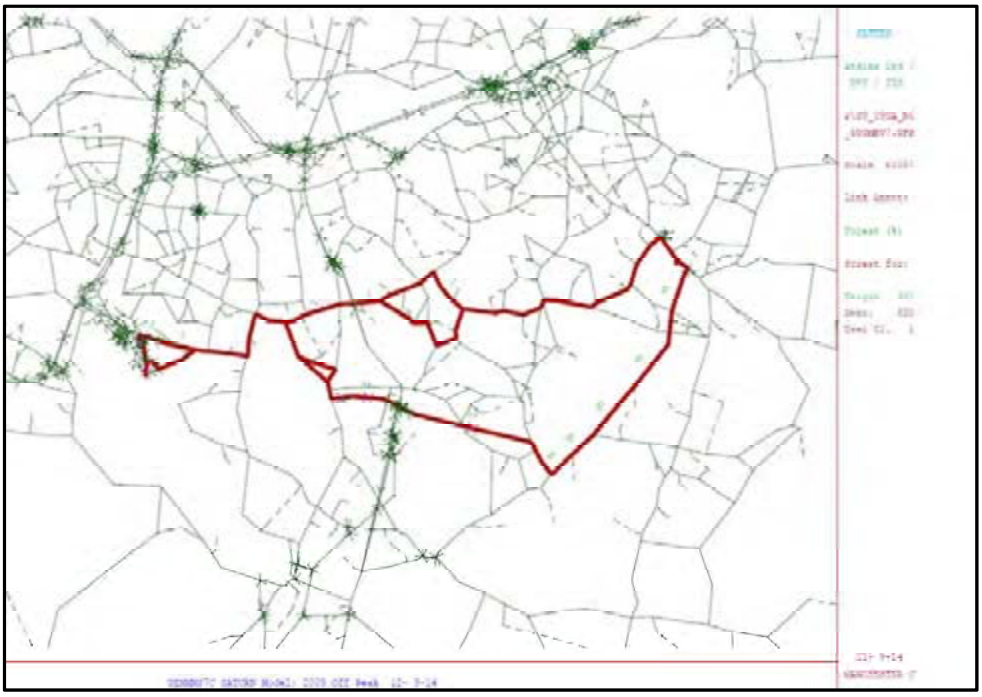
Hazel Grove to Manchester Airport – Interpeak



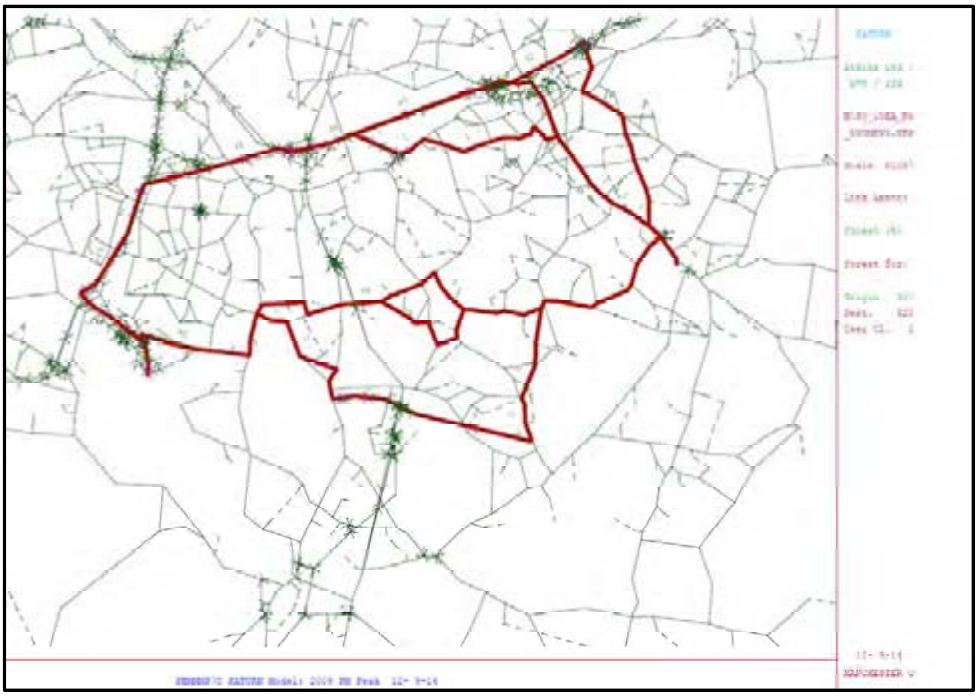
Hazel Grove to Manchester Airport – PM peak



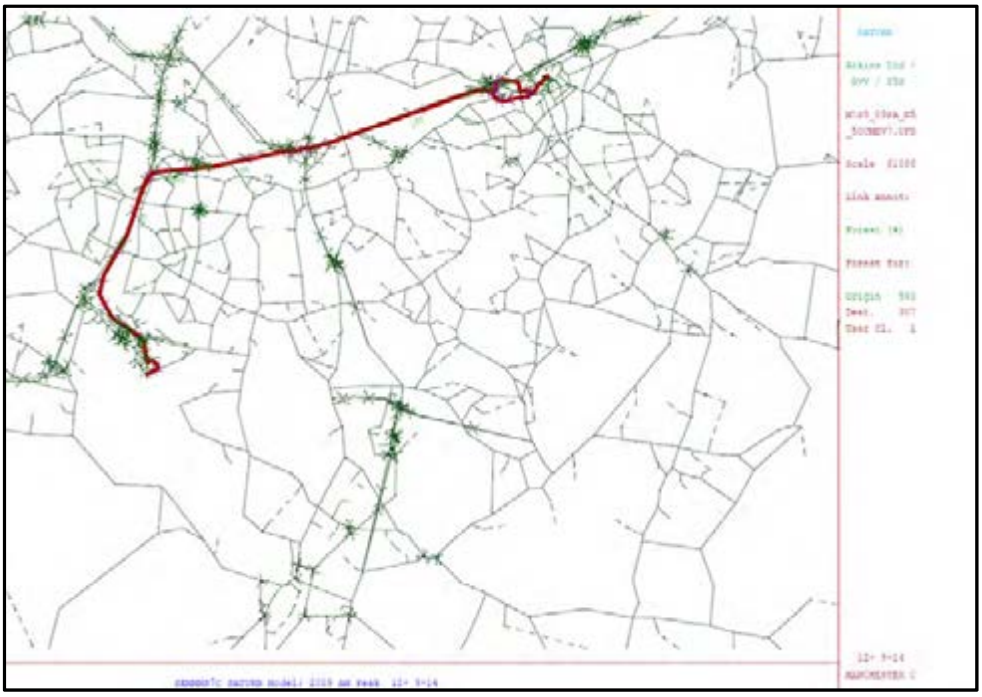
Manchester Airport to Hazel Grove – AM Peak



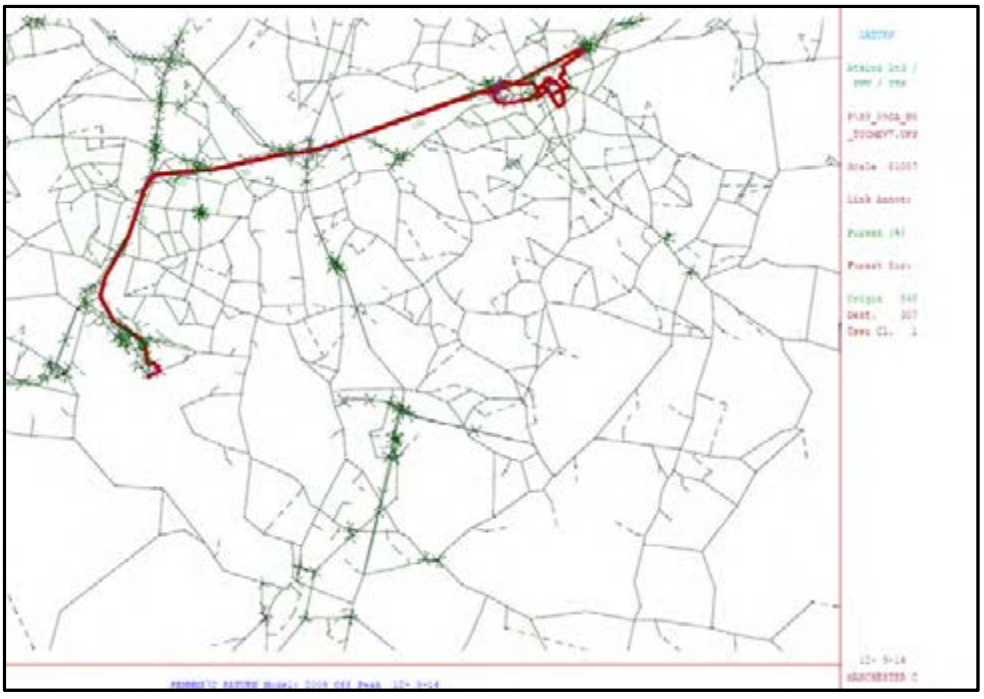
Manchester Airport to Hazel Grove – Interpeak



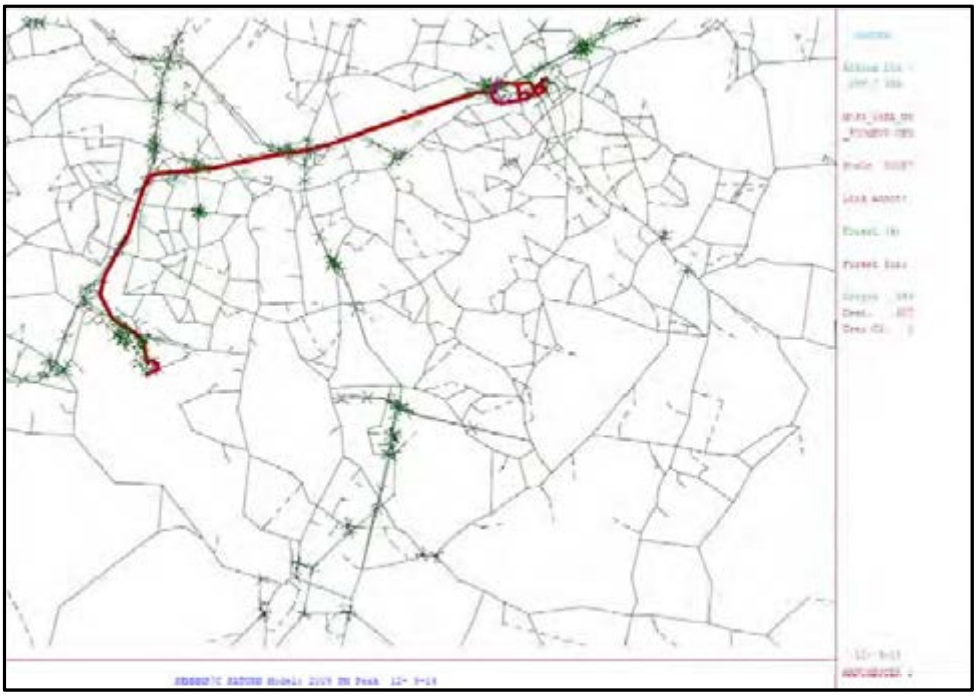
Manchester Airport to Hazel Grove – PM Peak



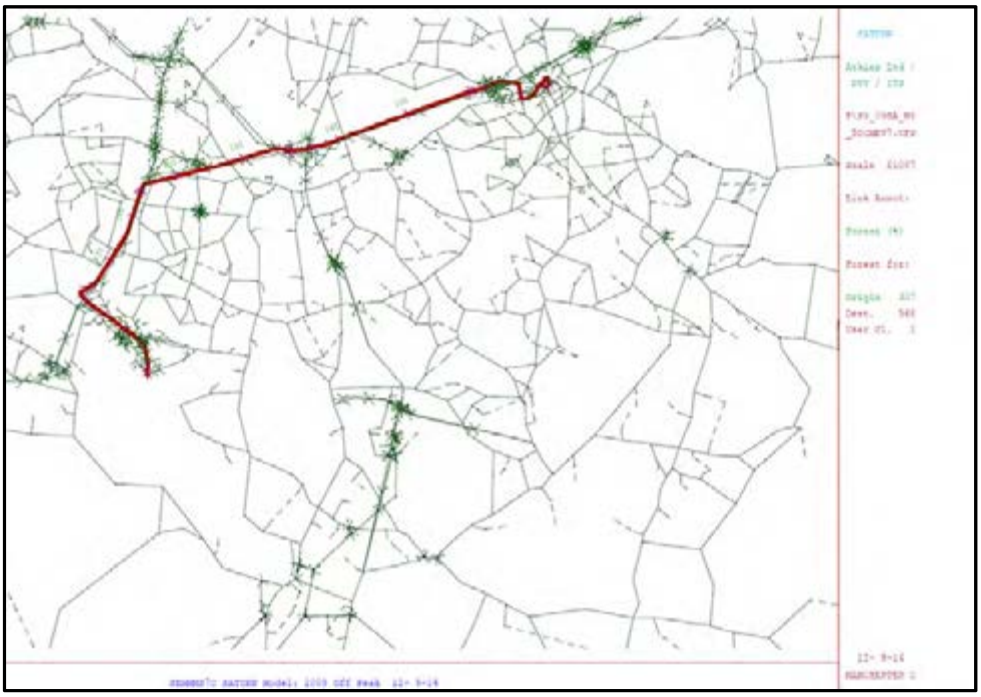
Stockport TC to Manchester Airport – AM Peak



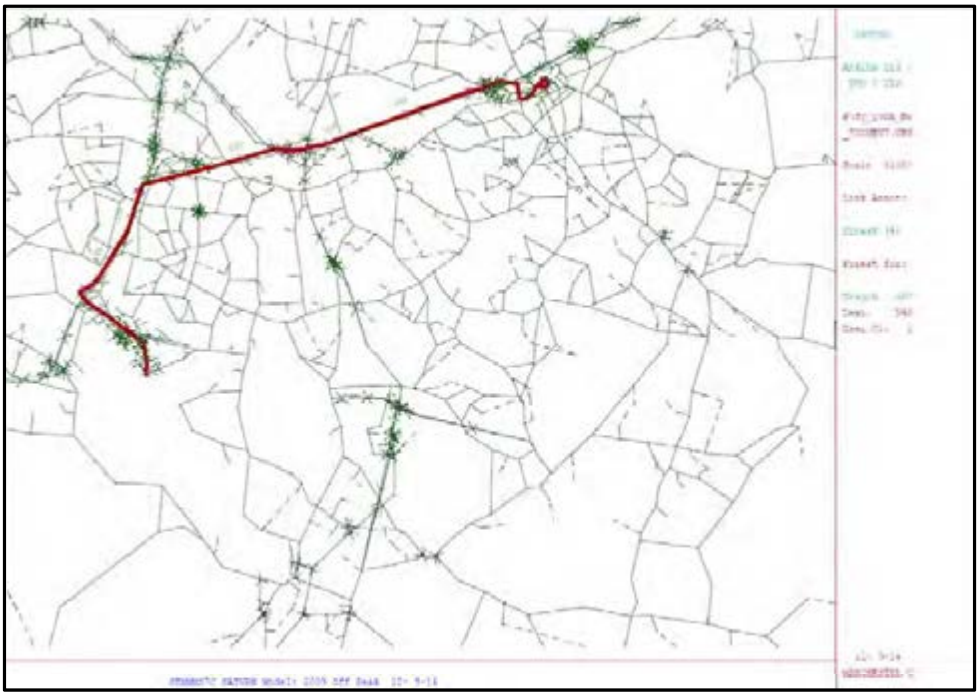
Stockport TC to Manchester Airport – Interpeak



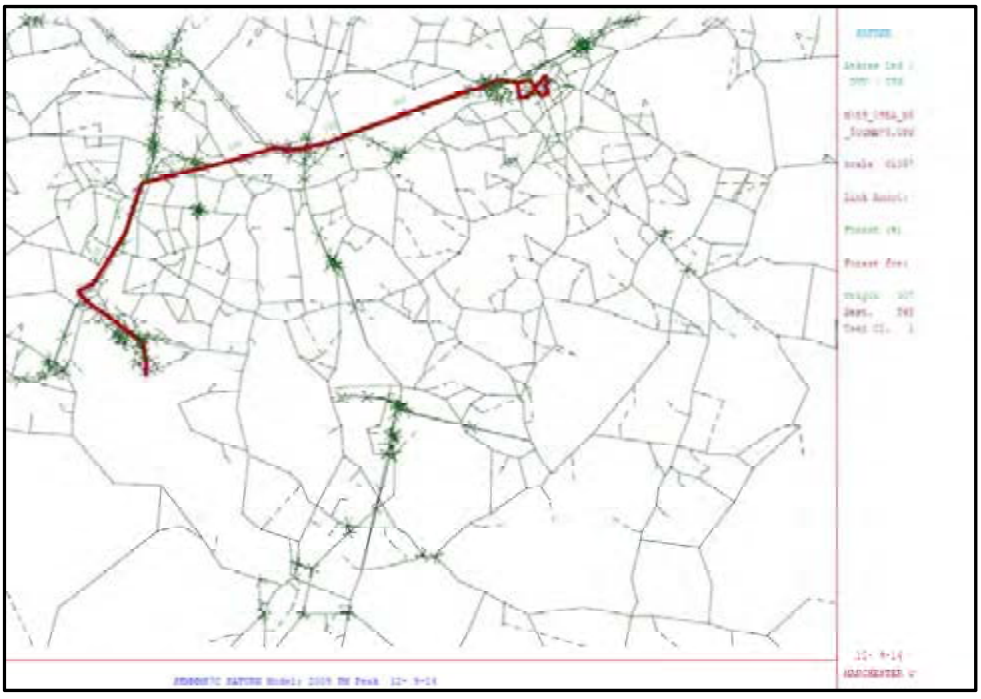
Stockport TC to Manchester Airport – PM Peak



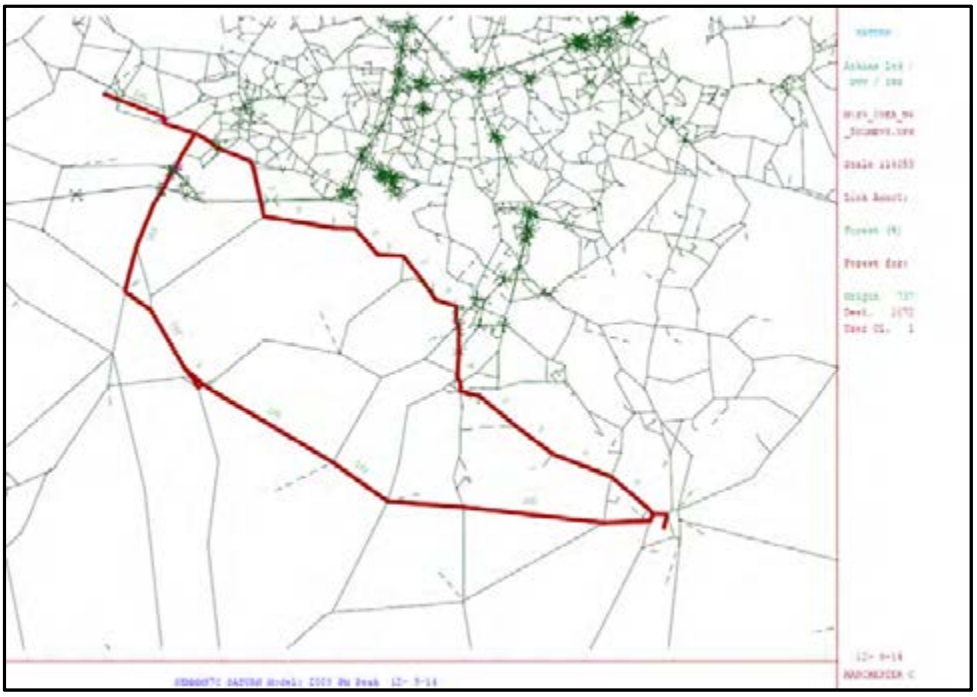
Manchester Airport to Stockport TC – AM Peak



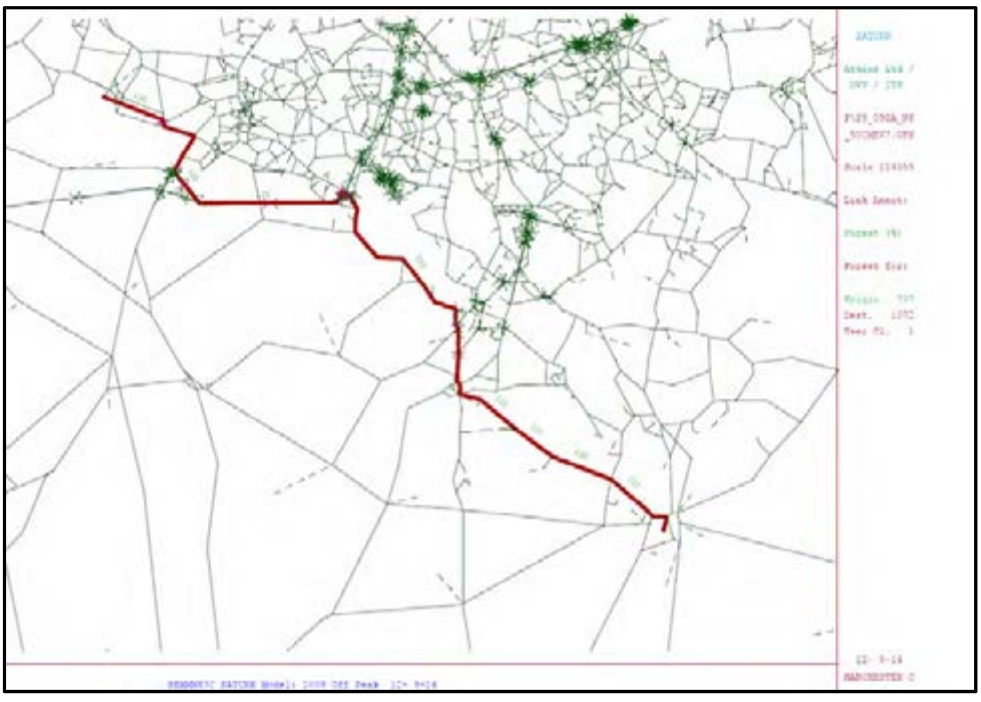
Manchester Airport to Stockport TC – Interpeak



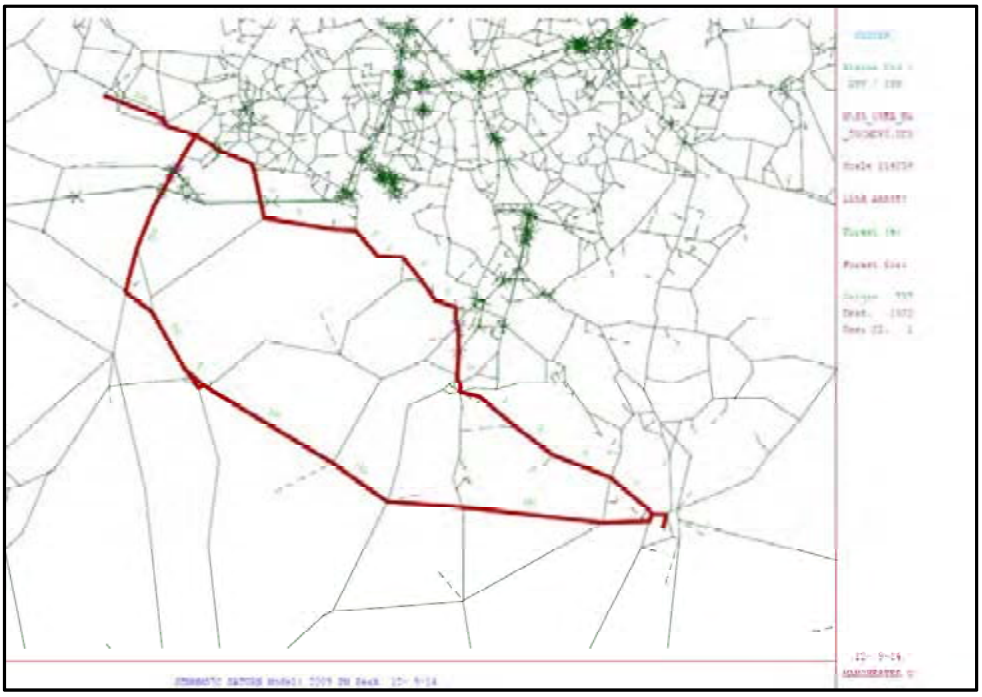
Manchester Airport to Stockport TC – PM Peak



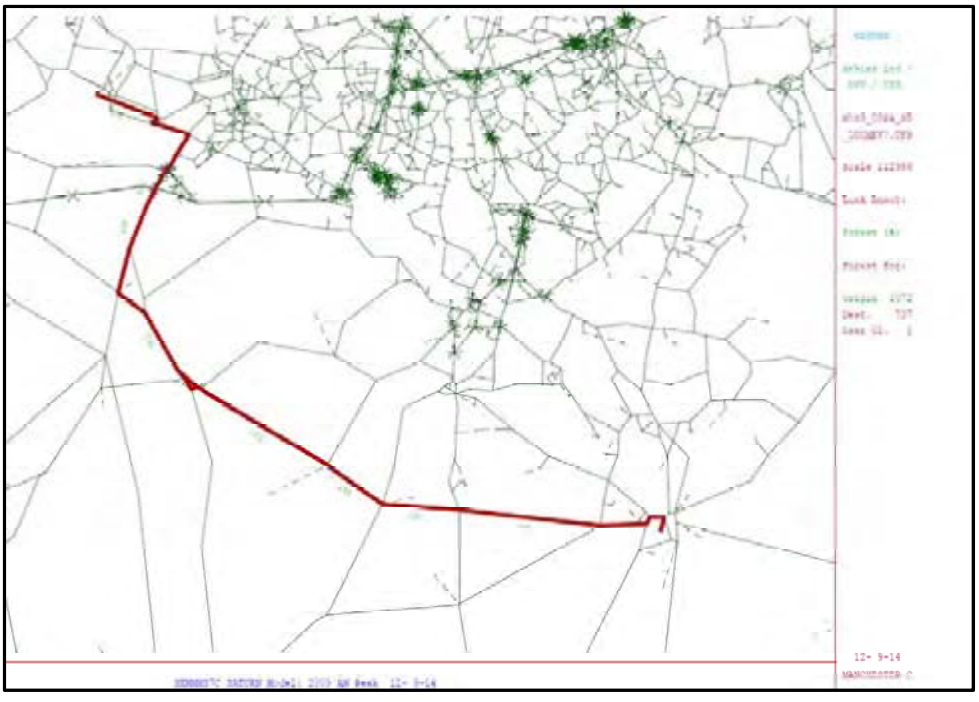
West Altrincham to Macclesfield– AM Peak



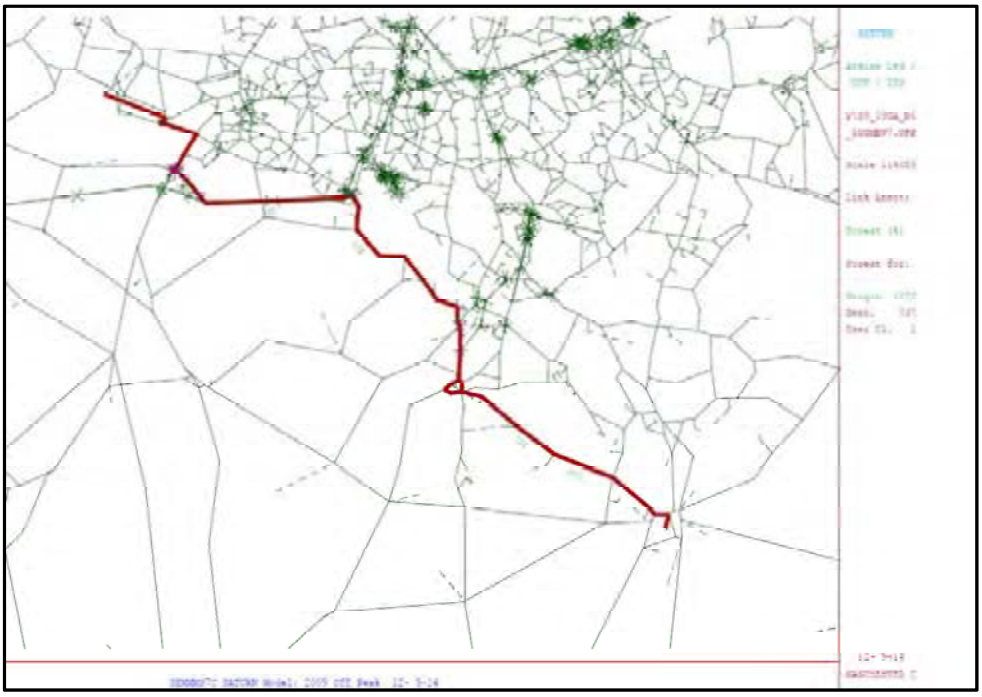
West Altrincham to Macclesfield– Interpeak



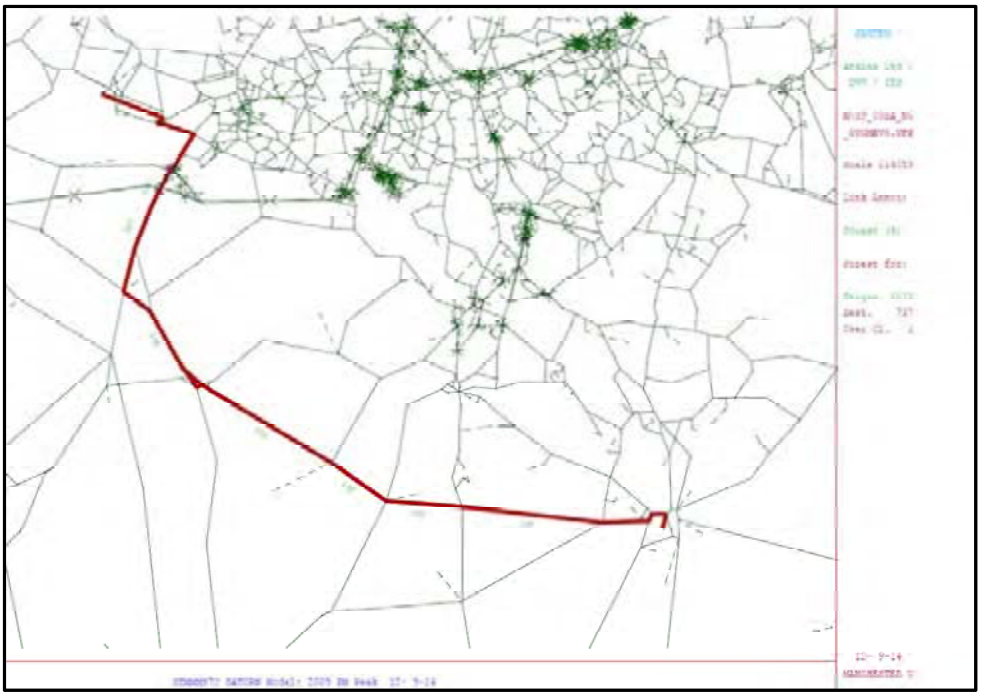
West Altrincham to Macclesfield– PM Peak



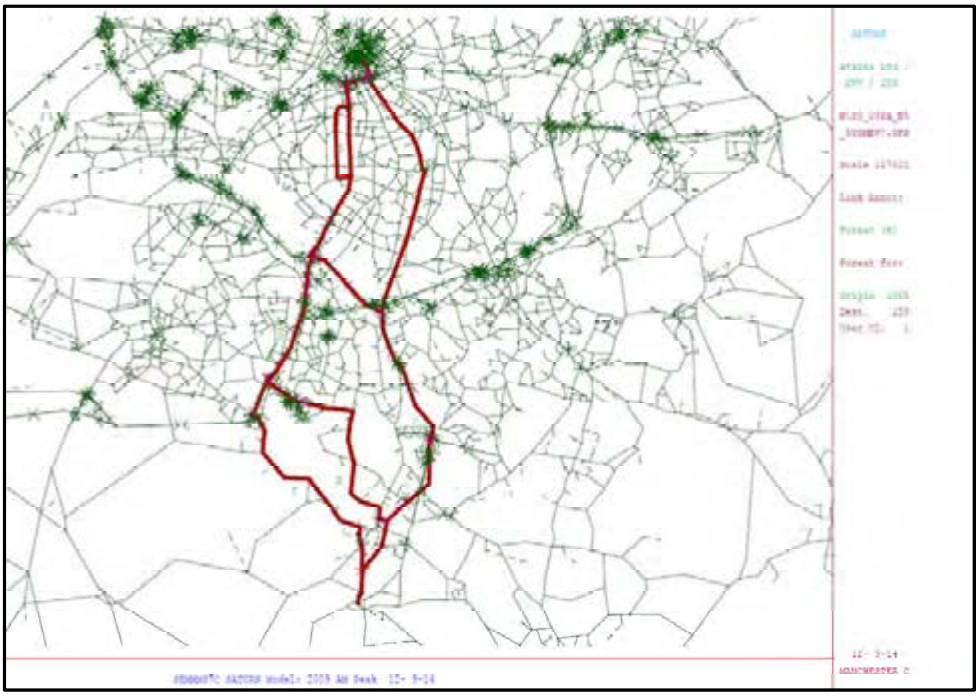
Macclesfield to West Altrincham – AM Peak



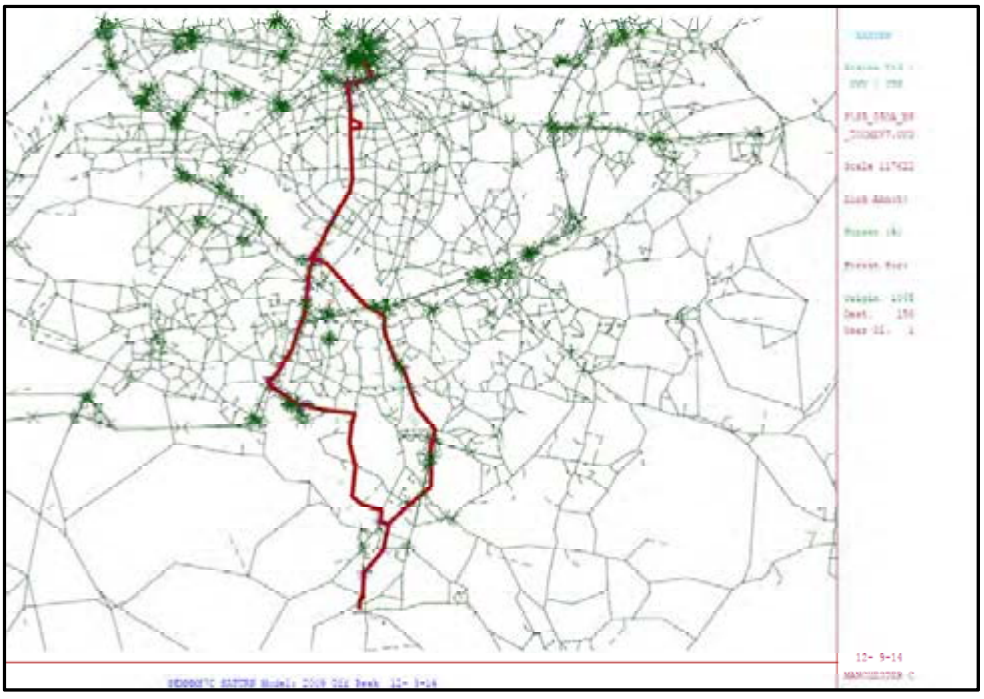
Macclesfield to West Altrincham – Interpeak



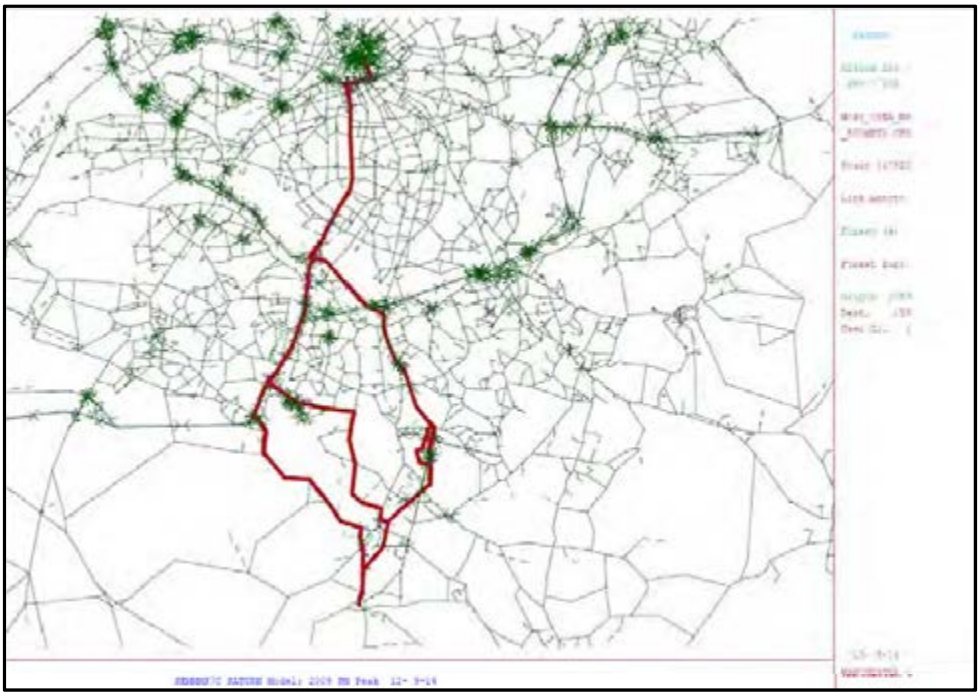
Macclesfield to West Altrincham – PM Peak



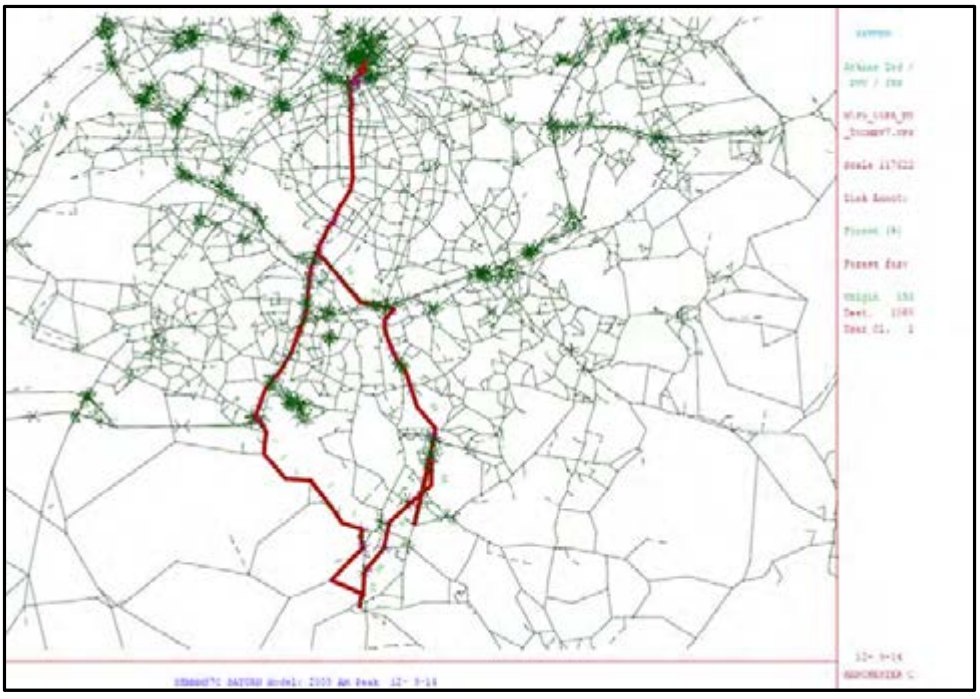
Alderley Edge to Manchester City Centre – AM Peak



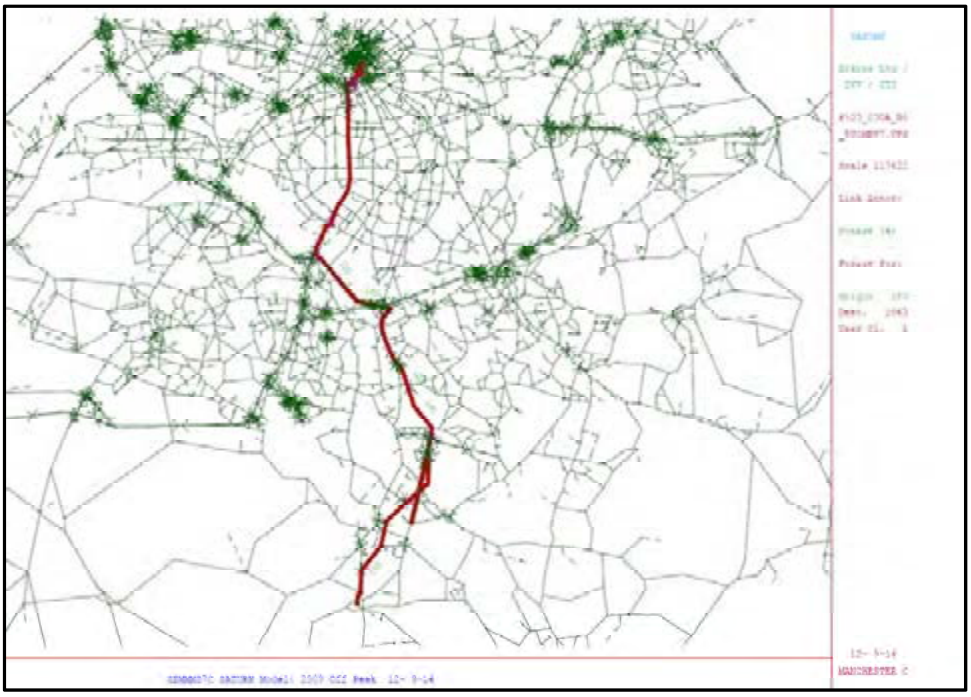
Alderley Edge to Manchester City Centre – Interpeak



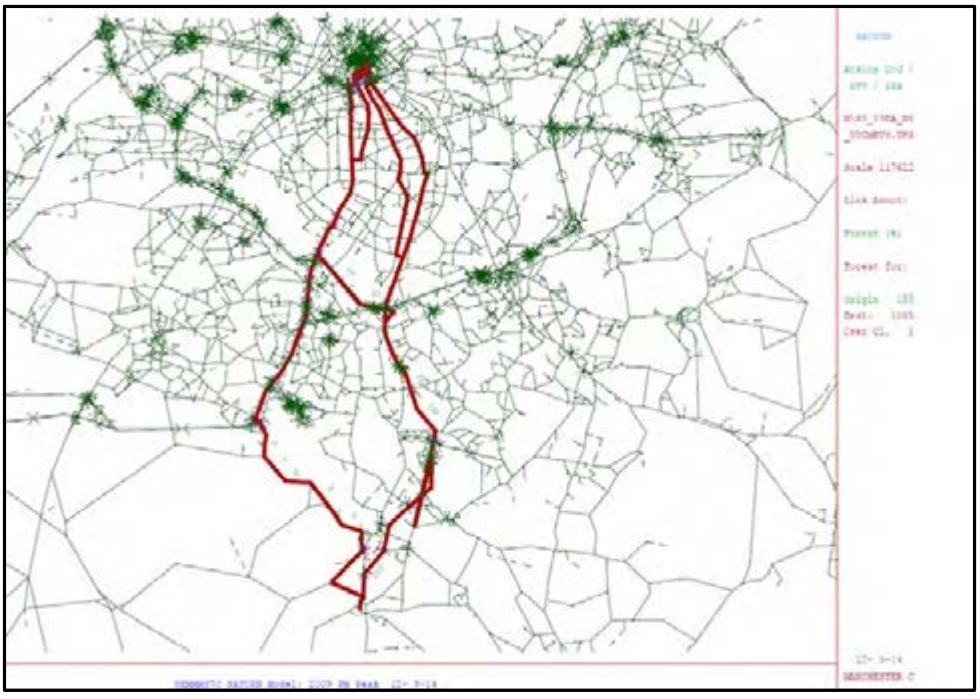
Alderley Edge to Manchester City Centre – PM Peak



Manchester City Centre to Alderley Edge – AM Peak



Manchester City Centre to Alderley Edge – Interpeak



Manchester City Centre to Alderley Edge – PM Peak

Appendix 3 Calculation of Generalised Cost for A6MARR

A6MARR uses a set of user class specific generalised costs. These are calculated using an excel workbook prepared initially by MVA Consultancy The basic approach has been applied in a number of studies from the Greater Manchester TIF bid onwards, with regular reviews and updates to reflect the impact of changes to WebTAG parameters. The approach is summarised below

Basic Parameters

The basic parameter inputs to the calculation process consist of:

- Perceived Values of Time per person expressed as pence per hour at average 2002 prices and values, sourced from Tables 1 and 2 of WebTag Unit 3.5.6
- Vehicle Occupancies per trip by vehicle type and work/non-work, sourced from WebTag Unit 3.5.6, Table 4
- Vehicle Operating Costs (fuel) sourced from WebTag Unit 3.5.6 Table 10 (parameter values), Table 11 (Fuel cost factors) and Table 12 (fleet composition)
- Vehicle Operating Costs (non-fuel) sourced from WebTag Unit 3.5.6 Table 15
- Goods vehicle splits from GMTU monitoring (class by proportion of vehicles and proportion of veh/km) and GMATS RSI data (work, non-work).

All WebTag inputs are drawn from the April 2011 edition of Unit 3.5.6.

Growth Rates

Information on growth in parameter values is based on WebTag Unit 3.5.6, April 2011. Tables used are:

- Value of Time per person 2003-2052, Table 3
- Car passenger occupancy by period, 2000-2036, Table 6
- Fleet composition 2002-2031, Table 12
- Fuel Efficiency improvements 2002-2035, Table 13
- Fuel price – increase in resource cost/hr, Table 14; and
- Fuel Price – fuel costs, duties and VAT, Table 11.

Process – Worked Example - 2009 Car Work-Time AM Peak Hour

Value of Time (PPM)

Value of Time for car work-time driver 2002 = 2186 pence per hour
Growth in VOT for car work-time from 2002 to 2009 = 1.05
VOT for car work-time driver, 2009 = 2186*1.05 = 2296 pence per hour per person
Value of Time for car work-time passenger 2002 = 1566 pence per hour
Growth in VOT for car work-time from 2002 to 2009 = 1.05

VOT for car work-time passenger, 2009 = 1566*1.05 = 1645 pence per hour per person
Occupants per car work-time, 2000 = 1.20
Growth in Passengers from 2000 to 2009 (AM Peak) = 0.9576
Occupants per car work-time, 2009 = (1.20 – 1)*0.9576=0.19

Value of time, pence per hour at 2009 = 2296 + (1645*0.19) = 2611 pence
Value of time, pence per minute at 2009 = 2611/60 = 43.52 pence

Value of Distance (PPK)

Fuel Consumption (Petrol)

From WebTag, Consumption Formula is $L = (a + bV + cV^2 + dV^3) / V$

For Petrol:
A = 1.04285
B= 0.04484
C=-0.00005
D=0.0000021781
V= 37.8 kph (AM Peak Network speed)

Substituting in above formula
$L =(1.054285+0.04484*37.8+-0.00005*37.8^2+0.0000021781*37.8^3)/37.8$
L= 0.07368

Growth adjustment for Petrol based on WebTag Unit 3.5.6, Table 13
= 0.07368*0.94 = 0.0695

For Diesel

A = 0.48099
B= 0.06450
C=-0.00058
D=0.0000045416
V= 37.8 kph

Substituting in above formula

$L = (0.48099+0.06450*37.8+-0.00058*37.8^2+0.0000045416*37.8^3)/37.8$
L= 0.06188

Growth adjustment for Diesel based on WebTag Unit 3.5.6, Table 13
= 0.06188*0.92 = 0.570

Fuel Price Per Litre

Price = Resource Cost + Duty + VAT

Petrol

Resource Cost = Fuel Cost Factor*(2009 Resource Cost Growth Factor/2005 Resource Cost Growth Factor) = 25 * (1.617/1.497) = 27.00

Fuel Duty = Duty*(2009 Duty Growth Factor/2005 Duty Growth Factor) =43.7 * (1.002/0.954) = 45.51

VAT = 2009 VAT Rate * Fuel Cost Factor = 0 * 1 = 0

Petrol price = (27 + 45.51)*0 = 72.51p/ltr

Diesel

Resource Cost = Fuel Cost Factor*(2009 Resource Cost Growth Factor/2005 Resource Cost Growth Factor) = 28 * (1.636/1.522) = 30.10

Fuel Duty = Duty*(2009 Duty Growth Factor/2005 Duty Growth Factor) = 43.7 * (1.002/0.954) = 45.51

VAT = 2009 VAT Rate * Fuel Cost Factor = 0* 1 = 0

Diesel price = (30.1 + 45.51)*0= 75.61p/ltr

Cost Per Km

Proportion of fleet using petrol & diesel

2009 Petrol = 0.621
2009 Diesel = 0.379

Petrol = 0.0695*72.51*0.621 = 3.129
Diesel = 0.0570*75.61*0.379 = 1.633
Cost per KM = 4.76

Vehicle Operating Costs – Non-Fuel
Based on formula C=a1 + b1/v

For car work-time:
A1=4.069
B1= 111.391

VOC (Non-Fuel) = 4.069 + 111.391/37.8 = 7.016

Final Values:

PPM= 43.52
PPK = (4.76+7.016) =11.78

Appendix 4 - Matrix Merging Methodology

Introduction

A4.1 This appendix provides details of the statistical procedures used by program MATMER to combine movements from Roadside Interview Surveys that have been 'fully observed' on more than one cordon. The procedure involves estimating the variances of fully observed matrix cells and using the estimated variances to calculate dispersion indices which can be used to combine movements that have been observed on more than one cordon in such a way that the greatest weight is given to the observation with the smallest cell variance.

Estimation of Cell Variances

A4.2 Cell variances are estimated using the method described in Appendix D13 of TAM (Traffic Appraisal Manual). Using this approach, the variance of the number of vehicles in a traffic stream Q with an attribute of interest Qa can be calculated to be:

$$Var(Q_a) = \frac{Q\,(Q-q)}{q^2\,(q-1)}\; q_a\,(q-q_a) \qquad (1)$$

Where:

Q is the counted flow in the period (e.g. cars in the morning peak hour)

q is the number of vehicles that are interviewed (sampled)

q_a is the number of vehicles in the sample that have the attribute of interest (e.g. trips from origin zone i to destination zone j for journey purpose k).

A4.3 This expression is derived assuming that the sampled population is finite and that the sample is taken without replacement, so that the probability distribution of the sample estimate is hypergeometric.

A4.4 When Q is large and qa is small, however, (as is normally the case in most roadside interview surveys), equation (1) can be approximated by the simpler expression:

$$Var(Q_a) = \frac{Q}{q}\left(\frac{Q}{q} - 1\right)\; q_a \qquad (2)$$

which is equivalent to the variance equation for an isolated site used in ERICA. Using this expression, the matrix cell value for each cordon and its associated variance can be obtained by summing the contributions from the trips at each of the sites forming the cordon, to obtain totals for the cordon as a whole.

A4.5 In MATBLD, the estimated variances are adjusted to allow for double counting and the application of the period to hour factors described above by multiplying each cell variance by the square of its associated PIJA value and the square of the period to hour factor for the site (described in paragraph 5.17). Site-specific variance factors are also applied, to adjust the variance for individual sites based on the age of the survey data. I.e.

$$Var(Q'_a) = V_{sfac} * \left(\frac{1000}{PIJA}\right)^2 * S_{hp}^{\ 2} * Var(Q_a) \qquad (3)$$

Where:

$Var(Q_a)$ is the variance calculated in equation (2)

PIJA is the PIJA value for this movement and cordon

S_{hp} is the site-specific hour to period factor

V_{sfac} is the site-specific variance factor.

A4.6 When building the A6MARR matrices, the variance factors for sites that were surveyed in 2001-2004 as part of the JETTTS, GMATS and M60 After Studies were set equal to 2.0, whilst the factors for sites that were surveyed in 2009, 2011 and 2013 as part of the A6MARR and Cheshire East roadside interview surveys were set equal to 1.0, so that the A6MARR and Cheshire RSI data was given approximately twice the weight (for movements observed on more than one cordon) during the matrix building procedure.

Calculation of Dispersion Indices

A4.7 The index of dispersion of a matrix cell is defined to be the ratio of the variance of the expanded trips to the expanded trips themselves i.e.

$$I_a = \frac{Var(Q_a)}{Q_a}$$

A4.8 This formula can only be applied, however, if the total number of trips in the cell (Qa) is greater than zero. An approximate method was therefore adopted for calculating the index of dispersion of fully observed movements where no trips were sampled, (observed zeros).

A4.9 Within MATBLD, the dispersion index of fully observed zero cells, (which also have an associated level of sampling error), is approximated by the average variance of the non-zero cells for vehicle type of interest. i.e.

$$I_0 = \frac{\sum Var(Q_a)}{\sum Q_a}$$

A4.10 Where the sum is over all non-zero fully observed cells for the cordon.

A4.11 Where movements are surveyed crossing more than one cordon, the dispersion indices are used to combine movements in such a way that the greatest weight is given to the observation with the lowest cell variance, to provide the best estimate of the actual cell value. To achieve this, when combining two movements Q1 and Q2, with dispersion indices I1 and I2, the value of the merged cell is estimated to be:

$$Q_M = \frac{(I_2 Q_1 + I_1 Q_2)}{(I_1 + I_2)}$$

With a combined index of dispersion:

$$I_M = \frac{(I_1 * I_2)}{(I_1 + I_2)}$$

A4.12 This formula can be applied pair-wise, in any order, to combine movements observed on three or more cordons if required.

Appendix 5 – Double Counting Tests

Introduction

A5.1 This appendix provides details of tests that were carried as part of the production of the A6MARR8 highway assignment matrices to investigate the impacts of correcting for double counting during the matrix building procedure. The tests involved re-building the fully observed A6MARR8 trip matrices using 'dummy' PIJA files, with entries of 1000 in all cells, for all cordons. This had the effect of setting the double counting factors equal to 1.000 for all movements, so that double counted trips were not corrected for when building the fully observed matrices.

A5.2 The results of the analysis are presented below in Tables A5.1 – A5.3, which show the numbers of trips in the fully observed A6MARR8 trip matrices with and without the double counting factors. Separate results are presented for the AM peak, PM peak and average inter-peak hours, for each journey purpose. The figures in the columns headed 'Percentage Difference' show the percentage change in matrix totals as a result of applying the double counting factors.

A5.3 As can be seen, the impacts of applying the double counting factors are relatively small, with the change in matrix totals, (for all trips combined), ranging from a reduction of -0.8 percentage points in the modelled AM peak hour to -1.2 percentage points in the PM peak hour. The changes in matrix totals are similar across purposes, with home-based employer's business trips in the AM peak hour showing the largest change, with a reduction in the overall matrix total of approximately -1.7 percentage points.

Table A5.1 Fully Observed AM Peak Hour Matrix Totals With and Without the Application of Double Counting Factors (Vehicles)

Journey Purpose/Vehicle Type	Applying Double Counting Factors	Without Applying Double Counting Factors	Percentage Difference
Home to Work Car	72,565	73,160	-0.8
Work to Home Car	2,853	2,878	-0.9
Home to Education Car	4,875	4,896	-0.4
Education to Home Car	1,197	1,210	-1.1
Home to Shopping Car	2,035	2,041	-0.3
Shopping to Home Car	675	682	-1.0
Home to Employer's Business Car	4,736	4,783	-1.0
Employer's Business to Home Car	288	293	-1.7
Home to Other Car	10,535	10,600	-0.6
Other to Home Car	4,228	4,246	-0.4
All Home Based Car	**103,986**	**104,788**	**-0.8**
Non-Home Based Employers Business Car	3,756	3,779	-0.6
Non-Home Based Other Car	10,484	10,571	-0.8
All Non-Home Based Car	**14,239**	**14,351**	**-0.8**
All Car	**118,226**	**119,139**	**-0.8**
Light Goods Vehicles	**16,381**	**16,515**	**-0.8**
Other Goods Vehicles	**5,993**	**6,023**	**-0.5**
Total	**140,600**	**141,677**	**-0.8**

Table A5.2 Fully Observed Average Inter-Peak Hour Matrix Totals With and Without the Application of Double Counting Factors (Vehicles)

Journey Purpose/Vehicle Type	Applying Double Counting Factors	Without Applying Double Counting Factors	Percentage Difference
Home to Work Car	11,073	11,172	-0.9
Work to Home Car	11,925	12,070	-1.2
Home to Education Car	1,876	1,896	-1.0
Education to Home Car	1,888	1,917	-1.6
Home to Shopping Car	12,684	12,783	-0.8
Shopping to Home Car	11,986	12,112	-1.0
Home to Employer's Business Car	2,864	2,899	-1.2
Employer's Business to Home Car	2,948	2,991	-1.4
Home to Other Car	16,172	16,313	-0.9
Other to Home Car	14,296	14,430	-0.9
All Home Based Car	**87,711**	**88,582**	**-1.0**
Non-Home Based Employers Business Car	18,967	19,192	-1.2
Non-Home Based Other Car	24,772	24,983	-0.9
All Non-Home Based Car	**43,739**	**44,175**	**-1.0**
All Car	**131,450**	**132,757**	**-1.0**
Light Goods Vehicles	**21,445**	**21,640**	**-0.9**
Other Goods Vehicles	**8,589**	**8,644**	**-0.6**
Total	**161,484**	**163,041**	**-1.0**

Table A5.3 Fully Observed PM Peak Hour Matrix Totals With and Without the Application of Double Counting Factors (Vehicles)			
Journey Purpose/Vehicle Type	**Applying Double Counting Factors**	**Without Applying Double Counting Factors**	**Percentage Difference**
Home to Work Car	3,758	3797.43	-1.1
Work to Home Car	76,823	77950.99	-1.5
Home to Education Car	1,166	1171.83	-0.5
Education to Home Car	2,660	2688.73	-1.1
Home to Shopping Car	3,588	3611.77	-0.7
Shopping to Home Car	9,378	9492.13	-1.2
Home to Employer's Business Car	779	788.31	-1.2
Employer's Business to Home Car	5,613	5671.97	-1.0
Home to Other Car	13,349	13456.72	-0.8
Other to Home Car	17,992	18182.83	-1.1
All Home Based Car	**135,107**	**136,813**	**-1.3**
Non-Home Based Employers Business Car	4,645	4703.84	-1.3
Non-Home Based Other Car	17,821	18039.87	-1.2
All Non-Home Based Car	**22,466**	**22,744**	**-1.2**
All Car	**157,573**	**159,556**	**-1.3**
Light Goods Vehicles	**12,938**	**13064.27**	**-1.0**
Other Goods Vehicles	**2,814**	**2829.63**	**-0.6**
Total	**173,325**	**175,450**	**-1.2**

Appendix 6 Prior and Estimated Matrix Comparisons by Sector

Table Number	Description
A2.1	AM Peak Hour Car Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.2	AM Peak Hour LGV Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.3	AM Peak Hour OGV Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.4	AM Peak Hour PCU Sector to Sector Comparison – Final Versus Penultimate Estimated Matrix
A2.5	Inter-Peak Hour Car Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.6	Inter-Peak Hour LGV Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.7	Inter-Peak Hour OGV Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.8	Inter-Peak Hour PCU Sector to Sector Comparison – Final Versus Penultimate Estimated Matrix
A2.9	PM Peak Hour Car Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.10	PM Peak Hour LGV Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.11	PM Peak Hour OGV Sector to Sector Comparison - Prior Versus Estimated Matrix
A2.12	PM Peak Hour PCU Sector to Sector Comparison – Final Versus Penultimate Estimated Matrix

Table A2.1 AM Peak Hour Car Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	460.4	2596.5	19482.8	540.0	5125.6	122.0	1154.6	165.3	174.5	83.5	2267.6	1803.9	33976.8
	After	455.6	2163.8	18333.3	557.7	4265.4	178.9	1046.1	293.2	221.8	70.1	1935.2	1848.3	31369.3
	Perc Diff	-1.0%	-16.7%	-5.9%	3.3%	-16.8%	46.7%	-9.4%	77.3%	27.1%	-16.1%	-14.7%	2.5%	-7.7%
2	Prior	1276.2	746.6	572.3	19287.5	7320.2	427.7	264.3	625.3	296.2	78.5	275.6	1970.5	33140.8
	After	1320.8	778.4	641.4	18078.1	7651.3	429.7	203.9	358.1	247.4	136.1	455.8	1816.0	32117.0
	Perc Diff	3.5%	4.3%	12.1%	-6.3%	4.5%	0.5%	-22.9%	-42.7%	-16.5%	73.2%	65.4%	-7.8%	-3.1%
3	Prior	1061.6	1430.1	3666.7	3645.6	63019.4	290.5	479.7	1662.0	2229.7	745.4	4320.6	4318.1	86869.4
	After	1322.4	2178.5	3324.7	3728.3	61410.3	376.2	587.3	1984.8	2422.8	769.9	4043.4	4698.0	86846.7
	Perc Diff	24.6%	52.3%	-9.3%	2.3%	-2.6%	29.5%	22.4%	19.4%	8.7%	3.3%	-6.4%	8.8%	0.0%
4	Prior	182.6	310.7	122.6	625.2	888.3	5280.8	638.3	467.5	72.5	11.8	67.8	5516.8	14185.1
	After	220.3	471.9	144.0	601.0	621.5	5292.2	492.5	399.4	32.0	7.5	111.6	5600.1	13993.9
	Perc Diff	20.7%	51.9%	17.5%	-3.9%	-30.0%	0.2%	-22.8%	-14.6%	-55.9%	-36.2%	64.6%	1.5%	-1.3%
5	Prior	306.0	1290.4	1550.5	419.9	1950.5	620.2	11115.4	168.4	121.4	58.4	463.5	5053.2	23117.6
	After	123.4	1040.5	954.0	203.2	718.9	341.5	10453.2	76.3	52.6	12.9	203.0	4452.1	18631.7
	Perc Diff	-59.7%	-19.4%	-38.5%	-51.6%	-63.1%	-44.9%	-6.0%	-54.7%	-56.7%	-77.8%	-56.2%	-11.9%	-19.4%
6	Prior	240.3	149.5	183.6	961.3	5409.0	399.2	145.0	34188.0	4915.9	214.0	395.2	15592.0	62793.2
	After	289.8	152.0	168.3	684.7	4129.0	375.4	106.5	31239.9	4140.2	124.5	247.6	12761.1	54419.1
	Perc Diff	20.6%	1.7%	-8.4%	-28.8%	-23.7%	-6.0%	-26.5%	-8.6%	-15.8%	-41.8%	-37.4%	-18.2%	-13.3%
7	Prior	142.5	120.2	212.4	450.6	6324.4	46.1	65.8	2898.2	34871.3	1330.8	894.6	4589.8	51946.8
	After	119.2	125.3	168.7	247.3	4574.5	5.0	43.2	2538.5	32505.9	1718.1	879.9	3987.5	46913.1
	Perc Diff	-16.3%	4.2%	-20.6%	-45.1%	-27.7%	-89.2%	-34.3%	-12.4%	-6.8%	29.1%	-1.6%	-13.1%	-9.7%
8	Prior	47.9	44.9	94.4	90.1	1479.9	19.4	32.3	131.5	1368.6	13717.5	2448.9	1810.4	21285.8
	After	50.1	63.3	103.3	71.8	1177.3	0.5	16.2	107.8	1429.9	13314.7	2746.1	1657.3	20738.2
	Perc Diff	4.5%	41.0%	9.5%	-20.4%	-20.4%	-97.7%	-49.9%	-18.0%	4.5%	-2.9%	12.1%	-8.5%	-2.6%
9	Prior	182.2	252.0	2245.2	299.4	7568.6	67.9	160.0	263.9	632.0	2204.9	33531.8	2441.2	49849.0
	After	196.7	227.6	1822.4	280.3	6569.1	113.0	98.2	203.0	618.7	2320.6	31527.8	2201.0	46178.5
	Perc Diff	7.9%	-9.7%	-18.8%	-6.4%	-13.2%	66.4%	-38.6%	-23.1%	-2.1%	5.2%	-6.0%	-9.8%	-7.4%
10	Prior	1273.0	1277.1	2282.1	2840.4	11940.0	6473.2	5805.4	16287.2	7667.2	3530.6	4825.2	917819.3	982020.6
	After	1275.4	1005.5	1691.1	2293.6	5552.6	6320.3	5204.9	12739.0	5834.5	2622.5	2967.1	914820.4	962326.8
	Perc Diff	0.2%	-21.3%	-25.9%	-19.3%	-53.5%	-2.4%	-10.3%	-21.8%	-23.9%	-25.7%	-38.5%	-0.3%	-2.0%
11	Prior	8625.0	16718.5	32723.8	30690.9	114579.5	14085.9	21093.3	57102.3	52467.2	22012.0	49778.2	962576.1	1382452.6
	After	8759.1	16761.2	29503.6	28540.0	99334.0	13836.3	19281.4	50197.0	47681.6	21150.0	45430.6	955744.8	1336219.5
	Perc Diff	1.6%	0.3%	-9.8%	-7.0%	-13.3%	-1.8%	-8.6%	-12.1%	-9.1%	-3.9%	-8.7%	-0.7%	-3.3%
12	Prior	460.4	2596.5	19482.8	540.0	5125.6	122.0	1154.6	165.3	174.5	83.5	2267.6	1803.9	33976.8
	After	455.6	2163.8	18333.3	557.7	4265.4	178.9	1046.1	293.2	221.8	70.1	1935.2	1848.3	31369.3
	Perc Diff	-1.0%	-16.7%	-5.9%	3.3%	-16.8%	46.7%	-9.4%	77.3%	27.1%	-16.1%	-14.7%	2.5%	-7.7%
Dest Totals	Prior	1276.2	746.6	572.3	19287.5	7320.2	427.7	264.3	625.3	296.2	78.5	275.6	1970.5	33140.8
	After	1320.8	778.4	641.4	18078.1	7651.3	429.7	203.9	358.1	247.4	136.1	455.8	1816.0	32117.0
	Perc Diff	3.5%	4.3%	12.1%	-6.3%	4.5%	0.5%	-22.9%	-42.7%	-16.5%	73.2%	65.4%	-7.8%	-3.1%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.2 AM Peak Hour LGV Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	141.5	23.0	11.7	128.1	99.8	1.9	7.0	2.3	7.4	0.0	0.0	60.0	482.8
	After	146.1	41.2	9.8	154.5	122.3	2.4	10.0	5.3	21.5	0.0	0.3	94.7	608.1
	Perc Diff	3.2%	79.0%	-16.3%	20.6%	22.5%	28.2%	42.6%	131.3%	190.6%	-19.0%	1088.6%	58.0%	26.0%
2	Prior	76.5	191.0	205.9	59.7	220.9	13.8	97.3	5.6	0.5	2.9	9.2	44.2	927.5
	After	73.5	283.8	197.6	76.4	216.0	43.7	112.1	10.7	0.9	3.4	9.5	58.8	1086.3
	Perc Diff	-3.9%	48.6%	-4.1%	27.8%	-2.2%	216.4%	15.3%	91.1%	104.5%	16.0%	3.1%	32.9%	17.1%
3	Prior	21.4	221.7	1108.3	50.4	614.0	12.5	193.9	26.3	19.7	17.4	260.7	193.4	2739.7
	After	25.7	224.2	1378.2	66.0	693.7	15.2	237.2	42.6	19.4	37.1	343.6	182.2	3265.0
	Perc Diff	20.5%	1.1%	24.4%	30.9%	13.0%	22.2%	22.4%	62.0%	-1.7%	113.5%	31.8%	-5.8%	19.2%
4	Prior	160.7	31.4	83.0	1037.1	612.9	78.9	27.6	66.0	19.3	27.9	33.1	226.8	2404.8
	After	139.6	48.8	96.8	1173.7	606.8	79.4	29.7	59.9	10.7	21.5	48.9	201.6	2517.3
	Perc Diff	-13.2%	55.2%	16.6%	13.2%	-1.0%	0.6%	7.3%	-9.2%	-44.5%	-23.0%	47.8%	-11.1%	4.7%
5	Prior	99.5	174.2	763.8	489.9	6563.8	11.6	51.4	231.8	280.7	127.9	740.5	734.0	10269.2
	After	148.5	171.9	453.7	561.6	6253.6	8.9	48.2	334.1	279.8	126.3	794.3	786.5	9967.6
	Perc Diff	49.4%	-1.3%	-40.6%	14.6%	-4.7%	-23.1%	-6.2%	44.1%	-0.3%	-1.3%	7.3%	7.2%	-2.9%
6	Prior	4.2	48.3	14.6	80.9	24.8	1.2	6.1	3.2	1.0	0.1	1.3	1.4	187.0
	After	10.7	38.9	32.9	95.2	61.1	1.2	9.5	8.5	0.9	0.0	9.7	1.9	270.4
	Perc Diff	156.8%	-19.6%	125.4%	17.8%	146.0%	0.0%	54.7%	164.5%	-6.1%	-71.8%	641.3%	40.0%	44.6%
7	Prior	1.1	28.2	144.3	19.2	48.0	4.1	29.8	0.8	18.7	7.3	3.8	49.3	354.5
	After	0.9	25.0	173.0	27.6	44.5	11.2	44.2	1.6	16.7	5.3	4.3	73.7	428.0
	Perc Diff	-18.9%	-11.2%	19.9%	43.8%	-7.3%	174.7%	48.3%	112.0%	-10.8%	-27.9%	13.9%	49.4%	20.7%
8	Prior	13.1	10.6	104.7	121.6	484.7	14.1	8.9	3255.1	590.6	34.5	35.7	1146.7	5820.3
	After	30.0	18.0	48.3	146.1	465.8	14.7	6.7	3473.4	653.1	16.2	34.0	1259.2	6165.5
	Perc Diff	129.3%	70.4%	-53.8%	20.1%	-3.9%	3.8%	-25.2%	6.7%	10.6%	-52.9%	-4.7%	9.8%	5.9%
9	Prior	12.4	0.9	44.1	40.5	470.8	1.6	5.4	432.8	3474.7	149.3	95.8	530.0	5258.2
	After	6.7	0.8	37.3	41.2	443.1	0.4	4.3	494.6	3365.0	212.0	126.9	539.5	5272.0
	Perc Diff	-45.9%	-10.7%	-15.4%	1.7%	-5.9%	-71.5%	-19.0%	14.3%	-3.2%	42.0%	32.4%	1.8%	0.3%
10	Prior	3.8	5.2	22.3	4.5	209.3	0.0	0.9	16.4	175.5	1317.7	370.1	240.8	2366.7
	After	3.3	10.9	15.9	5.5	221.2	0.0	0.8	7.9	194.4	1267.6	428.3	222.9	2378.6
	Perc Diff	-14.7%	107.1%	-28.8%	21.0%	5.7%	0.0%	-17.3%	-51.8%	10.8%	-3.8%	15.7%	-7.4%	0.5%
11	Prior	8.8	62.8	379.3	57.6	924.9	1.5	21.5	44.4	64.9	356.9	2379.4	310.3	4612.3
	After	14.4	45.9	338.1	70.9	835.1	2.8	18.1	56.4	62.1	354.2	2241.9	325.4	4365.2
	Perc Diff	62.9%	-26.9%	-10.9%	23.1%	-9.7%	82.7%	-15.7%	26.9%	-4.3%	-0.7%	-5.8%	4.9%	-5.4%
12	Prior	65.4	70.4	410.6	162.8	420.8	21.3	18.3	793.7	456.5	242.0	138.7	377.5	3177.9
	After	104.2	99.9	358.3	206.0	592.6	25.9	39.4	1113.1	586.4	240.4	196.0	598.5	4160.7
	Perc Diff	59.4%	41.9%	-12.7%	26.5%	40.8%	21.4%	115.9%	40.3%	28.4%	-0.6%	41.3%	58.5%	30.9%
Dest Totals	Prior	608.3	867.9	3292.7	2252.3	10694.7	162.5	468.1	4878.4	5109.5	2283.8	4068.2	3914.3	38600.8
	After	703.6	1009.3	3140.0	2624.5	10555.7	205.9	560.3	5608.1	5211.0	2284.0	4237.6	4344.9	40484.8
	Perc Diff	15.7%	16.3%	-4.6%	16.5%	-1.3%	26.7%	19.7%	15.0%	2.0%	0.0%	4.2%	11.0%	4.9%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.3 AM Peak Hour OGV Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	37.7	41.7	8.7	61.6	125.8	12.6	5.3	7.0	0.0	0.0	0.1	46.8	347.2
	After	31.9	16.9	1.2	40.8	123.2	10.4	3.3	32.1	0.0	0.0	0.0	45.9	305.7
	Perc Diff	-15.3%	-59.5%	-86.2%	-33.8%	-2.1%	-17.6%	-37.8%	359.9%	-51.7%	-79.2%	-74.7%	-1.7%	-11.9%
2	Prior	10.4	53.1	167.4	24.8	61.1	39.2	43.5	3.7	2.1	0.3	17.5	66.3	489.3
	After	12.5	60.2	123.3	19.1	56.2	20.7	28.5	14.2	4.5	0.7	47.2	86.2	473.4
	Perc Diff	20.4%	13.5%	-26.3%	-22.9%	-8.1%	-47.2%	-34.4%	288.3%	120.5%	121.9%	169.9%	30.0%	-3.3%
3	Prior	13.9	140.2	414.6	38.0	375.2	23.1	84.6	23.7	14.1	34.8	138.2	231.7	1532.1
	After	19.8	109.4	421.1	60.1	183.9	4.6	42.5	154.5	38.2	14.5	158.5	296.1	1503.2
	Perc Diff	42.7%	-21.9%	1.6%	58.4%	-51.0%	-80.1%	-49.7%	552.6%	170.2%	-58.3%	14.7%	27.8%	-1.9%
4	Prior	74.0	44.4	91.5	232.3	307.0	7.9	14.6	63.7	68.9	0.1	21.8	218.3	1144.7
	After	79.2	57.9	132.9	216.6	455.5	7.5	4.0	31.4	84.2	0.2	23.3	160.6	1253.2
	Perc Diff	7.0%	30.3%	45.2%	-6.8%	48.3%	-4.9%	-72.7%	-50.8%	22.2%	110.8%	6.9%	-26.4%	9.5%
5	Prior	35.2	67.3	306.2	202.7	2362.3	16.1	76.9	201.3	270.8	115.4	419.8	1194.6	5268.5
	After	55.7	113.4	187.7	166.7	2242.1	5.0	20.9	275.9	167.4	112.4	387.7	1306.6	5041.5
	Perc Diff	58.5%	68.5%	-38.7%	-17.7%	-5.1%	-69.0%	-72.8%	37.0%	-38.2%	-2.6%	-7.7%	9.4%	-4.3%
6	Prior	0.0	6.2	0.7	5.5	13.3	0.9	7.9	1.6	2.2	1.5	6.0	101.8	147.5
	After	0.0	2.4	3.3	6.2	28.7	0.9	5.4	5.5	4.2	2.6	53.9	144.2	257.3
	Perc Diff	0.0%	-61.9%	403.8%	13.5%	116.5%	0.0%	-31.9%	241.8%	86.4%	79.6%	795.8%	41.7%	74.5%
7	Prior	0.6	27.9	172.2	5.9	56.5	10.7	13.3	23.9	9.3	7.1	34.2	105.0	466.5
	After	0.6	31.6	46.0	2.7	19.3	4.2	18.6	41.3	1.9	2.5	22.6	102.5	293.9
	Perc Diff	1.3%	13.2%	-73.3%	-53.7%	-65.8%	-61.1%	39.7%	72.9%	-79.4%	-64.5%	-33.8%	-2.4%	-37.0%
8	Prior	12.2	11.1	32.1	26.0	285.5	1.1	16.0	1180.4	233.4	69.4	64.3	802.2	2733.7
	After	68.9	18.0	56.1	28.8	252.2	2.5	16.2	1176.2	204.4	106.7	101.7	1157.2	3188.8
	Perc Diff	466.3%	62.4%	74.9%	10.5%	-11.7%	116.2%	1.0%	-0.4%	-12.4%	53.7%	58.3%	44.3%	16.6%
9	Prior	16.4	1.1	32.2	8.4	225.8	17.0	2.0	158.2	1275.3	50.8	42.1	403.4	2232.5
	After	58.9	3.1	47.1	1.8	175.6	0.4	2.6	201.9	1189.2	54.9	32.9	560.4	2328.8
	Perc Diff	258.6%	190.5%	46.5%	-79.1%	-22.3%	-97.9%	33.2%	27.7%	-6.8%	8.2%	-21.7%	38.9%	4.3%
10	Prior	5.5	6.3	11.1	3.1	87.3	6.6	20.6	23.0	92.8	435.1	122.0	234.1	1047.5
	After	2.1	0.9	13.4	5.0	102.1	0.1	19.0	27.4	121.7	436.3	54.4	242.2	1024.6
	Perc Diff	-61.2%	-86.4%	21.2%	63.2%	16.9%	-99.0%	-7.5%	18.9%	31.2%	0.3%	-55.5%	3.5%	-2.2%
11	Prior	0.9	24.2	145.2	24.2	485.5	1.1	5.5	77.1	155.5	119.4	1294.1	486.5	2819.1
	After	3.2	32.4	121.5	14.1	296.3	0.5	4.0	45.0	116.6	121.1	1194.4	378.0	2327.2
	Perc Diff	271.2%	33.7%	-16.3%	-41.6%	-39.0%	-53.8%	-26.6%	-41.6%	-25.0%	1.4%	-7.7%	-22.3%	-17.5%
12	Prior	116.3	165.4	396.7	87.6	850.6	157.8	152.7	716.9	231.8	140.1	479.6	9196.5	12692.0
	After	145.4	103.4	422.4	115.4	959.8	171.0	133.7	1226.3	277.2	197.2	551.0	10709.0	15011.6
	Perc Diff	25.0%	-37.5%	6.5%	31.7%	12.8%	8.4%	-12.4%	71.1%	19.6%	40.7%	14.9%	16.4%	18.3%
Dest Totals	Prior	323.0	588.9	1778.5	720.0	5236.0	294.0	442.8	2480.4	2356.2	974.0	2639.7	13087.1	30920.7
	After	478.3	549.5	1576.2	677.2	4894.8	227.5	298.7	3231.7	2209.6	1049.2	2627.6	15188.8	33009.3
	Perc Diff	48.1%	-6.7%	-11.4%	-5.9%	-6.5%	-22.6%	-32.5%	30.3%	-6.2%	7.7%	-0.5%	16.1%	6.8%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.4 AM Peak Hour PCU Sector to Sector Comparison – Final Versus Penultimate Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	2756.5	683.6	243.3	1121.1	1152.4	84.8	84.2	180.3	59.7	17.4	136.4	993.4	7513.0
	After	2758.0	702.1	234.5	1167.6	1150.3	83.7	73.9	153.7	64.8	20.0	141.0	1006.1	7555.7
	Perc Diff	0.1%	2.7%	-3.6%	4.1%	-0.2%	-1.2%	-12.2%	-14.7%	8.7%	14.9%	3.4%	1.3%	0.6%
2	Prior	877.6	8189.9	2271.0	894.0	2130.8	407.6	1086.8	154.6	135.1	35.3	220.7	1210.2	17613.6
	After	891.5	8254.5	2249.8	917.3	2031.4	397.1	1109.2	165.6	138.0	37.2	229.0	1182.6	17603.3
	Perc Diff	1.6%	0.8%	-0.9%	2.6%	-4.7%	-2.6%	2.1%	7.1%	2.2%	5.3%	3.8%	-2.3%	-0.1%
3	Prior	488.6	2587.0	20026.3	661.5	5251.6	197.0	1348.0	416.3	278.7	141.3	2420.4	2354.8	36171.5
	After	501.1	2497.4	20132.7	683.9	5142.9	198.7	1325.9	490.3	279.3	121.7	2437.2	2326.5	36137.6
	Perc Diff	2.6%	-3.5%	0.5%	3.4%	-2.1%	0.9%	-1.6%	17.8%	0.2%	-13.9%	0.7%	-1.2%	-0.1%
4	Prior	1588.2	912.9	878.0	19528.8	8482.3	519.8	257.2	487.9	344.7	162.0	510.4	2304.9	35977.0
	After	1539.5	885.2	871.1	19468.3	8713.6	516.6	237.6	449.3	342.3	157.7	528.0	2178.2	35887.5
	Perc Diff	-3.1%	-3.0%	-0.8%	-0.3%	2.7%	-0.6%	-7.6%	-7.9%	-0.7%	-2.7%	3.4%	-5.5%	-0.2%
5	Prior	1524.9	2386.1	4047.5	4385.9	70050.2	390.9	643.1	2514.1	2905.1	1038.5	5195.4	6949.1	102030.9
	After	1526.7	2463.7	3966.2	4456.6	69906.0	390.2	656.4	2594.8	2870.0	1008.5	5225.4	6791.1	101855.7
	Perc Diff	0.1%	3.3%	-2.0%	1.6%	-0.2%	-0.2%	2.1%	3.2%	-1.2%	-2.9%	0.6%	-2.3%	-0.2%
6	Prior	222.6	505.8	172.7	705.8	678.5	5292.2	510.3	417.3	35.6	9.0	159.6	5692.1	14401.7
	After	230.9	513.1	180.3	702.4	711.3	5294.2	507.4	413.4	37.1	10.2	175.3	5746.2	14521.7
	Perc Diff	3.7%	1.4%	4.3%	-0.5%	4.8%	0.0%	-0.6%	-0.9%	4.2%	13.4%	9.9%	1.0%	0.8%
7	Prior	121.8	1086.2	1113.2	240.4	869.0	351.4	10482.2	111.0	75.3	22.1	233.3	4644.5	19350.3
	After	124.9	1097.1	1173.1	233.5	782.7	356.9	10516.0	119.2	71.2	20.7	229.9	4628.3	19353.6
	Perc Diff	2.5%	1.0%	5.4%	-2.8%	-9.9%	1.6%	0.3%	7.4%	-5.5%	-6.1%	-1.4%	-0.3%	0.0%
8	Prior	402.0	193.4	283.7	882.9	5041.4	392.8	136.0	35698.2	5078.1	257.4	388.6	15274.6	64029.0
	After	388.6	188.1	272.8	859.5	4847.1	392.5	129.4	35889.4	4997.8	247.5	383.3	15177.6	63773.5
	Perc Diff	-3.3%	-2.8%	-3.8%	-2.7%	-3.9%	-0.1%	-4.9%	0.5%	-1.6%	-3.9%	-1.4%	-0.6%	-0.4%
9	Prior	198.3	126.9	241.9	283.8	5237.7	7.3	50.3	3155.2	37064.3	1993.1	1051.1	5149.1	54559.0
	After	184.8	129.2	253.1	290.2	5193.2	5.8	50.2	3235.1	37060.1	1985.0	1039.7	5087.4	54513.9
	Perc Diff	-6.8%	1.8%	4.6%	2.2%	-0.8%	-20.5%	-0.2%	2.5%	0.0%	-0.4%	-1.1%	-1.2%	-0.1%
10	Prior	59.8	68.8	143.0	83.9	1568.4	0.6	37.7	130.0	1792.4	15013.8	3196.0	2138.4	24232.7
	After	55.5	75.1	132.6	82.2	1500.6	0.5	36.0	143.1	1746.1	15018.6	3228.7	2122.4	24141.4
	Perc Diff	-7.2%	9.2%	-7.2%	-2.1%	-4.3%	-18.3%	-4.5%	10.1%	-2.6%	0.0%	1.0%	-0.7%	-0.4%
11	Prior	202.5	286.5	2294.0	346.8	7576.3	111.4	120.3	283.4	810.8	2750.5	35026.4	2944.3	52753.1
	After	214.4	305.9	2282.1	365.2	7700.5	116.3	120.3	304.5	797.4	2795.9	34964.1	2904.3	52870.8
	Perc Diff	5.9%	6.8%	-0.5%	5.3%	1.6%	4.4%	0.1%	7.4%	-1.6%	1.6%	-0.2%	-1.4%	0.2%
12	Prior	1503.7	1197.0	2477.0	2630.1	7265.5	6500.3	5363.3	15001.3	6797.6	3053.9	3719.6	926273.7	981783.0
	After	1525.0	1208.7	2471.7	2614.9	7105.0	6517.1	5378.0	15078.4	6698.1	3060.2	3714.1	926127.8	981499.1
	Perc Diff	1.4%	1.0%	-0.2%	-0.6%	-2.2%	0.3%	0.3%	0.5%	-1.5%	0.2%	-0.1%	0.0%	0.0%
Dest Totals	Prior	9946.4	18224.1	34191.5	31765.1	115304.2	14256.2	20119.3	58549.6	55377.2	24494.4	52257.8	975929.1	1410414.9
	After	9941.0	18320.0	34219.8	31841.7	114784.6	14269.7	20140.4	59036.8	55102.2	24483.1	52295.8	975278.4	1409713.6
	Perc Diff	-0.1%	0.5%	0.1%	0.2%	-0.5%	0.1%	0.1%	0.8%	-0.5%	0.0%	0.1%	-0.1%	-0.05%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.5 Inter-Peak Hour Car Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	1513.9	713.4	246.5	989.7	702.9	97.7	142.3	101.9	52.5	22.6	97.2	675.1	5355.9
	After	1666.7	724.6	227.5	1232.1	717.2	75.0	73.9	79.0	65.3	51.7	158.2	555.6	5626.9
	Perc Diff	10.1%	1.6%	-7.7%	24.5%	2.0%	-23.2%	-48.0%	-22.5%	24.3%	128.6%	62.7%	-17.7%	5.1%
2	Prior	668.6	6061.1	2177.9	587.9	1169.7	210.5	943.2	64.0	62.2	25.0	85.8	763.5	12819.3
	After	749.6	6222.5	2120.9	571.5	1093.3	199.3	731.9	62.1	55.2	48.5	93.3	595.1	12543.2
	Perc Diff	12.1%	2.7%	-2.6%	-2.8%	-6.5%	-5.3%	-22.4%	-3.0%	-11.2%	94.2%	8.8%	-22.1%	-2.2%
3	Prior	210.3	2315.1	15673.2	268.5	3241.4	63.5	837.7	78.4	114.6	51.6	1728.4	1184.5	25767.1
	After	244.9	2261.2	14576.7	295.1	3418.5	68.3	686.3	131.3	157.5	64.9	1536.9	1153.7	24595.5
	Perc Diff	16.4%	-2.3%	-7.0%	9.9%	5.5%	7.6%	-18.1%	67.4%	37.4%	26.0%	-11.1%	-2.6%	-4.5%
4	Prior	914.1	582.9	329.4	13811.0	3645.3	307.2	145.0	502.3	192.3	43.6	153.6	1034.5	21661.2
	After	1134.9	519.9	283.6	13523.8	3442.1	306.6	109.1	275.9	143.1	56.3	213.1	905.7	20914.2
	Perc Diff	24.2%	-10.8%	-13.9%	-2.1%	-5.6%	-0.2%	-24.7%	-45.1%	-25.5%	29.3%	38.7%	-12.5%	-3.4%
5	Prior	754.5	1374.1	3246.1	4034.4	47771.8	232.7	423.9	2131.8	2555.8	638.0	4054.7	4423.3	71641.1
	After	755.9	1318.8	3453.8	3992.4	50943.1	212.5	249.1	1837.1	2354.1	731.3	4192.1	3669.9	73710.0
	Perc Diff	0.2%	-4.0%	6.4%	-1.0%	6.6%	-8.7%	-41.2%	-13.8%	-7.9%	14.6%	3.4%	-17.0%	2.9%
6	Prior	85.3	261.1	66.4	307.3	218.7	3283.2	490.5	312.5	25.1	4.3	32.1	4115.5	9201.9
	After	88.8	221.3	62.6	311.7	237.4	3283.4	287.9	298.8	20.9	7.0	62.4	4078.8	8961.3
	Perc Diff	4.1%	-15.2%	-5.7%	1.5%	8.6%	0.0%	-41.3%	-4.4%	-16.8%	61.7%	94.4%	-0.9%	-2.6%
7	Prior	132.9	991.2	853.8	143.9	410.3	486.8	7715.5	92.6	60.2	18.9	102.6	4706.4	15715.0
	After	89.1	742.9	720.8	123.9	264.2	306.9	6954.8	59.7	36.9	7.3	51.3	4075.5	13433.4
	Perc Diff	-33.0%	-25.1%	-15.6%	-13.9%	-35.6%	-36.9%	-9.9%	-35.6%	-38.6%	-61.2%	-50.0%	-13.4%	-14.5%
8	Prior	82.5	97.2	76.4	463.4	1910.8	300.7	91.8	26919.9	2790.7	72.1	123.7	11300.1	44229.4
	After	66.5	59.0	64.7	256.8	2187.6	271.0	46.1	24357.6	2521.1	73.2	132.1	9485.4	39521.0
	Perc Diff	-19.5%	-39.3%	-15.3%	-44.6%	14.5%	-9.9%	-49.7%	-9.5%	-9.7%	1.5%	6.8%	-16.1%	-10.6%
9	Prior	53.3	72.5	98.9	143.2	2211.3	27.4	58.5	2736.9	28179.6	1157.5	461.7	3605.6	38806.3
	After	98.2	74.8	106.5	145.5	2350.0	12.5	32.6	2569.7	25967.3	1442.3	519.0	3278.9	36597.3
	Perc Diff	84.4%	3.1%	7.7%	1.6%	6.3%	-54.2%	-44.3%	-6.1%	-7.9%	24.6%	12.4%	-9.1%	-5.7%
10	Prior	19.3	29.1	47.6	46.8	557.6	4.4	18.4	75.3	1217.3	11783.8	1754.4	1580.0	17134.0
	After	26.8	36.6	43.4	69.7	546.9	2.8	6.4	76.5	1528.6	11545.5	1859.1	1522.4	17264.9
	Perc Diff	39.0%	26.1%	-8.8%	48.9%	-1.9%	-35.9%	-65.5%	1.7%	25.6%	-2.0%	6.0%	-3.6%	0.8%
11	Prior	66.0	112.8	1796.8	139.5	4127.1	31.7	102.7	126.4	408.7	1605.7	26262.5	1526.4	36306.2
	After	86.8	109.2	1646.6	180.8	4470.3	46.6	53.8	150.3	458.9	1912.2	26167.0	1478.6	36760.8
	Perc Diff	31.5%	-3.2%	-8.4%	29.6%	8.3%	46.8%	-47.7%	19.0%	12.3%	19.1%	-0.4%	-3.1%	1.3%
12	Prior	533.3	675.2	1224.1	1030.0	4244.2	4105.7	4764.0	11521.6	3602.8	1529.6	1538.4	611086.4	645855.3
	After	629.8	564.4	1095.2	977.5	3596.2	4084.5	4134.7	10016.7	3317.7	1598.5	1396.5	610977.8	642389.4
	Perc Diff	18.1%	-16.4%	-10.5%	-5.1%	-15.3%	-0.5%	-13.2%	-13.1%	-7.9%	4.5%	-9.2%	0.0%	-0.5%
Dest Totals	Prior	5034.0	13285.8	25837.1	21965.5	70211.1	9151.3	15733.3	44663.5	39261.8	16952.6	36395.2	646001.4	944492.6
	After	5638.1	12855.3	24402.2	21680.8	73266.8	8869.4	13366.5	39914.7	36626.7	17538.9	36381.1	641777.3	932317.9
	Perc Diff	12.0%	-3.2%	-5.6%	-1.3%	4.4%	-3.1%	-15.0%	-10.6%	-6.7%	3.5%	0.0%	-0.7%	-1.3%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.6 Inter-Peak Hour LGV Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	160.7	70.7	18.0	161.7	131.9	0.0	16.2	6.2	17.0	7.9	11.8	61.9	664.0
	After	155.9	61.1	12.9	197.6	141.8	0.0	15.0	8.1	26.9	11.3	10.9	67.1	708.5
	Perc Diff	-3.0%	-13.6%	-28.4%	22.2%	7.5%	36.0%	-7.4%	29.8%	58.1%	42.7%	-7.1%	8.4%	6.7%
2	Prior	50.9	194.0	185.2	56.0	164.5	15.0	82.8	10.2	2.1	5.2	11.6	49.5	826.7
	After	90.4	308.3	182.1	84.5	208.2	33.6	68.5	14.5	3.9	4.4	14.9	76.3	1089.5
	Perc Diff	77.7%	59.0%	-1.7%	50.9%	26.6%	124.4%	-17.3%	43.1%	82.3%	-14.4%	28.4%	54.3%	31.8%
3	Prior	28.2	238.4	996.9	52.8	519.3	6.1	158.5	31.0	23.7	15.9	276.8	161.8	2509.3
	After	46.7	204.5	1222.4	79.6	558.6	4.3	162.2	40.9	20.4	16.3	308.8	157.7	2822.5
	Perc Diff	65.7%	-14.2%	22.6%	50.7%	7.6%	-30.2%	2.3%	32.2%	-13.7%	2.7%	11.6%	-2.5%	12.5%
4	Prior	120.0	58.4	86.3	1119.7	531.8	55.2	20.7	78.0	42.0	15.0	25.0	172.7	2324.8
	After	139.2	50.4	71.6	1175.8	611.1	54.2	15.6	43.7	48.6	26.4	39.9	194.7	2471.2
	Perc Diff	16.0%	-13.7%	-17.0%	5.0%	14.9%	-1.7%	-24.9%	-44.0%	15.6%	76.2%	59.8%	12.8%	6.3%
5	Prior	121.0	203.2	605.9	576.5	6817.1	38.2	60.3	367.2	333.6	152.3	613.6	724.7	10613.6
	After	150.8	172.8	570.0	714.2	6992.3	42.4	45.9	395.8	403.9	158.2	722.1	743.5	11111.9
	Perc Diff	24.7%	-15.0%	-5.9%	23.9%	2.6%	11.0%	-23.9%	7.8%	21.1%	3.9%	17.7%	2.6%	4.7%
6	Prior	7.8	7.2	1.5	55.2	38.9	6.4	4.9	8.9	0.3	2.5	0.6	5.2	139.4
	After	14.9	24.5	2.9	66.8	60.5	6.4	12.7	12.5	0.3	2.9	1.2	10.9	216.5
	Perc Diff	90.6%	241.9%	98.0%	21.0%	55.4%	0.0%	159.5%	40.4%	-16.2%	17.4%	100.6%	110.1%	55.3%
7	Prior	5.4	88.5	149.3	20.8	56.1	6.9	30.3	4.9	10.1	3.6	19.1	21.5	416.5
	After	4.7	71.6	162.8	19.2	40.6	16.9	43.2	11.5	10.0	0.9	25.9	41.3	448.7
	Perc Diff	-11.7%	-19.1%	9.1%	-7.4%	-27.7%	143.3%	42.7%	133.4%	-1.0%	-74.3%	36.0%	92.5%	7.7%
8	Prior	11.1	14.2	89.6	78.0	306.2	6.1	3.2	2665.6	402.4	16.7	19.1	799.9	4412.3
	After	12.6	18.7	23.5	52.1	413.0	8.5	2.9	2862.7	432.5	13.3	27.5	919.4	4786.8
	Perc Diff	13.3%	31.6%	-73.7%	-33.2%	34.9%	39.2%	-10.9%	7.4%	7.5%	-20.3%	44.1%	14.9%	8.5%
9	Prior	8.7	3.8	19.0	11.5	280.7	0.1	11.7	365.0	3250.9	166.6	82.9	537.3	4738.3
	After	19.6	4.6	20.5	12.5	347.8	0.0	7.3	451.3	3382.1	218.0	114.8	645.2	5223.7
	Perc Diff	126.0%	19.3%	8.0%	8.3%	23.9%	-96.4%	-37.2%	23.6%	4.0%	30.8%	38.4%	20.1%	10.2%
10	Prior	3.5	1.4	8.0	12.6	99.1	2.5	5.2	28.4	177.3	1732.4	298.8	221.3	2590.4
	After	7.2	1.4	9.3	27.2	116.6	1.6	1.6	30.5	244.4	1703.0	346.4	234.4	2723.6
	Perc Diff	110.1%	2.5%	16.1%	116.5%	17.7%	-37.1%	-69.0%	7.3%	37.9%	-1.7%	15.9%	5.9%	5.1%
11	Prior	5.6	26.5	326.7	40.9	643.2	0.6	20.1	24.5	52.2	274.7	2237.6	204.3	3856.9
	After	9.1	20.8	299.5	63.6	725.7	0.8	31.6	26.9	76.0	325.2	2365.4	240.3	4184.9
	Perc Diff	63.3%	-21.7%	-8.3%	55.7%	12.8%	34.8%	57.1%	9.6%	45.6%	18.4%	5.7%	17.6%	8.5%
12	Prior	66.0	67.9	434.1	171.5	723.0	4.9	32.6	761.8	516.7	221.6	198.6	462.4	3661.3
	After	107.9	68.7	244.1	166.6	715.6	7.3	60.1	902.7	616.8	223.9	231.7	762.4	4107.9
	Perc Diff	63.5%	1.2%	-43.8%	-2.9%	-1.0%	49.6%	84.4%	18.5%	19.4%	1.0%	16.7%	64.9%	12.2%
Dest Totals	Prior	588.8	974.2	2920.5	2357.2	10311.8	142.1	446.5	4351.9	4828.4	2614.4	3795.4	3422.5	36753.5
	After	759.2	1007.3	2821.8	2659.7	10931.7	176.0	466.6	4801.1	5265.8	2703.8	4209.6	4093.2	39895.7
	Perc Diff	28.9%	3.4%	-3.4%	12.8%	6.0%	23.9%	4.5%	10.3%	9.1%	3.4%	10.9%	19.6%	8.5%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.7 Inter-Peak Hour OGV Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	55.5	52.1	23.2	58.6	83.6	5.8	12.5	11.4	4.5	0.0	2.8	33.3	343.4
	After	49.8	20.8	11.7	96.6	129.8	4.5	4.8	74.3	55.4	0.0	6.1	61.2	515.1
	Perc Diff	-10.2%	-60.1%	-49.4%	64.9%	55.2%	-21.6%	-61.4%	549.9%	1135.2%	0.0%	113.5%	83.4%	50.0%
2	Prior	51.0	86.6	162.2	26.4	67.7	19.3	59.2	5.7	6.5	8.0	12.8	64.1	569.5
	After	32.0	87.5	105.5	24.8	63.7	8.5	33.4	9.4	7.5	46.9	32.3	58.5	510.0
	Perc Diff	-37.2%	1.1%	-35.0%	-6.1%	-5.8%	-55.9%	-43.6%	65.1%	16.0%	488.4%	152.0%	-8.8%	-10.4%
3	Prior	18.3	175.9	456.4	43.3	309.7	2.0	120.3	18.3	59.0	23.3	172.8	249.1	1648.4
	After	8.3	134.2	356.7	30.3	352.0	1.0	93.7	17.9	90.8	66.3	128.7	269.3	1549.3
	Perc Diff	-54.5%	-23.7%	-21.9%	-29.9%	13.6%	-48.5%	-22.1%	-2.1%	53.8%	184.2%	-25.5%	8.1%	-6.0%
4	Prior	60.6	27.8	44.0	216.6	308.6	11.5	10.1	39.8	31.1	5.7	33.3	232.8	1021.9
	After	54.6	20.8	37.6	201.6	396.4	10.5	5.0	39.9	26.7	5.1	71.7	298.5	1168.2
	Perc Diff	-10.0%	-25.1%	-14.4%	-6.9%	28.4%	-8.9%	-50.7%	0.3%	-14.3%	-11.4%	115.0%	28.2%	14.3%
5	Prior	71.8	79.0	345.2	280.1	2839.6	25.2	63.2	191.0	262.5	108.9	376.0	1088.0	5730.6
	After	128.3	92.7	255.1	325.2	2412.9	22.7	20.2	263.8	183.8	117.1	286.2	1243.6	5351.6
	Perc Diff	78.7%	17.4%	-26.1%	16.1%	-15.0%	-9.9%	-68.1%	38.1%	-30.0%	7.6%	-23.9%	14.3%	-6.6%
6	Prior	0.1	9.6	1.5	11.5	22.3	0.5	5.8	4.9	0.2	2.6	11.8	117.3	187.9
	After	0.1	7.8	2.3	10.9	30.5	0.5	4.3	2.6	0.4	10.7	59.4	181.6	311.0
	Perc Diff	88.3%	-18.9%	56.9%	-5.5%	37.0%	0.0%	-25.3%	-47.3%	111.5%	316.5%	403.6%	54.8%	65.5%
7	Prior	9.7	26.6	130.5	10.2	60.0	8.9	21.5	29.4	3.6	0.5	22.9	120.3	444.1
	After	4.9	17.0	75.4	3.1	15.9	3.9	21.6	39.4	4.4	0.7	4.5	106.7	297.5
	Perc Diff	-49.6%	-36.0%	-42.3%	-69.1%	-73.6%	-55.7%	0.4%	33.7%	23.9%	40.3%	-80.5%	-11.3%	-33.0%
8	Prior	15.8	6.4	46.7	52.0	227.0	5.7	24.4	1272.8	208.5	18.7	63.3	832.8	2774.0
	After	25.1	9.6	81.3	36.9	227.8	7.0	22.0	1270.3	196.0	20.4	44.1	1163.1	3103.6
	Perc Diff	59.1%	51.5%	74.2%	-29.1%	0.4%	23.3%	-10.1%	-0.2%	-6.0%	9.3%	-30.4%	39.7%	11.9%
9	Prior	5.2	4.8	45.1	29.3	229.6	0.7	3.2	242.5	1247.4	74.6	63.6	426.3	2372.2
	After	24.7	20.1	108.7	26.3	298.7	0.9	7.1	216.5	1156.0	85.6	72.5	556.5	2573.4
	Perc Diff	378.4%	319.5%	140.7%	-10.3%	30.1%	37.3%	117.8%	-10.7%	-7.3%	14.7%	14.0%	30.5%	8.5%
10	Prior	4.8	5.0	21.1	9.0	108.9	2.6	0.5	27.3	129.2	630.6	191.5	346.0	1476.6
	After	5.5	24.0	31.2	9.9	96.7	0.8	0.8	51.7	140.7	630.6	141.9	385.5	1519.3
	Perc Diff	13.4%	377.5%	47.8%	9.8%	-11.2%	-70.9%	77.6%	89.1%	8.9%	0.0%	-25.9%	11.4%	2.9%
11	Prior	3.9	8.1	131.0	29.2	489.0	12.9	23.8	71.0	81.9	138.9	1188.7	468.8	2647.1
	After	11.2	11.7	102.4	36.4	359.3	61.8	6.5	63.0	63.8	145.5	1028.8	549.5	2439.9
	Perc Diff	187.9%	44.4%	-21.8%	24.8%	-26.5%	378.1%	-72.7%	-11.2%	-22.1%	4.7%	-13.5%	17.2%	-7.8%
12	Prior	73.2	121.1	388.8	237.3	1081.7	181.3	116.0	920.5	435.9	343.0	463.9	10603.2	14966.0
	After	97.8	103.8	356.4	173.0	1068.8	197.1	128.5	1411.1	587.7	442.0	435.6	12310.9	17312.9
	Perc Diff	33.8%	-14.3%	-8.3%	-27.1%	-1.2%	8.7%	10.8%	53.3%	34.8%	28.8%	-6.1%	16.1%	15.7%
Dest Totals	Prior	369.7	603.0	1795.7	1003.3	5827.8	276.3	460.8	2834.7	2470.2	1354.8	2603.5	14582.1	34181.8
	After	442.3	550.0	1524.2	974.8	5452.6	319.3	347.9	3459.8	2513.2	1570.8	2311.7	17185.1	36651.8
	Perc Diff	19.6%	-8.8%	-15.1%	-2.8%	-6.4%	15.5%	-24.5%	22.1%	1.7%	15.9%	-11.2%	17.9%	7.2%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.8 Inter-Peak Hour PCU Sector to Sector Comparison – Final Versus Penultimate Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	1870.2	804.0	252.8	1517.5	987.9	79.1	99.3	179.4	137.7	60.8	179.0	682.7	6850.4
	After	1872.4	806.4	252.1	1526.3	988.8	79.6	93.8	161.4	147.6	63.0	175.2	683.8	6850.5
	Perc Diff	0.1%	0.3%	-0.3%	0.6%	0.1%	0.6%	-5.5%	-10.0%	7.2%	3.6%	-2.1%	0.2%	0.0%
2	Prior	873.1	6591.2	2417.6	699.9	1360.8	238.2	824.8	90.6	62.7	102.9	135.4	724.9	14122.2
	After	872.0	6618.3	2408.5	680.7	1365.3	241.3	833.7	86.0	66.6	99.7	140.5	729.9	14142.7
	Perc Diff	-0.1%	0.4%	-0.4%	-2.7%	0.3%	1.3%	1.1%	-5.0%	6.2%	-3.1%	3.7%	0.7%	0.1%
3	Prior	298.3	2591.8	16062.9	401.7	4292.3	75.3	940.7	175.7	285.7	147.7	1977.6	1622.8	28872.4
	After	299.9	2599.9	16155.8	405.0	4329.1	73.6	942.2	190.1	268.8	147.5	1974.5	1580.7	28967.3
	Perc Diff	0.6%	0.3%	0.6%	0.8%	0.9%	-2.2%	0.2%	8.2%	-5.9%	-0.1%	-0.2%	-2.6%	0.3%
4	Prior	1325.5	598.8	389.2	14916.2	4482.6	372.3	133.6	364.1	227.4	91.9	315.1	1404.2	24620.9
	After	1328.7	591.1	392.8	14901.1	4449.5	371.3	129.7	359.5	218.4	87.8	324.7	1398.9	24553.6
	Perc Diff	0.2%	-1.3%	0.9%	-0.1%	-0.7%	-0.3%	-2.9%	-1.3%	-4.0%	-4.4%	3.0%	-0.4%	-0.3%
5	Prior	1030.2	1592.4	4255.7	5047.1	60335.6	276.9	319.8	2477.6	2998.9	1021.6	5210.7	5671.1	90237.6
	After	1035.0	1584.3	4278.8	5031.8	60348.4	277.6	315.2	2496.6	2941.8	1006.6	5200.4	5657.0	90173.5
	Perc Diff	0.5%	-0.5%	0.5%	-0.3%	0.0%	0.3%	-1.4%	0.8%	-1.9%	-1.5%	-0.2%	-0.2%	-0.1%
6	Prior	103.8	255.9	68.5	389.5	330.2	3290.3	303.2	313.3	21.4	20.7	123.7	4265.6	9486.0
	After	103.9	253.6	67.8	389.4	328.5	3290.3	304.9	314.0	21.5	20.7	123.0	4271.3	9488.8
	Perc Diff	0.1%	-0.9%	-1.1%	0.0%	-0.5%	0.0%	0.6%	0.2%	0.6%	-0.2%	-0.5%	0.1%	0.0%
7	Prior	99.1	829.4	946.2	140.5	331.2	331.8	7017.8	105.1	50.9	9.2	81.0	4222.7	14164.8
	After	98.7	831.5	959.0	146.3	320.7	327.7	7019.7	110.5	51.4	9.0	81.7	4223.5	14179.6
	Perc Diff	-0.4%	0.3%	1.3%	4.2%	-3.2%	-1.2%	0.0%	5.2%	0.8%	-2.6%	0.9%	0.0%	0.1%
8	Prior	105.8	86.9	167.6	357.8	2819.8	287.0	72.3	28507.5	3123.3	108.2	204.8	11540.8	47382.0
	After	104.2	87.3	169.5	345.8	2828.3	286.5	71.0	28490.5	3149.6	106.9	203.6	11567.9	47411.3
	Perc Diff	-1.6%	0.4%	1.2%	-3.4%	0.3%	-0.2%	-1.9%	-0.1%	0.8%	-1.2%	-0.6%	0.2%	0.1%
9	Prior	141.8	92.6	231.6	200.5	3047.3	12.3	49.4	3251.9	30454.7	1755.7	704.2	4457.1	44399.1
	After	142.5	99.4	235.7	184.2	2996.4	13.5	47.0	3237.4	30505.4	1745.9	706.3	4480.7	44394.4
	Perc Diff	0.5%	7.3%	1.8%	-8.1%	-1.7%	9.5%	-4.9%	-0.4%	0.2%	-0.6%	0.3%	0.5%	0.0%
10	Prior	40.0	59.4	80.8	100.8	772.8	5.2	9.0	158.5	1913.4	13867.9	2335.2	2155.7	21498.7
	After	39.5	62.1	83.9	106.8	760.3	5.1	8.8	158.7	1913.7	13879.1	2347.4	2142.3	21507.8
	Perc Diff	-1.3%	4.6%	3.9%	5.9%	-1.6%	-0.5%	-2.0%	0.1%	0.0%	0.1%	0.5%	-0.6%	0.0%
11	Prior	105.5	139.6	2059.9	289.9	5550.9	109.1	95.1	240.9	585.6	2375.7	29613.8	2267.3	43433.3
	After	107.1	141.6	2048.5	280.8	5555.3	109.2	91.9	240.2	598.7	2382.9	29561.2	2268.4	43385.7
	Perc Diff	1.5%	1.4%	-0.6%	-3.2%	0.1%	0.1%	-3.4%	-0.3%	2.2%	0.3%	-0.2%	0.0%	-0.1%
12	Prior	849.7	724.3	1687.9	1311.2	5425.2	4290.3	4326.7	12340.8	4500.7	2263.7	2065.0	623947.7	663733.0
	After	835.6	736.9	1695.7	1317.1	5380.6	4288.9	4323.4	12330.5	4522.2	2264.4	2063.9	624051.1	663810.2
	Perc Diff	-1.7%	1.7%	0.5%	0.4%	-0.8%	0.0%	-0.1%	-0.1%	0.5%	0.0%	-0.1%	0.0%	0.0%
Dest Totals	Prior	6843.0	14366.4	28620.5	25372.5	89736.4	9367.7	14191.5	48205.5	44362.5	21826.0	42945.3	662962.8	1008800.2
	After	6839.5	14412.6	28748.1	25315.3	89651.2	9364.7	14181.1	48175.7	44405.7	21813.5	42902.4	663055.6	1008865.4
	Perc Diff	-0.1%	0.3%	0.4%	-0.2%	-0.1%	0.0%	-0.1%	-0.1%	0.1%	-0.1%	-0.1%	0.0%	0.01%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.9 PM Peak Hour Car Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	1763.8	815.4	394.1	1418.9	991.2	145.0	219.4	224.3	140.4	50.9	182.8	1311.6	7657.7
	After	2028.0	914.7	343.1	1834.1	973.7	159.5	118.0	143.9	74.5	35.0	233.0	1106.2	7963.5
	Perc Diff	15.0%	12.2%	-13.0%	29.3%	-1.8%	10.1%	-46.2%	-35.9%	-46.9%	-31.3%	27.5%	-15.7%	4.0%
2	Prior	712.3	6370.1	2842.3	803.0	1516.6	272.7	1180.1	153.2	120.0	54.5	233.6	1380.0	15638.5
	After	750.8	6510.6	2645.2	777.1	1480.6	382.7	1143.8	82.2	86.3	94.4	292.6	1172.5	15418.8
	Perc Diff	5.4%	2.2%	-6.9%	-3.2%	-2.4%	40.3%	-3.1%	-46.3%	-28.1%	73.1%	25.2%	-15.0%	-1.4%
3	Prior	290.4	2622.0	15228.6	534.9	4414.6	99.3	1177.9	162.3	215.6	105.9	2371.3	1695.5	28918.2
	After	291.7	2405.2	15509.3	637.0	4166.3	161.5	1100.8	93.3	303.6	88.1	2132.5	1668.1	28557.4
	Perc Diff	0.4%	-8.3%	1.8%	19.1%	-5.6%	62.7%	-6.5%	-42.5%	40.8%	-16.8%	-10.1%	-1.6%	-1.2%
4	Prior	842.0	864.9	674.6	14701.6	4780.3	601.2	335.5	1026.2	446.8	127.8	327.2	2347.1	27075.3
	After	959.5	861.4	452.5	15086.1	5182.5	631.1	200.6	854.8	199.9	74.6	387.1	2102.7	26993.0
	Perc Diff	14.0%	-0.4%	-32.9%	2.6%	8.4%	5.0%	-40.2%	-16.7%	-55.3%	-41.6%	18.3%	-10.4%	-0.3%
5	Prior	1128.5	2413.0	5502.8	7305.3	50289.0	587.6	1049.7	4762.5	5563.5	1542.3	7285.8	9297.5	96727.3
	After	1212.9	2415.9	5102.7	7171.2	56394.5	528.9	745.2	4960.5	4944.0	1650.5	7776.0	7734.2	100636.5
	Perc Diff	7.5%	0.1%	-7.3%	-1.8%	12.1%	-10.0%	-29.0%	4.2%	-11.1%	7.0%	6.7%	-16.8%	4.0%
6	Prior	70.0	354.0	166.4	688.4	555.9	4098.0	579.9	470.8	82.5	18.9	93.3	5666.2	12844.4
	After	63.8	362.2	145.5	712.7	539.4	4106.9	324.5	393.4	34.0	11.3	128.9	5369.1	12191.7
	Perc Diff	-8.9%	2.3%	-12.6%	3.5%	-3.0%	0.2%	-44.0%	-16.4%	-58.8%	-40.1%	38.1%	-5.2%	-5.1%
7	Prior	126.3	1401.2	1522.9	509.2	1290.4	576.7	9239.1	184.1	134.8	70.0	558.4	5804.3	21417.4
	After	50.1	1187.2	1154.7	271.2	756.2	432.8	8685.1	87.5	55.6	30.0	347.1	5425.0	18482.6
	Perc Diff	-60.3%	-15.3%	-24.2%	-46.7%	-41.4%	-24.9%	-6.0%	-52.5%	-58.8%	-57.1%	-37.8%	-6.5%	-13.7%
8	Prior	91.4	113.1	199.8	852.0	2697.2	383.9	135.3	30509.0	4079.5	214.3	422.2	14376.9	54074.7
	After	117.8	97.9	148.6	598.5	2520.6	348.9	72.5	28410.8	3271.8	174.9	298.5	12201.2	48262.1
	Perc Diff	28.9%	-13.5%	-25.6%	-29.8%	-6.5%	-9.1%	-46.4%	-6.9%	-19.8%	-18.3%	-29.3%	-15.1%	-10.7%
9	Prior	51.3	85.6	209.1	464.8	2881.7	58.1	66.9	5005.6	31740.8	1523.1	882.4	5489.6	48459.2
	After	84.7	91.9	188.7	354.7	2964.0	11.2	30.6	4240.1	31382.0	1864.1	848.3	5305.4	47365.7
	Perc Diff	65.1%	7.4%	-9.8%	-23.7%	2.9%	-80.8%	-54.2%	-15.3%	-1.1%	22.4%	-3.9%	-3.4%	-2.3%
10	Prior	16.1	23.6	80.6	86.0	853.3	10.7	29.0	216.7	1677.3	12486.7	2632.2	2253.3	20365.4
	After	37.7	42.3	77.8	148.7	991.1	0.6	12.7	260.5	2126.7	12304.6	2784.5	2169.1	20956.6
	Perc Diff	134.7%	79.4%	-3.4%	73.0%	16.1%	-94.1%	-56.0%	20.2%	26.8%	-1.5%	5.8%	-3.7%	2.9%
11	Prior	91.8	203.6	2596.2	350.1	5424.5	45.1	196.0	390.9	859.5	2514.2	28551.0	2604.6	43827.4
	After	144.3	240.9	2431.9	483.0	6072.4	99.5	148.2	473.8	964.9	2758.0	28109.4	2587.2	44513.4
	Perc Diff	57.2%	18.3%	-6.3%	38.0%	11.9%	120.6%	-24.4%	21.2%	12.3%	9.7%	-1.5%	-0.7%	1.6%
12	Prior	575.4	1019.5	2579.5	3170.7	8606.7	5103.8	4787.4	17649.5	8053.2	3685.2	6119.9	777899.4	839250.2
	After	671.1	932.8	1590.2	2929.5	5164.3	5446.6	4200.7	13545.1	6494.5	2610.7	3187.7	776483.9	823257.0
	Perc Diff	16.6%	-8.5%	-38.4%	-7.6%	-40.0%	6.7%	-12.3%	-23.3%	-19.4%	-29.2%	-47.9%	-0.2%	-1.9%
Dest Totals	Prior	5759.3	16286.0	31997.0	30884.9	84301.2	11982.0	18996.3	60755.1	53113.9	22393.8	49660.2	830126.1	1216255.7
	After	6412.5	16063.1	29790.2	31003.7	87205.6	12310.2	16782.8	53546.0	49937.8	21696.2	46525.5	823324.7	1194598.2
	Perc Diff	11.3%	-1.4%	-6.9%	0.4%	3.4%	2.7%	-11.7%	-11.9%	-6.0%	-3.1%	-6.3%	-0.8%	-1.8%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.10 PM Peak Hour LGV Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	142.4	67.8	20.1	81.3	66.8	1.5	2.4	11.3	12.3	2.7	17.0	56.0	481.7
	After	146.4	81.3	17.3	128.2	66.2	2.2	3.6	15.7	21.2	3.7	13.0	44.1	542.7
	Perc Diff	2.8%	19.9%	-14.2%	57.6%	-0.9%	48.3%	47.0%	38.7%	72.0%	35.6%	-23.8%	-21.2%	12.7%
2	Prior	24.8	166.2	192.7	49.1	125.9	16.3	44.6	7.2	1.2	0.2	11.9	53.5	693.6
	After	45.0	209.7	162.9	75.9	167.3	21.5	44.5	11.9	1.0	0.1	19.4	60.4	819.6
	Perc Diff	81.5%	26.2%	-15.5%	54.5%	32.9%	31.8%	-0.2%	66.1%	-16.6%	-31.8%	62.8%	12.9%	18.2%
3	Prior	9.3	151.9	1032.2	60.5	392.8	13.1	177.6	15.5	27.6	24.3	266.8	148.5	2320.1
	After	9.7	110.3	1156.7	88.3	472.4	12.6	166.6	19.5	33.3	21.5	323.3	118.0	2532.3
	Perc Diff	4.4%	-27.4%	12.1%	46.0%	20.3%	-4.0%	-6.2%	25.9%	20.8%	-11.7%	21.2%	-20.5%	9.1%
4	Prior	104.4	42.6	66.4	944.6	391.3	17.7	15.4	66.0	54.8	11.4	25.6	167.3	1907.4
	After	102.4	47.9	40.4	1051.2	585.2	18.5	14.4	66.0	53.0	8.7	47.7	227.5	2262.9
	Perc Diff	-2.0%	12.6%	-39.1%	11.3%	49.5%	4.5%	-6.8%	0.1%	-3.2%	-23.7%	86.3%	36.0%	18.6%
5	Prior	96.1	115.3	599.3	456.5	5422.1	47.9	54.9	392.9	340.3	199.5	522.3	551.8	8799.0
	After	124.9	130.4	472.6	449.4	5198.4	140.2	53.4	517.3	400.7	138.9	562.5	689.4	8878.3
	Perc Diff	29.9%	13.1%	-21.1%	-1.6%	-4.1%	192.5%	-2.8%	31.7%	17.8%	-30.4%	7.7%	24.9%	0.9%
6	Prior	1.3	12.7	8.6	46.8	32.9	2.2	3.2	15.1	3.2	0.4	17.7	21.4	165.5
	After	1.5	29.6	6.8	55.2	46.5	2.2	9.3	19.3	3.6	0.7	19.4	57.1	251.1
	Perc Diff	17.3%	133.5%	-21.0%	17.9%	41.2%	0.0%	192.1%	27.8%	12.4%	53.6%	10.0%	166.1%	51.7%
7	Prior	0.8	35.1	215.9	30.0	66.6	7.8	18.5	7.4	6.7	2.2	10.5	25.0	426.5
	After	0.3	45.7	164.5	38.5	71.9	19.0	23.9	6.2	4.0	0.8	14.6	53.9	443.4
	Perc Diff	-64.2%	30.2%	-23.8%	28.3%	8.0%	145.4%	28.8%	-16.2%	-40.0%	-65.1%	39.5%	115.9%	4.0%
8	Prior	4.4	7.0	18.4	49.4	224.0	0.0	3.2	2929.7	439.3	29.5	25.9	765.2	4495.9
	After	8.2	21.6	13.7	37.3	231.9	0.0	5.4	3126.6	390.7	15.6	24.8	976.6	4852.3
	Perc Diff	87.8%	209.2%	-25.2%	-24.6%	3.5%	0.0%	68.9%	6.7%	-11.0%	-47.2%	-4.3%	27.6%	7.9%
9	Prior	0.3	6.2	23.5	19.1	308.7	0.0	25.6	378.6	2716.4	134.5	58.1	433.4	4104.4
	After	2.2	4.3	11.2	26.4	319.5	0.0	18.7	363.9	2790.8	163.2	51.8	491.6	4243.5
	Perc Diff	624.6%	-31.2%	-52.1%	37.9%	3.5%	-95.9%	-26.9%	-3.9%	2.7%	21.3%	-10.9%	13.4%	3.4%
10	Prior	0.0	4.5	7.2	14.3	79.3	2.9	1.4	9.0	170.7	1392.5	177.8	168.8	2028.2
	After	0.0	2.2	8.2	32.4	127.9	0.4	0.5	11.5	183.6	1359.8	241.9	190.2	2158.6
	Perc Diff	0.0%	-51.3%	13.9%	127.5%	61.3%	-86.1%	-62.5%	27.4%	7.5%	-2.3%	36.1%	12.7%	6.4%
11	Prior	7.9	16.9	251.0	13.7	428.3	0.5	20.3	25.7	84.5	322.0	2306.3	261.7	3738.9
	After	16.0	17.8	221.1	40.3	515.7	1.0	23.4	31.7	118.5	270.4	2306.5	328.3	3890.8
	Perc Diff	102.1%	5.1%	-11.9%	193.7%	20.4%	94.7%	15.5%	23.2%	40.2%	-16.0%	0.0%	25.5%	4.1%
12	Prior	34.7	82.3	531.5	254.4	548.4	1.3	23.7	931.4	481.3	117.8	339.8	427.6	3774.2
	After	43.8	75.0	269.5	349.0	500.2	2.9	29.2	1090.1	584.3	92.9	301.2	689.2	4027.2
	Perc Diff	26.4%	-9.0%	-49.3%	37.2%	-8.8%	121.9%	23.2%	17.0%	21.4%	-21.1%	-11.3%	61.2%	6.7%
Dest Totals	Prior	426.4	708.5	2966.7	2019.7	8087.3	111.2	390.8	4789.8	4338.2	2237.0	3779.6	3080.3	32935.4
	After	500.3	775.8	2545.0	2372.0	8303.1	220.5	392.8	5279.8	4584.8	2076.3	3926.1	3926.4	34902.9
	Perc Diff	17.3%	9.5%	-14.2%	17.4%	2.7%	98.3%	0.5%	10.2%	5.7%	-7.2%	3.9%	27.5%	6.0%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.11 PM Peak Hour OGV Sector to Sector Comparison - Prior Versus Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	17.9	22.6	13.8	16.7	20.7	1.3	24.6	0.2	0.0	0.0	0.0	22.6	140.5
	After	20.1	8.4	3.0	33.8	43.5	3.2	2.6	2.4	0.0	0.0	0.0	40.7	157.7
	Perc Diff	12.2%	-62.8%	-78.6%	102.7%	110.4%	138.2%	-89.3%	1161.3%	-50.4%	-21.8%	-4.5%	80.0%	12.3%
2	Prior	17.2	17.0	76.6	17.1	21.3	0.5	20.2	0.6	0.3	0.2	14.3	29.9	215.1
	After	7.4	15.0	61.6	10.0	12.9	2.1	9.4	8.9	1.8	1.3	36.4	35.5	202.4
	Perc Diff	-56.7%	-12.0%	-19.5%	-41.5%	-39.2%	309.2%	-53.4%	1506.1%	471.4%	443.4%	154.9%	18.7%	-5.9%
3	Prior	8.3	80.8	148.7	26.8	114.9	8.7	42.4	2.7	16.8	6.8	60.8	168.8	686.6
	After	2.1	53.8	95.0	19.9	95.1	21.1	14.5	2.5	77.4	11.1	43.4	112.2	548.1
	Perc Diff	-74.0%	-33.5%	-36.1%	-25.8%	-17.2%	141.6%	-65.9%	-8.1%	360.3%	63.4%	-28.6%	-33.5%	-20.2%
4	Prior	40.4	9.9	26.2	75.1	112.3	12.5	3.8	10.4	10.8	7.9	3.5	83.4	396.2
	After	27.1	6.2	38.8	69.9	229.7	12.4	2.2	56.9	21.3	11.4	9.4	178.0	663.4
	Perc Diff	-32.9%	-37.1%	48.2%	-6.9%	104.5%	0.0%	-41.7%	447.6%	98.0%	43.0%	166.5%	113.6%	67.5%
5	Prior	52.8	34.8	159.3	149.1	980.6	1.4	55.7	114.0	115.7	20.5	173.0	460.0	2316.8
	After	80.4	35.1	143.2	132.7	786.3	1.2	30.3	229.8	128.8	45.6	143.1	677.7	2434.3
	Perc Diff	52.3%	0.9%	-10.1%	-11.0%	-19.8%	-12.6%	-45.6%	101.5%	11.3%	122.3%	-17.3%	47.3%	5.1%
6	Prior	0.5	5.1	13.8	6.7	7.1	0.0	2.4	0.8	1.0	0.7	3.3	58.8	100.1
	After	3.2	0.4	1.2	6.6	20.2	0.0	1.2	2.2	3.0	4.1	48.2	106.0	196.3
	Perc Diff	591.2%	-91.8%	-91.3%	-1.6%	186.5%	0.0%	-50.3%	166.5%	189.0%	509.5%	1375.9%	80.1%	96.1%
7	Prior	0.3	23.3	69.7	3.6	36.2	4.5	5.2	14.1	5.8	4.2	20.3	62.8	249.9
	After	0.0	7.5	45.0	0.4	6.8	2.5	6.1	10.9	2.8	1.8	4.8	55.4	144.0
	Perc Diff	-87.4%	-67.8%	-35.4%	-88.8%	-81.1%	-44.3%	17.6%	-22.2%	-51.9%	-58.3%	-76.4%	-11.8%	-42.4%
8	Prior	8.3	1.3	2.6	10.9	121.2	0.4	7.8	413.7	54.3	8.3	30.1	440.5	1099.5
	After	13.9	3.6	4.1	7.5	164.8	1.4	3.3	398.8	65.4	25.6	33.7	613.4	1335.5
	Perc Diff	66.4%	176.6%	55.7%	-31.2%	36.0%	245.7%	-57.2%	-3.6%	20.3%	207.5%	12.0%	39.2%	21.5%
9	Prior	0.0	5.1	15.0	0.9	60.0	0.5	1.2	135.2	344.4	20.4	7.9	172.0	762.5
	After	0.4	48.1	7.9	2.3	71.6	1.1	4.2	103.4	321.8	34.9	17.3	172.0	785.1
	Perc Diff	1530.2%	843.9%	-47.6%	163.5%	19.5%	110.6%	254.9%	-23.5%	-6.6%	71.5%	120.6%	0.0%	3.0%
10	Prior	0.0	0.0	7.3	2.8	64.1	0.0	14.4	30.6	45.0	182.8	79.7	267.3	693.9
	After	0.0	0.0	7.3	16.6	46.2	0.0	2.7	28.8	24.1	183.8	49.5	307.2	666.2
	Perc Diff	0.0%	-88.8%	0.3%	489.5%	-27.9%	-92.4%	-81.5%	-5.7%	-46.5%	0.5%	-37.8%	14.9%	-4.0%
11	Prior	2.5	11.2	73.1	26.4	205.5	9.6	6.4	18.5	51.8	82.1	384.0	424.4	1295.4
	After	10.2	7.2	53.8	15.6	135.7	108.7	3.3	19.6	73.5	65.9	339.4	352.3	1185.3
	Perc Diff	313.6%	-35.5%	-26.5%	-40.7%	-34.0%	1036.3%	-47.5%	6.3%	41.8%	-19.8%	-11.6%	-17.0%	-8.5%
12	Prior	28.3	37.7	84.3	61.0	501.6	92.7	57.8	389.1	125.5	83.6	280.2	5348.0	7089.9
	After	70.1	74.8	81.1	71.6	476.7	103.0	49.7	630.0	154.5	125.3	282.9	6657.9	8777.6
	Perc Diff	147.6%	98.5%	-3.8%	17.4%	-5.0%	11.0%	-14.0%	61.9%	23.1%	50.0%	1.0%	24.5%	23.8%
Dest Totals	Prior	176.5	248.8	690.2	396.9	2245.4	132.2	241.9	1129.8	771.5	417.5	1057.0	7538.5	15046.2
	After	235.0	260.3	541.9	386.9	2089.7	256.8	129.6	1494.4	874.3	510.8	1008.3	9308.1	17096.0
	Perc Diff	33.1%	4.6%	-21.5%	-2.5%	-6.9%	94.2%	-46.4%	32.3%	13.3%	22.3%	-4.6%	23.5%	13.6%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Table A2.12 PM Peak Hour PCU Sector to Sector Comparison – Final Versus Penultimate Estimated Matrix

Sectors	SATME2	1	2	3	4	5	6	7	8	9	10	11	12	Orig Totals
1	Prior	2204.3	978.5	362.2	2016.7	1066.0	162.4	134.4	167.3	106.2	47.0	234.6	1177.4	8657.0
	After	2194.4	1004.5	363.3	1996.0	1083.4	164.9	124.2	161.9	95.7	38.7	246.0	1191.0	8664.0
	Perc Diff	-0.4%	2.7%	0.3%	-1.0%	1.6%	1.6%	-7.6%	-3.2%	-9.8%	-17.8%	4.8%	1.2%	0.1%
2	Prior	808.9	6716.9	2870.7	880.9	1675.7	401.1	1163.2	107.1	98.1	91.1	318.2	1265.0	16396.9
	After	803.3	6735.3	2869.7	863.1	1660.8	406.3	1197.7	103.1	89.1	95.8	348.3	1268.4	16440.8
	Perc Diff	-0.7%	0.3%	0.0%	-2.0%	-0.9%	1.3%	3.0%	-3.7%	-9.2%	5.2%	9.5%	0.3%	0.3%
3	Prior	319.4	2585.4	16545.8	727.7	4728.6	186.8	1268.1	120.9	398.7	132.5	2473.8	1896.9	31384.8
	After	303.6	2569.2	16761.0	745.2	4733.8	195.2	1282.0	115.4	414.3	120.6	2499.2	1898.3	31637.8
	Perc Diff	-5.0%	-0.6%	1.3%	2.4%	0.1%	4.5%	1.1%	-4.5%	3.9%	-9.0%	1.0%	0.1%	0.8%
4	Prior	1100.3	913.0	544.9	16089.6	6017.2	655.5	217.1	1039.3	290.9	98.6	432.9	2480.3	29879.7
	After	1089.0	915.6	531.7	16207.2	5997.4	662.1	217.2	977.7	274.2	94.6	444.2	2508.2	29919.3
	Perc Diff	-1.0%	0.3%	-2.4%	0.7%	-0.3%	1.0%	0.0%	-5.9%	-5.7%	-4.0%	2.6%	1.1%	0.1%
5	Prior	1407.2	2574.4	5738.6	7700.5	62085.9	653.9	871.0	5740.6	5507.0	1868.0	8466.7	9307.9	111921.6
	After	1418.1	2581.5	5718.6	7753.4	62379.2	670.3	828.9	5707.7	5473.5	1835.1	8481.7	9101.3	111949.2
	Perc Diff	0.8%	0.3%	-0.3%	0.7%	0.5%	2.5%	-4.8%	-0.6%	-0.6%	-1.8%	0.2%	-2.2%	0.0%
6	Prior	68.7	383.1	151.7	746.5	599.8	4107.0	343.8	421.6	40.3	14.2	180.7	5494.4	12551.8
	After	68.5	392.2	153.5	774.4	606.1	4109.1	335.0	414.9	40.5	16.1	196.5	5532.2	12639.1
	Perc Diff	-0.3%	2.4%	1.2%	3.7%	1.1%	0.1%	-2.6%	-1.6%	0.5%	13.3%	8.7%	0.7%	0.7%
7	Prior	51.4	1250.9	1401.3	322.0	895.7	463.7	8708.0	110.3	70.2	38.6	397.8	5525.3	19235.1
	After	50.4	1240.5	1364.2	310.1	834.9	454.4	8715.1	104.6	62.4	32.6	366.4	5534.3	19070.0
	Perc Diff	-1.8%	-0.8%	-2.6%	-3.7%	-6.8%	-2.0%	0.1%	-5.2%	-11.0%	-15.6%	-7.9%	0.2%	-0.9%
8	Prior	144.3	123.7	165.6	679.9	2982.9	350.1	82.3	31913.5	3733.4	221.9	352.6	13633.9	54384.2
	After	139.9	123.1	166.4	643.2	2917.3	350.3	81.2	31936.2	3727.9	216.1	357.1	13791.2	54449.9
	Perc Diff	-3.1%	-0.4%	0.5%	-5.4%	-2.2%	0.1%	-1.4%	0.1%	-0.1%	-2.6%	1.3%	1.2%	0.1%
9	Prior	89.6	147.9	218.8	403.1	3303.7	17.3	58.7	4708.4	34418.4	2057.7	920.3	6004.2	52348.2
	After	87.3	144.3	207.8	383.4	3355.2	12.3	53.4	4707.5	34494.6	2062.1	917.5	5969.0	52394.4
	Perc Diff	-2.6%	-2.5%	-5.0%	-4.9%	1.6%	-28.9%	-8.9%	0.0%	0.2%	0.2%	-0.3%	-0.6%	0.1%
10	Prior	36.6	41.7	93.7	200.0	1159.4	1.3	17.7	299.4	2332.1	13844.4	3077.0	2678.4	23781.6
	After	37.7	44.5	93.3	197.8	1165.2	1.0	15.9	300.8	2334.4	13848.2	3076.0	2666.6	23781.3
	Perc Diff	3.1%	6.7%	-0.4%	-1.1%	0.5%	-18.1%	-9.8%	0.4%	0.1%	0.0%	0.0%	-0.4%	0.0%
11	Prior	175.7	248.2	2701.4	525.6	6691.2	214.6	177.2	522.8	1153.3	3049.4	30647.5	3281.4	49388.3
	After	170.5	265.9	2706.8	538.9	6723.8	209.2	175.0	525.1	1156.9	3094.3	30755.3	3267.8	49589.5
	Perc Diff	-3.0%	7.1%	0.2%	2.5%	0.5%	-2.5%	-1.3%	0.4%	0.3%	1.5%	0.4%	-0.4%	0.4%
12	Prior	784.6	1112.8	1978.0	3345.3	6140.4	5538.6	4262.0	15661.7	7241.8	2829.1	3783.2	783823.9	836501.4
	After	785.0	1082.6	1940.8	3350.0	6141.3	5552.4	4279.6	15265.2	7233.3	2828.9	3771.8	783831.0	836061.9
	Perc Diff	0.0%	-2.7%	-1.9%	0.1%	0.0%	0.3%	0.4%	-2.5%	-0.1%	0.0%	-0.3%	0.0%	-0.1%
Dest Totals	Prior	7191.2	17076.4	32772.8	33637.9	97346.5	12752.3	17303.5	60812.8	55390.4	24292.6	51285.3	836568.9	1246430.6
	After	7147.8	17099.2	32877.0	33762.7	97598.5	12787.5	17305.2	60320.1	55396.9	24283.2	51459.9	836559.2	1246597.2
	Perc Diff	-0.6%	0.1%	0.3%	0.4%	0.3%	0.3%	0.0%	-0.8%	0.0%	0.0%	0.3%	0.0%	0.01%

Note: The shading indicates those sector to sector comparisons where the percentage difference is >10% and the absolute difference is >500

Appendix 7 Detailed Assignment Validation Results for Cordons & Screenlines

Table A3.1 Detailed Assignment Validation Results (Actual Flows,All PCU's, AM Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	10684	10774	90	0.8%	4.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9785	0.9
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	8616	8339	-277	-3.2%	4.4%	92.3%	100.0%	100.0%	88.9%	0.0%	92.3%	0.9519	3.0
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	17778	16832	-946	-5.3%	6.0%	85.0%	90.0%	100.0%	70.0%	100.0%	85.0%	0.9849	7.2
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	17176	16779	-397	-2.3%	3.7%	95.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.9957	3.0
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	14913	14311	-602	-4.0%	6.7%	85.7%	95.2%	90.9%	90.0%	0.0%	90.5%	0.9511	5.0
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	14307	13759	-548	-3.8%	7.7%	85.7%	85.7%	77.8%	91.7%	0.0%	85.7%	0.9248	4.6
Airport Cordon Inbound	Demands														
	Actuals	5	2642	2621	-21	-0.8%	3.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9954	0.4
Airport Cordon Outbound	Demands														
	Actuals	5	1757	1672	-85	-4.8%	5.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9905	2.1
Wilmslow Cordon Inbound	Demands														
	Actuals	4	3259	3199	-60	-1.8%	2.1%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9661	1.1
Wilmslow Cordon Outbound	Demands														
	Actuals	4	3526	3130	-396	-11.2%	11.2%	75.0%	75.0%	66.7%	100.0%	0.0%	75.0%	0.2033	6.9
A34 Screenline Westbound	Demands														
	Actuals	7	6931	6957	26	0.4%	15.2%	57.1%	71.4%	50.0%	100.0%	0.0%	57.1%	0.7375	0.3
A34 Screenline Eastbound	Demands														
	Actuals	7	4657	4650	-7	-0.2%	15.1%	71.4%	71.4%	33.3%	75.0%	0.0%	57.1%	0.6900	0.1
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	4522	4288	-234	-5.2%	6.5%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9077	3.5
Stockport-Hazel Grove Screenline SouthEastbound	Demands														
	Actuals	5	4399	4260	-139	-3.2%	3.2%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9545	2.1

Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	5081	4909	-172	-3.4%	11.6%	71.4%	71.4%	75.0%	66.7%	0.0%	71.4%	0.6515	2.4
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	3906	3787	-119	-3.1%	3.7%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9842	1.9
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	2948	2906	-42	-1.4%	2.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9962	0.8
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	2250	2171	-79	-3.5%	4.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9812	1.7
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	13583	12857	-726	-5.3%	5.8%	91.7%	100.0%	80.0%	100.0%	100.0%	91.7%	0.9948	6.3
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	13668	13093	-575	-4.2%	4.5%	91.7%	91.7%	100.0%	85.7%	100.0%	91.7%	0.9968	5.0
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	5311	5160	-151	-2.8%	4.5%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9860	2.1
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	5454	5078	-376	-6.9%	7.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9667	5.2
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	1514	1377	-137	-9.1%	11.0%	100.0%	100.0%	0.0%	80.0%	0.0%	80.0%	0.8789	3.6
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	1149	1402	253	22.0%	34.9%	80.0%	80.0%	0.0%	80.0%	0.0%	80.0%	-0.7362	7.1
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	2429	2313	-116	-4.8%	4.9%	85.7%	85.7%	100.0%	100.0%	0.0%	100.0%	0.9933	2.4
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	2765	2669	-96	-3.5%	4.4%	85.7%	85.7%	100.0%	100.0%	0.0%	100.0%	0.9943	1.8
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	815	806	-9	-1.1%	2.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9975	0.3
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	951	917	-34	-3.6%	6.9%	83.3%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9934	1.1
A523 East Screenline Eastbound	Demands														
	Actuals	7	1349	1463	114	8.5%	13.5%	85.7%	85.7%	0.0%	85.7%	0.0%	85.7%	0.8973	3.0
A523 East Screenline	Demands														

Westbound	Actuals	7	2178	2318	140	6.4%	9.7%	71.4%	100.0%	0.0%	85.7%	0.0%	85.7%	0.9307	3.0
A523 West Screenline Eastbound	Demands														
	Actuals	5	1932	1916	-16	-0.8%	3.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9877	0.4
A523 West Screenline Westbound	Demands														
	Actuals	5	2381	2607	226	9.5%	16.2%	80.0%	80.0%	100.0%	75.0%	0.0%	80.0%	0.5052	4.5
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	4623	4292	-331	-7.2%	7.5%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9685	5.0
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	4601	4197	-404	-8.8%	11.3%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9040	6.1
Random Independent Counts	Demands														
	Actuals	62	53682	51476	-2206	-4.1%	10.9%	75.8%	91.9%	80.0%	77.8%	0.0%	79.0%	0.9336	9.6
GMSM Motorway Counts	Demands														
	Actuals	141	405222	395614	-9608	-2.4%	4.2%	87.9%	95.0%	88.9%	89.5%	94.1%	91.5%	0.9899	15.2
Independent Motorway Counts	Demands														
	Actuals	8	45419	43007	-2412	-5.3%	5.5%	62.5%	87.5%	0.0%	0.0%	75.0%	75.0%	0.8759	11.5
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	126273	121467	-4806	-3.8%	4.5%	91.7%	97.2%	90.9%	100.0%	91.7%	91.7%	0.9881	13.7
All Independent Counts	Demands														
	Actuals	84	110689	106090	-4599	-4.2%	9.1%	72.6%	88.1%	72.7%	78.1%	75.0%	75.0%	0.9871	14.0

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.2 Detailed Assignment Validation Results (Actual Flows,All PCU's, Inter Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	7167	7226	59	0.8%	3.5%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9787	0.7
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	7307	7136	-171	-2.3%	3.3%	92.3%	100.0%	100.0%	88.9%	0.0%	92.3%	0.9693	2.0
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	12083	11993	-90	-0.7%	3.5%	95.0%	95.0%	100.0%	93.8%	0.0%	95.0%	0.9938	0.8
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	11710	11595	-115	-1.0%	3.3%	95.0%	95.0%	100.0%	93.3%	0.0%	95.0%	0.9913	1.1
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	11877	11510	-367	-3.1%	5.5%	95.2%	95.2%	100.0%	93.3%	0.0%	95.2%	0.9021	3.4
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	12171	11735	-436	-3.6%	4.4%	95.2%	100.0%	75.0%	100.0%	0.0%	95.2%	0.9595	4.0
Airport Cordon Inbound	Demands														
	Actuals	5	1734	1742	8	0.5%	5.8%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9895	0.2
Airport Cordon Outbound	Demands														
	Actuals	5	1850	1882	32	1.7%	2.9%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9966	0.7
Wilmslow Cordon Inbound	Demands														
	Actuals	4	2382	2229	-153	-6.4%	7.8%	75.0%	100.0%	50.0%	100.0%	0.0%	75.0%	0.8976	3.2
Wilmslow Cordon Outbound	Demands														
	Actuals	4	2385	2254	-131	-5.5%	5.5%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9574	2.7
A34 Screenline Westbound	Demands														
	Actuals	7	4299	4021	-278	-6.5%	17.4%	42.9%	71.4%	50.0%	40.0%	0.0%	42.9%	0.7271	4.3
A34 Screenline Eastbound	Demands														
	Actuals	7	4256	3975	-281	-6.6%	10.3%	85.7%	85.7%	100.0%	75.0%	0.0%	85.7%	0.7717	4.4
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	3259	3225	-34	-1.0%	1.5%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9958	0.6
Stockport-Hazel Grove	Demands														

Screenline SouthEastbound	Actuals	5	3560	3541	-19	-0.5%	3.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9788	0.3
Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	3916	3867	-49	-1.3%	1.8%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9967	0.8
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	3785	3693	-92	-2.4%	3.1%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9867	1.5
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	2193	2194	1	0.1%	3.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9953	0.0
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	2127	2120	-7	-0.3%	1.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9991	0.2
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	10342	10127	-215	-2.1%	2.5%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.9991	2.1
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	10221	9746	-475	-4.7%	4.8%	83.3%	100.0%	66.7%	100.0%	100.0%	91.7%	0.9953	4.8
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	3329	3217	-112	-3.4%	3.7%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9893	2.0
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	3143	3019	-124	-4.0%	5.7%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9825	2.2
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	1010	974	-36	-3.6%	6.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9608	1.1
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	1000	966	-34	-3.4%	10.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8528	1.1
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	2192	2138	-54	-2.5%	3.2%	85.7%	85.7%	100.0%	100.0%	0.0%	100.0%	0.9976	1.2
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	2124	2082	-42	-2.0%	3.4%	85.7%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9977	0.9
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	530	523	-7	-1.3%	6.2%	83.3%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9904	0.3
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	539	541	2	0.4%	5.6%	83.3%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9944	0.1
A523 East Screenline Eastbound	Demands														
	Actuals	7	1606	1562	-44	-2.7%	5.9%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9926	1.1

A523 East Screenline Westbound	Demands														
	Actuals	7	1591	1517	-74	-4.7%	5.7%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9882	1.9
A523 West Screenline Eastbound	Demands														
	Actuals	5	1352	1370	18	1.3%	3.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9913	0.5
A523 West Screenline Westbound	Demands														
	Actuals	5	1325	1357	32	2.4%	2.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9945	0.9
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	2914	2715	-199	-6.8%	7.0%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9697	3.8
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	2862	2684	-178	-6.2%	8.5%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9596	3.4
Random Independent Counts	Demands														
	Actuals	62	43246	40823	-2423	-5.6%	11.6%	82.3%	93.5%	80.8%	80.6%	0.0%	80.6%	0.9357	11.8
GMSM Motorway Counts	Demands														
	Actuals	141	339604	335239	-4365	-1.3%	3.4%	90.8%	94.3%	91.5%	75.0%	94.8%	90.1%	0.9924	7.5
Independent Motorway Counts	Demands														
	Actuals	8	34078	33023	-1055	-3.1%	3.7%	100.0%	100.0%	0.0%	0.0%	100.0%	100.0%	0.9591	5.8
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	94207	92115	-2092	-2.2%	2.4%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.9953	6.9
All Independent Counts	Demands														
	Actuals	84	85879	81842	-4037	-4.7%	8.7%	81.0%	91.7%	80.6%	75.6%	100.0%	79.8%	0.9903	13.9

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.3 Detailed Assignment Validation Results (Actual Flows,All PCU's, PM Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	9255	8591	-664	-7.2%	8.2%	91.7%	91.7%	87.5%	100.0%	0.0%	91.7%	0.7515	7.0
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	9958	9525	-433	-4.4%	7.2%	92.3%	92.3%	87.5%	100.0%	0.0%	92.3%	0.4572	4.4
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	17531	17010	-521	-3.0%	8.5%	80.0%	85.0%	90.0%	77.8%	100.0%	85.0%	0.9636	4.0
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	16051	15945	-106	-0.7%	3.3%	95.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.9957	0.8
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	14707	14906	199	1.4%	7.4%	95.2%	95.2%	90.9%	90.0%	0.0%	90.5%	0.9174	1.6
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	15586	15353	-233	-1.5%	3.9%	95.2%	95.2%	100.0%	88.9%	0.0%	95.2%	0.9795	1.9
Airport Cordon Inbound	Demands														
	Actuals	5	1625	1602	-23	-1.4%	5.8%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9889	0.6
Airport Cordon Outbound	Demands														
	Actuals	5	2410	2373	-37	-1.5%	8.6%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9771	0.8
Wilmslow Cordon Inbound	Demands														
	Actuals	4	3073	3078	5	0.2%	3.2%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9888	0.1
Wilmslow Cordon Outbound	Demands														
	Actuals	4	3312	3065	-247	-7.5%	8.4%	75.0%	100.0%	66.7%	100.0%	0.0%	75.0%	0.5678	4.4
A34 Screenline Westbound	Demands														
	Actuals	7	4948	5236	288	5.8%	12.4%	85.7%	85.7%	66.7%	100.0%	0.0%	85.7%	0.8207	4.0
A34 Screenline Eastbound	Demands														
	Actuals	7	6949	6081	-868	-12.5%	15.0%	57.1%	71.4%	50.0%	100.0%	0.0%	57.1%	0.1682	10.8
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	3929	3875	-54	-1.4%	1.6%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9922	0.9
Stockport-Hazel Grove Screenline SouthEastbound	Demands														
	Actuals	5	4325	4308	-17	-0.4%	5.3%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9366	0.3

Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	4340	4379	39	0.9%	2.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9954	0.6
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	5685	5738	53	0.9%	10.5%	71.4%	71.4%	80.0%	50.0%	0.0%	71.4%	0.7579	0.7
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	2533	2542	9	0.4%	1.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9990	0.2
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	3471	3433	-38	-1.1%	2.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9965	0.6
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	12901	12646	-255	-2.0%	7.6%	91.7%	91.7%	83.3%	100.0%	100.0%	91.7%	0.9906	2.3
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	14032	13359	-673	-4.8%	11.0%	66.7%	75.0%	50.0%	71.4%	100.0%	66.7%	0.9840	5.8
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	5141	5038	-103	-2.0%	3.1%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9951	1.4
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	4735	4706	-29	-0.6%	3.1%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9938	0.4
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	1456	1436	-20	-1.4%	3.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9895	0.5
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	1674	1375	-299	-17.9%	18.2%	80.0%	80.0%	0.0%	80.0%	0.0%	80.0%	0.4289	7.7
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	2960	2916	-44	-1.5%	3.4%	85.7%	85.7%	100.0%	100.0%	0.0%	100.0%	0.9968	0.8
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	2425	2438	13	0.5%	5.6%	85.7%	85.7%	100.0%	100.0%	0.0%	100.0%	0.9924	0.3
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	922	916	-6	-0.7%	2.8%	83.3%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9984	0.2
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	914	917	3	0.3%	5.4%	83.3%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9911	0.1
A523 East Screenline Eastbound	Demands														
	Actuals	7	2339	2292	-47	-2.0%	2.6%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9975	1.0
A523 East Screenline	Demands														

Westbound	Actuals	7	1542	1545	3	0.2%	3.3%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9967	0.1
A523 West Screenline Eastbound	Demands														
	Actuals	5	1926	1888	-38	-2.0%	4.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9504	0.9
A523 West Screenline Westbound	Demands														
	Actuals	5	1809	1811	2	0.1%	2.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9968	0.0
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	4407	4132	-275	-6.2%	8.4%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9398	4.2
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	3998	3671	-327	-8.2%	8.2%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9391	5.3
Random Independent Counts	Demands														
	Actuals	62	52740	50295	-2445	-4.6%	13.2%	69.4%	88.7%	71.9%	76.7%	0.0%	74.2%	0.9046	10.8
GMSM Motorway Counts	Demands														
	Actuals	141	415412	406262	-9150	-2.2%	4.5%	89.4%	93.6%	89.1%	93.3%	91.5%	90.8%	0.9879	14.3
Independent Motorway Counts	Demands														
	Actuals	8	41704	41338	-366	-0.9%	3.7%	87.5%	87.5%	0.0%	0.0%	87.5%	87.5%	0.9376	1.8
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	122856	120395	-2461	-2.0%	2.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.9951	7.1
All Independent Counts	Demands														
	Actuals	84	106341	102950	-3391	-3.2%	9.6%	71.4%	86.9%	68.3%	80.0%	87.5%	75.0%	0.9849	10.5

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.4 Detailed Assignment Validation Results (Actual Flows,All Car's, AM Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	9257	9203	-54	-0.6%	2.3%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9934	0.6
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	7439	7246	-193	-2.6%	3.4%	92.3%	100.0%	100.0%	90.9%	0.0%	92.3%	0.9587	2.3
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	15521	14562	-959	-6.2%	6.5%	80.0%	90.0%	100.0%	72.7%	100.0%	85.0%	0.9774	7.8
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	15026	14621	-405	-2.7%	3.7%	95.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.9945	3.3
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	11862	11352	-510	-4.3%	5.0%	85.7%	100.0%	100.0%	87.5%	0.0%	90.5%	0.9614	4.7
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	11327	10981	-346	-3.1%	7.3%	85.7%	85.7%	80.0%	87.5%	0.0%	85.7%	0.9153	3.3
Airport Cordon Inbound	Demands														
	Actuals	5	2371	2343	-28	-1.2%	1.7%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9988	0.6
Airport Cordon Outbound	Demands														
	Actuals	5	1543	1494	-49	-3.2%	3.6%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9965	1.3
Wilmslow Cordon Inbound	Demands														
	Actuals	4	2849	2812	-37	-1.3%	1.5%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9561	0.7
Wilmslow Cordon Outbound	Demands														
	Actuals	4	3023	2745	-278	-9.2%	9.2%	75.0%	100.0%	66.7%	100.0%	0.0%	75.0%	0.4502	5.2
A34 Screenline Westbound	Demands														
	Actuals	7	6111	6184	73	1.2%	17.2%	42.9%	57.1%	25.0%	66.7%	0.0%	42.9%	0.6428	0.9
A34 Screenline Eastbound	Demands														
	Actuals	7	3938	3976	38	1.0%	16.9%	71.4%	71.4%	100.0%	50.0%	0.0%	57.1%	0.3367	0.6
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	3701	3658	-43	-1.2%	3.2%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9624	0.7
Stockport-Hazel Grove	Demands														

Screenline SouthEastbound	Actuals	5	3582	3539	-43	-1.2%	1.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9960	0.7
Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	4100	4023	-77	-1.9%	11.7%	71.4%	71.4%	100.0%	66.7%	0.0%	71.4%	0.5740	1.2
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	2808	2796	-12	-0.4%	1.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9986	0.2
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	2389	2373	-16	-0.7%	0.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9991	0.3
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	1684	1680	-4	-0.2%	1.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9985	0.1
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	11358	10852	-506	-4.5%	4.5%	91.7%	100.0%	100.0%	87.5%	100.0%	91.7%	0.9959	4.8
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	11410	11094	-316	-2.8%	3.1%	91.7%	91.7%	100.0%	85.7%	100.0%	91.7%	0.9977	3.0
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	4448	4485	37	0.8%	1.6%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9962	0.6
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	4618	4437	-181	-3.9%	4.8%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9605	2.7
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	1262	1219	-43	-3.4%	4.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9808	1.2
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	935	1237	302	32.3%	33.2%	80.0%	80.0%	0.0%	80.0%	0.0%	80.0%	-0.9175	9.2
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	1763	1713	-50	-2.8%	3.1%	85.7%	85.7%	0.0%	100.0%	0.0%	100.0%	0.9958	1.2
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	2158	2099	-59	-2.7%	3.0%	85.7%	85.7%	100.0%	100.0%	0.0%	100.0%	0.9960	1.3
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	685	674	-11	-1.6%	1.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9982	0.4
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	823	794	-29	-3.5%	3.5%	83.3%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9974	1.0
A523 East Screenline Eastbound	Demands														
	Actuals	7	1117	1218	101	9.0%	13.3%	85.7%	85.7%	0.0%	85.7%	0.0%	85.7%	0.8823	3.0

A523 East Screenline Westbound	Demands														
	Actuals	7	1907	2036	129	6.8%	9.2%	71.4%	100.0%	0.0%	85.7%	0.0%	85.7%	0.9132	2.9
A523 West Screenline Eastbound	Demands														
	Actuals	5	1698	1688	-10	-0.6%	4.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9854	0.2
A523 West Screenline Westbound	Demands														
	Actuals	5	2086	2291	205	9.8%	14.5%	80.0%	80.0%	100.0%	75.0%	0.0%	80.0%	0.6144	4.4
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	3841	3660	-181	-4.7%	5.0%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9639	3.0
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	3928	3578	-350	-8.9%	10.8%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.8912	5.7
Random Independent Counts	Demands														
	Actuals	62	43719	42927	-792	-1.8%	11.8%	82.3%	95.2%	64.3%	91.2%	0.0%	79.0%	0.9302	3.8
GMSM Motorway Counts	Demands														
	Actuals	141	294423	290426	-3997	-1.4%	3.5%	92.9%	94.3%	92.6%	92.9%	97.8%	94.3%	0.9914	7.4
Independent Motorway Counts	Demands														
	Actuals	8	35475	33815	-1660	-4.7%	5.5%	87.5%	100.0%	0.0%	0.0%	100.0%	100.0%	0.9054	8.9
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	98474	96094	-2380	-2.4%	3.6%	91.7%	100.0%	84.6%	100.0%	100.0%	94.4%	0.9908	7.6
All Independent Counts	Demands														
	Actuals	84	89243	86902	-2341	-2.6%	9.9%	78.6%	90.5%	60.6%	83.7%	100.0%	76.2%	0.9858	7.9

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.5 Detailed Assignment Validation Results (Actual Flows,Cars, Inter Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	5803	5774	-29	-0.5%	0.8%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9993	0.4
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	5937	5754	-183	-3.1%	3.8%	92.3%	92.3%	0.0%	92.3%	0.0%	92.3%	0.8982	2.4
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	10042	9877	-165	-1.6%	2.4%	95.0%	95.0%	100.0%	94.4%	0.0%	95.0%	0.9960	1.7
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	9581	9394	-187	-2.0%	2.3%	95.0%	95.0%	100.0%	94.4%	0.0%	95.0%	0.9887	1.9
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	9092	8684	-408	-4.5%	5.1%	95.2%	95.2%	100.0%	95.0%	0.0%	95.2%	0.8543	4.3
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	9291	9012	-279	-3.0%	3.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9793	2.9
Airport Cordon Inbound	Demands														
	Actuals	5	1519	1513	-6	-0.4%	0.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9999	0.2
Airport Cordon Outbound	Demands														
	Actuals	5	1629	1628	-1	-0.1%	0.1%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	1.0000	0.0
Wilmslow Cordon Inbound	Demands														
	Actuals	4	1958	1803	-155	-7.9%	8.3%	75.0%	100.0%	100.0%	66.7%	0.0%	75.0%	0.8029	3.6
Wilmslow Cordon Outbound	Demands														
	Actuals	4	1929	1839	-90	-4.7%	4.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9584	2.1
A34 Screenline Westbound	Demands														
	Actuals	7	3563	3321	-242	-6.8%	15.8%	57.1%	85.7%	100.0%	33.3%	0.0%	42.9%	0.7231	4.1
A34 Screenline Eastbound	Demands														
	Actuals	7	3579	3191	-388	-10.8%	13.9%	71.4%	85.7%	100.0%	66.7%	0.0%	71.4%	0.5147	6.7
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	2586	2586	0	0.0%	0.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9994	0.0
Stockport-Hazel Grove Screenline SouthEastbound	Demands														
	Actuals	5	2914	2894	-20	-0.7%	2.3%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9689	0.4

Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	2877	2859	-18	-0.6%	0.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9993	0.3
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	2732	2686	-46	-1.7%	2.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9874	0.9
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	1642	1622	-20	-1.2%	1.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9983	0.5
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	1554	1549	-5	-0.3%	2.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9975	0.1
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	7948	7855	-93	-1.2%	1.3%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.9996	1.0
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	7824	7588	-236	-3.0%	3.0%	91.7%	100.0%	100.0%	88.9%	100.0%	91.7%	0.9971	2.7
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	2541	2540	-1	0.0%	0.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9998	0.0
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	2373	2375	2	0.1%	0.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9993	0.0
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	801	795	-6	-0.8%	2.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9957	0.2
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	780	785	5	0.6%	6.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9489	0.2
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	1504	1476	-28	-1.9%	2.8%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9980	0.7
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	1445	1418	-27	-1.9%	2.7%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9980	0.7
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	434	423	-11	-2.5%	3.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9954	0.5
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	435	436	1	0.2%	4.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9954	0.0
A523 East Screenline Eastbound	Demands														
	Actuals	7	1249	1259	10	0.8%	3.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9959	0.3
A523 East Screenline	Demands														

Westbound	Actuals	7	1211	1202	-9	-0.7%	0.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9995	0.3
A523 West Screenline Eastbound	Demands														
	Actuals	5	1084	1083	-1	-0.1%	1.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9978	0.0
A523 West Screenline Westbound	Demands														
	Actuals	5	1072	1080	8	0.8%	0.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9989	0.2
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	2220	2113	-107	-4.8%	4.8%	90.0%	90.0%	0.0%	100.0%	0.0%	100.0%	0.9708	2.3
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	2170	2045	-125	-5.8%	8.9%	90.0%	90.0%	0.0%	90.0%	0.0%	90.0%	0.9494	2.7
Random Independent Counts	Demands														
	Actuals	62	34105	32060	-2045	-6.0%	12.5%	80.6%	91.9%	68.8%	87.0%	0.0%	82.3%	0.9166	11.2
GMSM Motorway Counts	Demands														
	Actuals	141	214679	213855	-824	-0.4%	2.5%	95.7%	97.9%	96.6%	88.6%	100.0%	95.0%	0.9934	1.8
Independent Motorway Counts	Demands														
	Actuals	8	23234	23043	-191	-0.8%	2.6%	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%	0.9750	1.3
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	63968	63638	-330	-0.5%	1.4%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.9983	1.3
All Independent Counts	Demands														
	Actuals	84	64481	61615	-2866	-4.4%	9.2%	79.8%	91.7%	75.0%	79.3%	100.0%	79.8%	0.9861	11.4

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.6 Detailed Assignment Validation Results (Actual Flows,Car's, PM Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	7770	7649	-121	-1.6%	3.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9920	1.4
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	9049	8673	-376	-4.2%	7.1%	92.3%	92.3%	85.7%	100.0%	0.0%	92.3%	0.2305	4.0
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	16180	15484	-696	-4.3%	7.8%	85.0%	85.0%	88.9%	90.0%	100.0%	90.0%	0.9688	5.5
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	14599	14444	-155	-1.1%	3.3%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9960	1.3
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	12842	12993	151	1.2%	6.8%	95.2%	95.2%	100.0%	85.7%	0.0%	90.5%	0.9283	1.3
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	13717	13458	-259	-1.9%	4.3%	95.2%	95.2%	100.0%	100.0%	0.0%	100.0%	0.9781	2.2
Airport Cordon Inbound	Demands														
	Actuals	5	1435	1417	-18	-1.3%	1.3%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9996	0.5
Airport Cordon Outbound	Demands														
	Actuals	5	2207	2208	1	0.1%	4.9%	80.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9914	0.0
Wilmslow Cordon Inbound	Demands														
	Actuals	4	2826	2815	-11	-0.4%	1.6%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9965	0.2
Wilmslow Cordon Outbound	Demands														
	Actuals	4	3058	2821	-237	-7.8%	8.2%	75.0%	100.0%	66.7%	100.0%	0.0%	75.0%	0.4738	4.4
A34 Screenline Westbound	Demands														
	Actuals	7	4420	4745	325	7.4%	11.7%	85.7%	85.7%	100.0%	80.0%	0.0%	85.7%	0.7424	4.8
A34 Screenline Eastbound	Demands														
	Actuals	7	6401	5542	-859	-13.4%	16.4%	57.1%	71.4%	50.0%	100.0%	0.0%	57.1%	-0.0044	11.1
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	3482	3433	-49	-1.4%	1.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9949	0.8
Stockport-Hazel Grove Screenline SouthEastbound	Demands														
	Actuals	5	3811	3788	-23	-0.6%	4.8%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9519	0.4

Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	3768	3729	-39	-1.0%	1.4%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9964	0.6
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	4958	4982	24	0.5%	10.3%	71.4%	71.4%	100.0%	50.0%	0.0%	71.4%	0.7576	0.3
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	2211	2176	-35	-1.6%	1.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9985	0.7
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	3007	2970	-37	-1.2%	1.2%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9985	0.7
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	11384	11218	-166	-1.5%	8.4%	91.7%	91.7%	80.0%	100.0%	100.0%	91.7%	0.9877	1.6
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	12402	11806	-596	-4.8%	11.2%	66.7%	75.0%	50.0%	71.4%	100.0%	66.7%	0.9812	5.4
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	4656	4620	-36	-0.8%	2.2%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9947	0.5
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	4307	4331	24	0.6%	1.3%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9989	0.4
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	1291	1265	-26	-2.0%	2.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9897	0.7
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	1488	1222	-266	-17.9%	17.9%	80.0%	80.0%	0.0%	80.0%	0.0%	80.0%	0.3303	7.2
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	2557	2493	-64	-2.5%	3.1%	85.7%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9970	1.3
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	2000	2008	8	0.4%	5.7%	85.7%	85.7%	0.0%	100.0%	0.0%	100.0%	0.9891	0.2
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	855	839	-16	-1.9%	1.9%	83.3%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9984	0.5
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	830	832	2	0.2%	2.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9970	0.1
A523 East Screenline Eastbound	Demands														
	Actuals	7	2157	2098	-59	-2.7%	2.8%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9968	1.3
A523 East Screenline	Demands														

Westbound	Actuals	7	1394	1393	-1	-0.1%	1.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9991	0.0
A523 West Screenline Eastbound	Demands														
	Actuals	5	1768	1754	-14	-0.8%	2.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9926	0.3
A523 West Screenline Westbound	Demands														
	Actuals	5	1672	1677	5	0.3%	0.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9996	0.1
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	3978	3717	-261	-6.6%	7.6%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9361	4.2
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	3543	3291	-252	-7.1%	7.1%	90.0%	90.0%	100.0%	88.9%	0.0%	90.0%	0.9447	4.3
Random Independent Counts	Demands														
	Actuals	62	46605	44347	-2258	-4.8%	14.6%	64.5%	87.1%	55.2%	72.7%	0.0%	64.5%	0.8874	10.6
GMSM Motorway Counts	Demands														
	Actuals	141	333211	328617	-4594	-1.4%	3.9%	92.9%	95.0%	93.1%	87.5%	94.9%	92.9%	0.9884	8.0
Independent Motorway Counts	Demands														
	Actuals	8	35154	34747	-407	-1.2%	4.3%	87.5%	87.5%	0.0%	0.0%	87.5%	87.5%	0.9287	2.2
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	103379	101348	-2031	-2.0%	3.1%	100.0%	100.0%	100.0%	75.0%	100.0%	97.2%	0.9944	6.3
All Independent Counts	Demands														
	Actuals	84	92580	89381	-3199	-3.5%	10.7%	67.9%	85.7%	56.8%	74.4%	87.5%	67.9%	0.9797	10.6

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.7 Detailed Assignment Validation Results (Actual Flows,LGV's, AM Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	733	813	80	10.9%	15.8%	91.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8191	2.9
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	646	649	3	0.5%	9.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9254	0.1
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	1214	1227	13	1.1%	10.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9456	0.4
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	1171	1220	49	4.2%	14.4%	95.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9019	1.4
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	1539	1509	-30	-2.0%	7.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9662	0.8
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	1586	1574	-12	-0.8%	8.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9420	0.3
Airport Cordon Inbound	Demands														
	Actuals	5	136	128	-8	-5.9%	5.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9902	0.7
Airport Cordon Outbound	Demands														
	Actuals	5	94	77	-17	-18.1%	18.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7425	1.8
Wilmslow Cordon Inbound	Demands														
	Actuals	4	233	250	17	7.3%	10.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9001	1.1
Wilmslow Cordon Outbound	Demands														
	Actuals	4	307	270	-37	-12.1%	12.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.5741	2.2
A34 Screenline Westbound	Demands														
	Actuals	7	501	481	-20	-4.0%	18.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7325	0.9
A34 Screenline Eastbound	Demands														
	Actuals	7	414	346	-68	-16.4%	19.3%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.1791	3.5
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	459	380	-79	-17.2%	17.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.5754	3.9
Stockport-Hazel Grove	Demands														

Screenline SouthEastbound	Actuals	5	461	435	-26	-5.6%	9.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8970	1.2
Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	536	546	10	1.9%	15.7%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.6702	0.4
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	602	608	6	1.0%	1.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9975	0.2
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	317	309	-8	-2.5%	5.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9794	0.5
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	290	279	-11	-3.8%	4.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9692	0.7
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	1126	1091	-35	-3.1%	9.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9947	1.1
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	1092	1040	-52	-4.8%	4.8%	91.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9976	1.6
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	481	374	-107	-22.3%	24.3%	77.8%	88.9%	0.0%	100.0%	0.0%	100.0%	0.5830	5.2
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	426	384	-42	-9.9%	22.5%	88.9%	88.9%	0.0%	100.0%	0.0%	100.0%	0.6407	2.1
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	159	90	-69	-43.4%	43.4%	80.0%	100.0%	0.0%	100.0%	0.0%	100.0%		6.2
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	140	101	-39	-27.9%	52.1%	80.0%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.9423	3.6
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	319	301	-18	-5.6%	5.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9872	1.0
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	298	286	-12	-4.0%	4.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9947	0.7
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	92	93	1	1.1%	12.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9780	0.1
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	81	86	5	6.2%	18.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9120	0.5
A523 East Screenline Eastbound	Demands														
	Actuals	7	168	182	14	8.3%	14.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9238	1.1

A523 East Screenline Westbound	Demands														
	Actuals	7	183	179	-4	-2.2%	4.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9874	0.3
A523 West Screenline Eastbound	Demands														
	Actuals	5	157	154	-3	-1.9%	9.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9259	0.2
A523 West Screenline Westbound	Demands														
	Actuals	5	183	205	22	12.0%	30.6%	80.0%	80.0%	0.0%	100.0%	0.0%	100.0%		1.6
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	463	365	-98	-21.2%	21.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8367	4.8
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	388	356	-32	-8.3%	12.9%	90.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9336	1.7
Random Independent Counts	Demands														
	Actuals	62	5262	4467	-795	-15.1%	27.4%	85.5%	93.5%	0.0%	98.4%	0.0%	98.4%	0.5886	11.4
GMSM Motorway Counts	Demands														
	Actuals	141	43519	42561	-958	-2.2%	5.3%	98.6%	99.3%	100.0%	99.3%	0.0%	99.3%	0.9817	4.6
Independent Motorway Counts	Demands														
	Actuals	8	4619	4572	-47	-1.0%	2.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9602	0.7
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	12889	12410	-479	-3.7%	5.1%	97.2%	97.2%	100.0%	100.0%	0.0%	100.0%	0.9799	4.3
All Independent Counts	Demands														
	Actuals	84	10796	9866	-930	-8.6%	16.0%	88.1%	95.2%	0.0%	98.8%	0.0%	98.8%	0.9638	9.1

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.8 Detailed Assignment Validation Results (Actual Flows,LGV's, Inter Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	687	784	97	14.1%	15.9%	91.7%	91.7%	0.0%	100.0%	0.0%	100.0%	0.6036	3.6
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	752	758	6	0.8%	3.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9927	0.2
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	1087	1145	58	5.3%	10.3%	95.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9435	1.7
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	1191	1230	39	3.3%	6.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9821	1.1
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	1429	1434	5	0.4%	7.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9545	0.1
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	1462	1414	-48	-3.3%	6.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9505	1.3
Airport Cordon Inbound	Demands														
	Actuals	5	121	121	0	0.0%	0.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	1.0000	0.0
Airport Cordon Outbound	Demands														
	Actuals	5	118	118	0	0.0%	0.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	1.0000	0.0
Wilmslow Cordon Inbound	Demands														
	Actuals	4	268	269	1	0.4%	0.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9998	0.1
Wilmslow Cordon Outbound	Demands														
	Actuals	4	297	288	-9	-3.0%	3.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9802	0.5
A34 Screenline Westbound	Demands														
	Actuals	7	467	367	-100	-21.4%	28.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.0510	4.9
A34 Screenline Eastbound	Demands														
	Actuals	7	425	401	-24	-5.7%	25.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.0665	1.2
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	393	380	-13	-3.3%	3.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9823	0.7
Stockport-Hazel Grove Screenline SouthEastbound	Demands														
	Actuals	5	397	394	-3	-0.8%	2.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9963	0.2

Romiley-Hazel Grove Screenline Westbound	Demands													
	Actuals	7	534	533	-1	-0.2%	1.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9959	0.0
Romiley-Hazel Grove Screenline Eastbound	Demands													
	Actuals	7	540	537	-3	-0.6%	3.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9774	0.1
Romiley-New Mills Screenline Westbound	Demands													
	Actuals	7	278	293	15	5.4%	10.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9140	0.9
Romiley-New Mills Screenline Eastbound	Demands													
	Actuals	7	298	300	2	0.7%	5.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9819	0.1
North-of-Scheme screenline Northbound	Demands													
	Actuals	12	1140	1115	-25	-2.2%	4.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9978	0.7
North-of-Scheme screenline Southbound	Demands													
	Actuals	12	1138	1077	-61	-5.4%	5.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9960	1.8
South-of-Wilmslow Screenline Northbound	Demands													
	Actuals	9	437	350	-87	-19.9%	20.4%	88.9%	88.9%	0.0%	100.0%	0.0%	100.0%	0.6597	4.4
South-of-Wilmslow Screenline Southbound	Demands													
	Actuals	9	417	339	-78	-18.7%	23.5%	88.9%	88.9%	0.0%	100.0%	0.0%	100.0%	0.6943	4.0
Whaley Bridge & Horwich End Cordon Inbound	Demands													
	Actuals	5	125	111	-14	-11.2%	24.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%		1.3
Whaley Bridge & Horwich End Cordon Outbound	Demands													
	Actuals	5	135	116	-19	-14.1%	31.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%		1.7
Disley & Newtown Cordon Inbound	Demands													
	Actuals	7	286	294	8	2.8%	7.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9754	0.5
Disley & Newtown Cordon Outbound	Demands													
	Actuals	7	300	311	11	3.7%	6.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9901	0.6
Bollington / Adlington Cordon Inbound	Demands													
	Actuals	6	67	64	-3	-4.5%	4.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9825	0.4
Bollington / Adlington Cordon Outbound	Demands													
	Actuals	6	74	73	-1	-1.4%	6.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9828	0.1
A523 East Screenline Eastbound	Demands													
	Actuals	7	204	187	-17	-8.3%	9.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9491	1.2
A523 East Screenline	Demands													

Westbound	Actuals	7	219	188	-31	-14.2%	14.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7291	2.2
A523 West Screenline Eastbound	Demands														
	Actuals	5	159	159	0	0.0%	0.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	1.0000	0.0
A523 West Screenline Westbound	Demands														
	Actuals	5	152	158	6	4.0%	3.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9816	0.5
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	363	297	-66	-18.2%	18.2%	90.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8394	3.6
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	360	336	-24	-6.7%	7.8%	90.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9673	1.3
Random Independent Counts	Demands														
	Actuals	62	4938	4481	-457	-9.3%	21.5%	96.8%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8259	6.7
GMSM Motorway Counts	Demands														
	Actuals	141	44013	43464	-549	-1.3%	3.2%	96.5%	99.3%	100.0%	99.2%	0.0%	99.3%	0.9890	2.6
Independent Motorway Counts	Demands														
	Actuals	8	4268	4321	53	1.2%	2.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9499	0.8
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	11944	11922	-22	-0.2%	1.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9972	0.2
All Independent Counts	Demands														
	Actuals	84	10098	9570	-528	-5.2%	14.1%	97.6%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9798	5.3

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.9 Detailed Assignment Validation Results (Actual Flows,LGV, PM Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	565	570	5	0.9%	6.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9581	0.2
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	559	574	15	2.7%	8.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9548	0.6
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	858	958	100	11.7%	23.5%	95.0%	95.0%	0.0%	95.0%	0.0%	95.0%	0.6081	3.3
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	965	1009	44	4.6%	11.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9648	1.4
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	1131	1138	7	0.6%	13.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7681	0.2
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	1189	1175	-14	-1.2%	6.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9632	0.4
Airport Cordon Inbound	Demands														
	Actuals	5	100	99	-1	-1.0%	1.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9990	0.1
Airport Cordon Outbound	Demands														
	Actuals	5	102	70	-32	-31.4%	31.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.8151	3.5
Wilmslow Cordon Inbound	Demands														
	Actuals	4	194	208	14	7.2%	15.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8949	1.0
Wilmslow Cordon Outbound	Demands														
	Actuals	4	183	194	11	6.0%	7.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8797	0.8
A34 Screenline Westbound	Demands														
	Actuals	7	383	313	-70	-18.3%	40.7%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.2114	3.8
A34 Screenline Eastbound	Demands														
	Actuals	7	397	323	-74	-18.6%	30.7%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.4189	3.9
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	307	306	-1	-0.3%	1.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9991	0.1
Stockport-Hazel Grove Screenline SouthEastbound	Demands														
	Actuals	5	373	370	-3	-0.8%	8.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8204	0.2

Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	421	441	20	4.8%	6.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9031	1.0
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	545	549	4	0.7%	8.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8644	0.2
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	238	239	1	0.4%	3.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9904	0.1
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	320	322	2	0.6%	2.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9959	0.1
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	972	892	-80	-8.2%	9.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9908	2.6
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	1033	965	-68	-6.6%	11.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9850	2.2
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	335	288	-47	-14.0%	24.8%	88.9%	88.9%	0.0%	100.0%	0.0%	100.0%	0.6783	2.7
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	329	270	-59	-17.9%	19.8%	88.9%	88.9%	0.0%	100.0%	0.0%	100.0%	0.6523	3.4
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	117	115	-2	-1.7%	10.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9039	0.2
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	147	104	-43	-29.3%	29.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.3440	3.8
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	279	268	-11	-3.9%	5.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9926	0.7
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	280	274	-6	-2.1%	2.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9982	0.4
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	52	58	6	11.5%	11.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9735	0.8
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	75	67	-8	-10.7%	18.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8823	0.9
A523 East Screenline Eastbound	Demands														
	Actuals	7	155	154	-1	-0.7%	7.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9832	0.1
A523 East Screenline	Demands														

Westbound	Actuals	7	126	121	-5	-4.0%	10.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9482	0.4
A523 West Screenline Eastbound	Demands														
	Actuals	5	129	101	-28	-21.7%	21.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.1979	2.6
A523 West Screenline Westbound	Demands														
	Actuals	5	113	93	-20	-17.7%	23.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.5237	2.0
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	322	279	-43	-13.4%	20.8%	90.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8904	2.5
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	354	259	-95	-26.8%	26.8%	90.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7103	5.4
Random Independent Counts	Demands														
	Actuals	62	4089	3697	-392	-9.6%	29.1%	93.5%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7385	6.3
GMSM Motorway Counts	Demands														
	Actuals	141	39410	38249	-1161	-3.0%	6.0%	96.5%	99.3%	100.0%	97.8%	0.0%	97.9%	0.9766	5.9
Independent Motorway Counts	Demands														
	Actuals	8	3860	3868	8	0.2%	5.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8558	0.1
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	11457	11197	-260	-2.3%	3.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9927	2.4
All Independent Counts	Demands														
	Actuals	84	8729	8201	-528	-6.1%	19.3%	92.9%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9662	5.7

Note: the overall number of Matrix Estimation Count Sites excludes duplicate sites on cordons and screenlines

Table A3.10 Detailed Assignment Validation Results (Actual Flows,OGV, AM Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	390	628	238	61.0%	63.1%	75.0%	75.0%	0.0%	100.0%	0.0%	100.0%	0.4426	10.5
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	303	325	22	7.3%	11.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9617	1.2
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	767	942	175	22.8%	36.1%	90.0%	90.0%	0.0%	95.0%	0.0%	95.0%	0.6366	6.0
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	682	835	153	22.4%	37.1%	85.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7280	5.6
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	1023	1150	127	12.4%	34.9%	90.5%	95.2%	0.0%	95.2%	0.0%	95.2%	0.5030	3.9
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	958	913	-45	-4.7%	16.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7747	1.5
Airport Cordon Inbound	Demands														
	Actuals	5	125	107	-18	-14.4%	14.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9481	1.7
Airport Cordon Outbound	Demands														
	Actuals	5	113	65	-48	-42.5%	51.3%	80.0%	100.0%	0.0%	100.0%	0.0%	100.0%		5.1
Wilmslow Cordon Inbound	Demands														
	Actuals	4	124	125	1	0.8%	15.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9203	0.1
Wilmslow Cordon Outbound	Demands														
	Actuals	4	126	103	-23	-18.3%	18.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.5324	2.1
A34 Screenline Westbound	Demands														
	Actuals	7	194	239	45	23.2%	68.6%	85.7%	85.7%	0.0%	100.0%	0.0%	100.0%	0.5087	3.1
A34 Screenline Eastbound	Demands														
	Actuals	7	180	274	94	52.2%	82.2%	85.7%	85.7%	0.0%	85.7%	0.0%	85.7%	0.4533	6.2
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	147	170	23	15.7%	26.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8452	1.8
Stockport-Hazel Grove	Demands														

Screenline SouthEastbound	Actuals	5	206	203	-3	-1.5%	3.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9967	0.2
Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	314	296	-18	-5.7%	11.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9590	1.0
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	314	342	28	8.9%	9.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9552	1.5
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	180	193	13	7.2%	12.8%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9766	1.0
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	180	183	3	1.7%	5.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9950	0.2
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	839	820	-19	-2.3%	14.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9868	0.7
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	882	857	-25	-2.8%	5.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9986	0.8
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	283	284	1	0.4%	0.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9999	0.1
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	284	245	-39	-13.7%	13.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9110	2.4
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	69	56	-13	-18.8%	56.5%	80.0%	100.0%	0.0%	100.0%	0.0%	100.0%		1.6
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	48	52	4	8.3%	8.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8419	0.6
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	300	288	-12	-4.0%	4.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9957	0.7
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	249	272	23	9.2%	10.8%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9841	1.4
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	25	32	7	28.0%	28.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7137	1.3
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	29	29	0	0.0%	34.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7276	0.0
A523 East Screenline Eastbound	Demands														
	Actuals	7	46	53	7	15.2%	41.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.6683	1.0

A523 East Screenline Westbound	Demands													
	Actuals	7	66	93	27	40.9%	56.1%	85.7%	100.0%	0.0%	100.0%	0.0%	100.0%	0.3860	3.0
A523 West Screenline Eastbound	Demands													
	Actuals	5	67	72	5	7.5%	43.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.5643	0.6
A523 West Screenline Westbound	Demands													
	Actuals	5	109	110	1	0.9%	19.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8432	0.1
Prestbury To Whaley Bridge Screenline Northbound	Demands													
	Actuals	10	293	252	-41	-14.0%	16.7%	90.0%	90.0%	0.0%	100.0%	0.0%	100.0%	0.9250	2.5
Prestbury To Whaley Bridge Screenline Southbound	Demands													
	Actuals	10	232	247	15	6.5%	14.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9635	1.0
Random Independent Counts	Demands													
	Actuals	62	2930	3167	237	8.1%	47.8%	77.4%	87.1%	0.0%	98.4%	0.0%	98.4%	0.5979	4.3
GMSM Motorway Counts	Demands													
	Actuals	141	65831	62463	-3368	-5.1%	10.0%	82.3%	91.5%	78.6%	87.6%	0.0%	85.8%	0.9445	13.3
Independent Motorway Counts	Demands													
	Actuals	8	4891	4589	-302	-6.2%	9.7%	87.5%	100.0%	66.7%	100.0%	0.0%	87.5%	0.4363	4.4
Matrix Estimation Motorway Counts	Demands													
	Actuals	36	13465	12844	-621	-4.6%	8.0%	91.7%	94.4%	100.0%	100.0%	0.0%	100.0%	0.9601	5.4
All Independent Counts	Demands													
	Actuals	84	8195	8269	74	0.9%	26.3%	79.8%	88.1%	66.7%	97.5%	0.0%	96.4%	0.9421	0.8

Table A3.11 Detailed Assignment Validation Results (Actual Flows,OGV, Inter Peak Hour)

Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	431	526	95	22.0%	24.4%	91.7%	91.7%	0.0%	100.0%	0.0%	100.0%	0.8218	4.3
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	377	485	108	28.7%	34.0%	84.6%	92.3%	0.0%	100.0%	0.0%	100.0%	0.6957	5.2
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	812	869	57	7.0%	16.9%	95.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8598	2.0
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	777	862	85	10.9%	12.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9190	3.0
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	1049	1070	21	2.0%	8.3%	95.2%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9312	0.6
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	1086	1003	-83	-7.6%	10.4%	95.2%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8768	2.6
Airport Cordon Inbound	Demands														
	Actuals	5	83	67	-16	-19.3%	62.7%	80.0%	100.0%	0.0%	100.0%	0.0%	100.0%		1.8
Airport Cordon Outbound	Demands														
	Actuals	5	94	94	0	0.0%	0.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	1.0000	0.0
Wilmslow Cordon Inbound	Demands														
	Actuals	4	136	144	8	5.9%	22.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9088	0.7
Wilmslow Cordon Outbound	Demands														
	Actuals	4	132	115	-17	-12.9%	12.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9388	1.5
A34 Screenline Westbound	Demands														
	Actuals	7	210	274	64	30.5%	75.2%	71.4%	71.4%	0.0%	100.0%	0.0%	100.0%	0.2130	4.1
A34 Screenline Eastbound	Demands														
	Actuals	7	189	325	136	72.0%	72.0%	71.4%	85.7%	0.0%	100.0%	0.0%	100.0%	0.3175	8.5
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	184	181	-3	-1.6%	3.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9953	0.2
Stockport-Hazel Grove Screenline SouthEastbound	Demands														
	Actuals	5	164	169	5	3.1%	6.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9847	0.4

Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	426	423	-3	-0.7%	2.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9979	0.1
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	420	419	-1	-0.2%	0.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9999	0.0
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	243	244	1	0.4%	10.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9892	0.1
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	235	235	0	0.0%	0.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	1.0000	0.0
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	1089	1061	-28	-2.6%	5.0%	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	0.9975	0.9
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	1094	987	-107	-9.8%	14.5%	100.0%	100.0%	0.0%	100.0%	0.0%	91.7%	0.9618	3.3
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	319	316	-3	-0.9%	0.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9991	0.2
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	320	291	-29	-9.1%	9.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9712	1.7
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	59	57	-2	-3.4%	16.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8445	0.3
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	59	53	-6	-10.2%	33.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.3831	0.8
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	363	354	-9	-2.5%	4.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9967	0.5
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	348	340	-8	-2.3%	3.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9986	0.4
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	17	28	11	64.7%	76.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	-0.1677	2.3
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	18	24	6	33.3%	55.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7119	1.3
A523 East Screenline Eastbound	Demands														
	Actuals	7	134	105	-29	-21.6%	23.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8805	2.7
A523 East Screenline	Demands														

Westbound	Actuals	7	148	118	-30	-20.3%	32.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7632	2.6
A523 West Screenline Eastbound	Demands														
	Actuals	5	102	127	25	24.5%	24.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8077	2.3
A523 West Screenline Westbound	Demands														
	Actuals	5	98	118	20	20.4%	20.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9117	1.9
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	316	292	-24	-7.6%	13.3%	90.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9688	1.4
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	318	289	-29	-9.1%	16.0%	90.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9604	1.7
Random Independent Counts	Demands														
	Actuals	62	2994	3299	305	10.2%	33.9%	83.9%	90.3%	0.0%	100.0%	0.0%	100.0%	0.7666	5.4
GMSM Motorway Counts	Demands														
	Actuals	141	79219	77667	-1552	-2.0%	7.0%	90.1%	91.5%	87.9%	93.5%	0.0%	92.2%	0.9682	5.5
Independent Motorway Counts	Demands														
	Actuals	8	6325	5627	-698	-11.0%	11.0%	87.5%	100.0%	83.3%	50.0%	0.0%	75.0%	0.5315	9.0
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	17446	16408	-1038	-6.0%	7.2%	86.1%	94.4%	88.9%	92.6%	0.0%	91.7%	0.9486	8.0
All Independent Counts	Demands														
	Actuals	84	9718	9525	-193	-2.0%	20.7%	82.1%	89.3%	83.3%	98.7%	0.0%	97.6%	0.9639	2.0

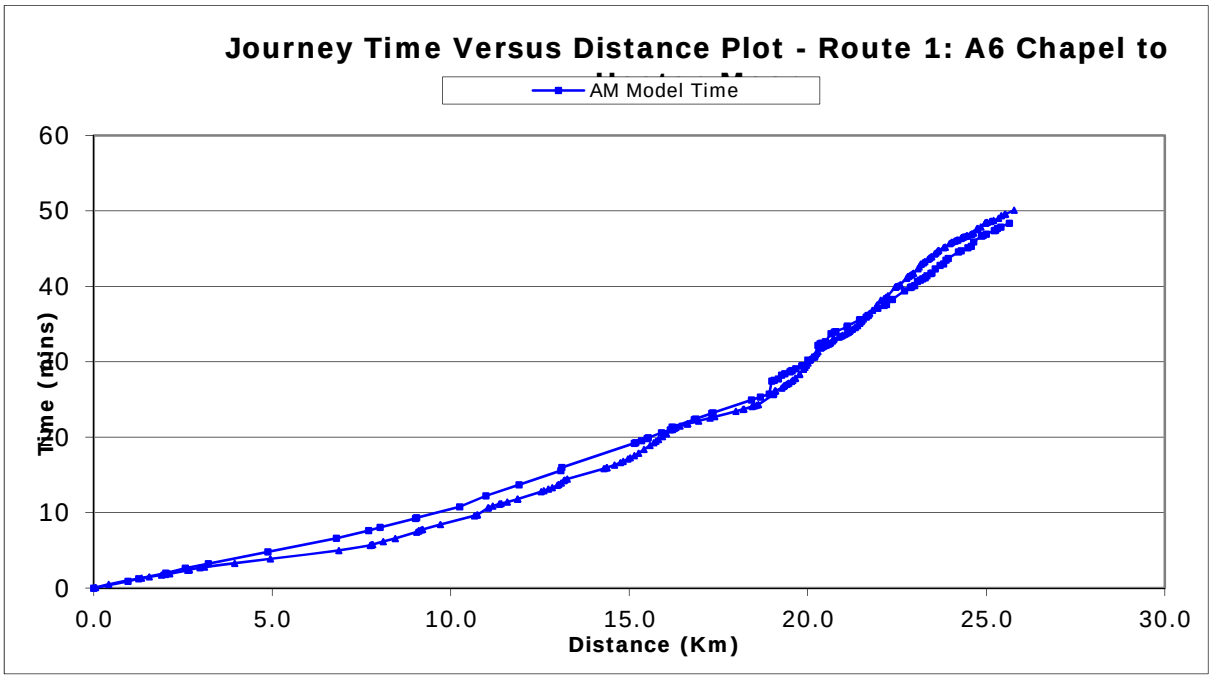
Table A3.12 Detailed Assignment Validation Results (Actual Flows,OGV, PM Peak Hour)

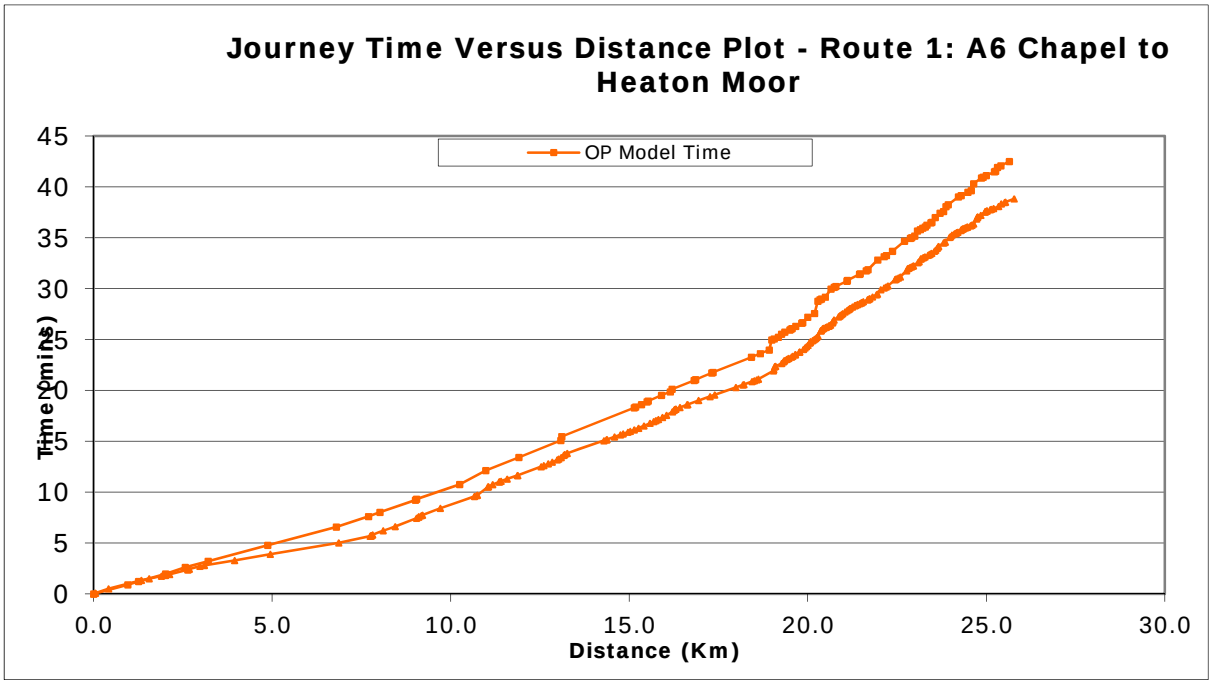
Count Set	Model Type	No. of Sites	Count Sum	Model Sum	Difference	% Difference	%AAD Count	% GEH<5	% GEH<7	DFT 1	DFT 2	DFT 3	All	Y=X R-squared	Count Set GEH
SEMMMS Cordon 1 Inbound	Demands														
	Actuals	12	232	243	11	4.7%	70.3%	75.0%	83.3%	0.0%	100.0%	0.0%	100.0%	-0.2825	0.7
SEMMMS Cordon 1 Outbound	Demands														
	Actuals	13	149	161	12	8.1%	65.8%	92.3%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0638	1.0
SEMMMS Cordon 2 Inbound	Demands														
	Actuals	20	357	464	107	30.0%	42.9%	95.0%	95.0%	0.0%	100.0%	0.0%	100.0%	0.5295	5.3
SEMMMS Cordon 2 Outbound	Demands														
	Actuals	20	338	386	48	14.2%	46.7%	85.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.4523	2.5
SEMMMS Cordon 3 Inbound	Demands														
	Actuals	21	415	447	32	7.7%	39.5%	90.5%	100.0%	0.0%	100.0%	0.0%	100.0%	0.2158	1.5
SEMMMS Cordon 3 Outbound	Demands														
	Actuals	21	388	415	27	7.0%	22.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7845	1.3
Airport Cordon Inbound	Demands														
	Actuals	5	82	42	-40	-48.8%	78.0%	80.0%	80.0%	0.0%	100.0%	0.0%	100.0%		5.1
Airport Cordon Outbound	Demands														
	Actuals	5	76	54	-22	-29.0%	36.8%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.2950	2.7
Wilmslow Cordon Inbound	Demands														
	Actuals	4	24	42	18	75.0%	75.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.4499	3.1
Wilmslow Cordon Outbound	Demands														
	Actuals	4	35	40	5	14.3%	20.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9291	0.8
A34 Screenline Westbound	Demands														
	Actuals	7	66	127	61	92.4%	116.7%	85.7%	85.7%	0.0%	100.0%	0.0%	100.0%	0.1792	6.2
A34 Screenline Eastbound	Demands														
	Actuals	7	78	152	74	94.9%	115.4%	71.4%	100.0%	0.0%	100.0%	0.0%	100.0%	0.3076	6.9
Stockport-Hazel Grove Screenline NorthWestbound	Demands														
	Actuals	5	64	58	-6	-9.4%	9.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9681	0.8
Stockport-Hazel Grove Screenline SouthEastbound	Demands														
	Actuals	5	64	66	2	3.1%	6.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9970	0.2

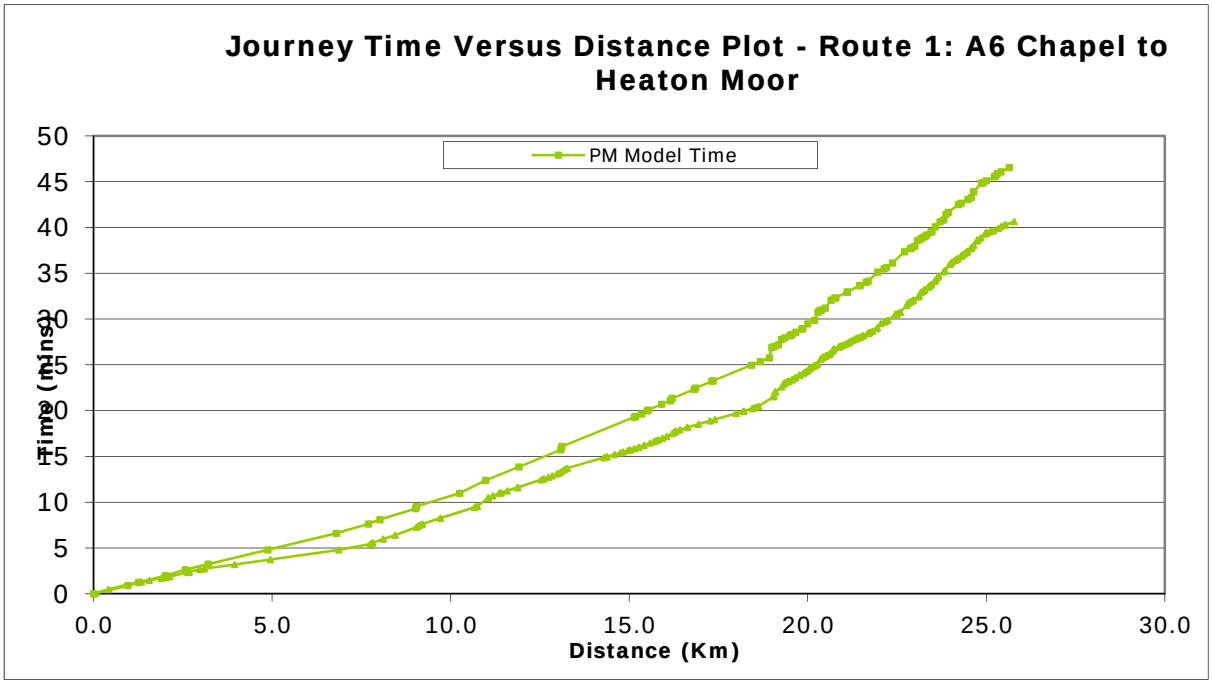
Romiley-Hazel Grove Screenline Westbound	Demands														
	Actuals	7	97	151	54	55.7%	55.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.5152	4.8
Romiley-Hazel Grove Screenline Eastbound	Demands														
	Actuals	7	121	155	34	28.1%	28.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7159	2.9
Romiley-New Mills Screenline Westbound	Demands														
	Actuals	7	79	91	12	15.2%	20.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9281	1.3
Romiley-New Mills Screenline Eastbound	Demands														
	Actuals	7	102	108	6	5.9%	5.9%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9961	0.6
North-of-Scheme screenline Northbound	Demands														
	Actuals	12	411	436	25	6.1%	10.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9960	1.2
North-of-Scheme screenline Southbound	Demands														
	Actuals	12	465	490	25	5.4%	10.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9959	1.1
South-of-Wilmslow Screenline Northbound	Demands														
	Actuals	9	118	114	-4	-3.4%	8.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9739	0.4
South-of-Wilmslow Screenline Southbound	Demands														
	Actuals	9	86	90	4	4.7%	14.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9713	0.4
Whaley Bridge & Horwich End Cordon Inbound	Demands														
	Actuals	5	48	43	-5	-10.4%	27.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8302	0.7
Whaley Bridge & Horwich End Cordon Outbound	Demands														
	Actuals	5	38	35	-3	-7.9%	55.3%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.2357	0.5
Disley & Newtown Cordon Inbound	Demands														
	Actuals	7	117	136	19	16.2%	23.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9432	1.7
Disley & Newtown Cordon Outbound	Demands														
	Actuals	7	135	138	3	2.2%	2.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9993	0.3
Bollington / Adlington Cordon Inbound	Demands														
	Actuals	6	11	12	1	9.1%	9.1%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9000	0.3
Bollington / Adlington Cordon Outbound	Demands														
	Actuals	6	12	10	-2	-16.7%	66.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%		0.6
A523 East Screenline Eastbound	Demands														
	Actuals	7	29	29	0	0.0%	27.6%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.7113	0.0
A523 East Screenline	Demands														

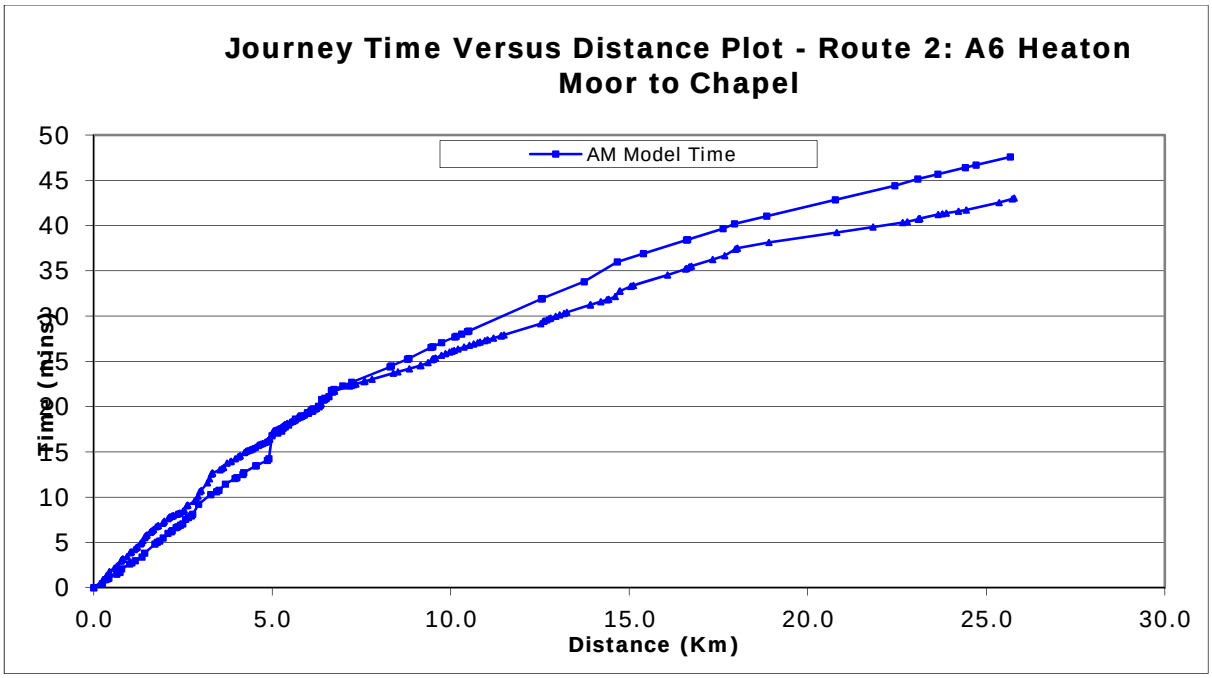
Westbound	Actuals	7	24	22	-2	-8.3%	50.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.2528	0.4
A523 West Screenline Eastbound	Demands														
	Actuals	5	39	32	-7	-18.0%	89.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%		1.2
A523 West Screenline Westbound	Demands														
	Actuals	5	31	44	13	41.9%	74.2%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.3529	2.1
Prestbury To Whaley Bridge Screenline Northbound	Demands														
	Actuals	10	122	120	-2	-1.6%	19.7%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9620	0.2
Prestbury To Whaley Bridge Screenline Southbound	Demands														
	Actuals	10	104	103	-1	-1.0%	24.0%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9099	0.1
Random Independent Counts	Demands														
	Actuals	62	962	1296	334	34.7%	69.9%	83.9%	93.5%	0.0%	100.0%	0.0%	100.0%	0.3802	9.9
GMSM Motorway Counts	Demands														
	Actuals	141	41291	39104	-2187	-5.3%	11.1%	83.7%	95.7%	70.6%	95.2%	0.0%	92.2%	0.9437	10.9
Independent Motorway Counts	Demands														
	Actuals	8	2692	2691	-1	0.0%	5.4%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.8003	0.0
Matrix Estimation Motorway Counts	Demands														
	Actuals	36	7799	7723	-76	-1.0%	7.5%	100.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.9605	0.9
All Independent Counts	Demands														
	Actuals	84	3798	4266	468	12.3%	25.9%	84.5%	94.0%	0.0%	100.0%	0.0%	100.0%	0.9638	7.4

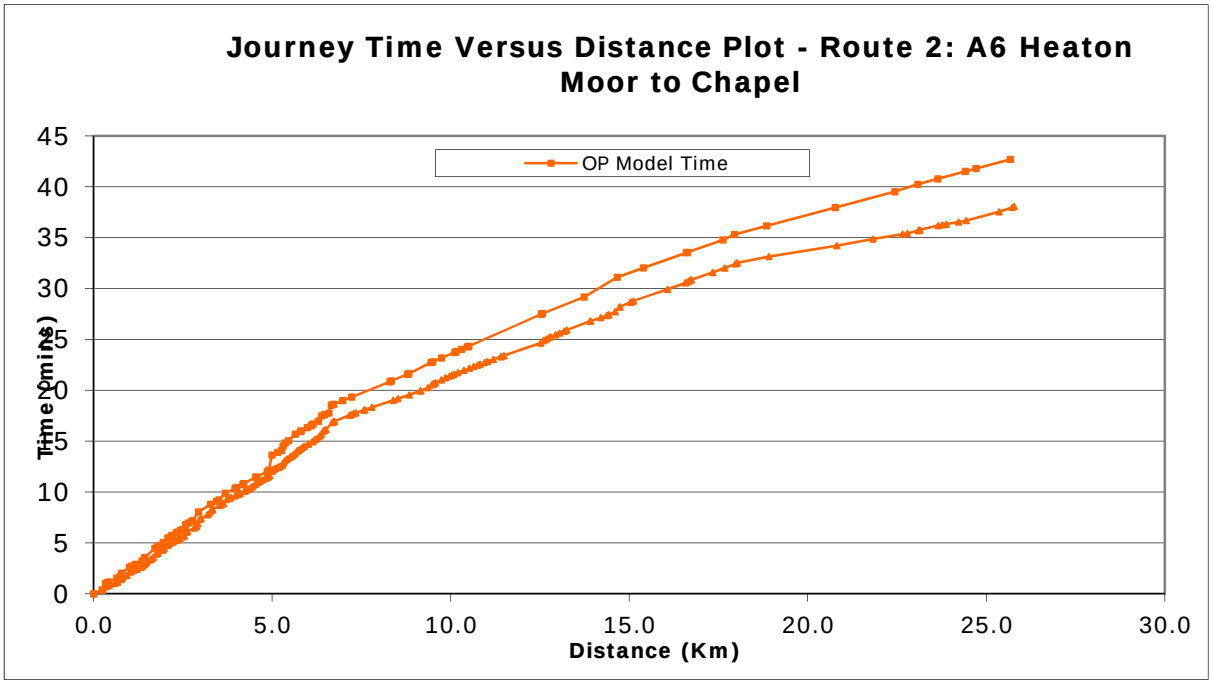
Appendix 8 Graphs of Observed Versus Modelled Journey Times

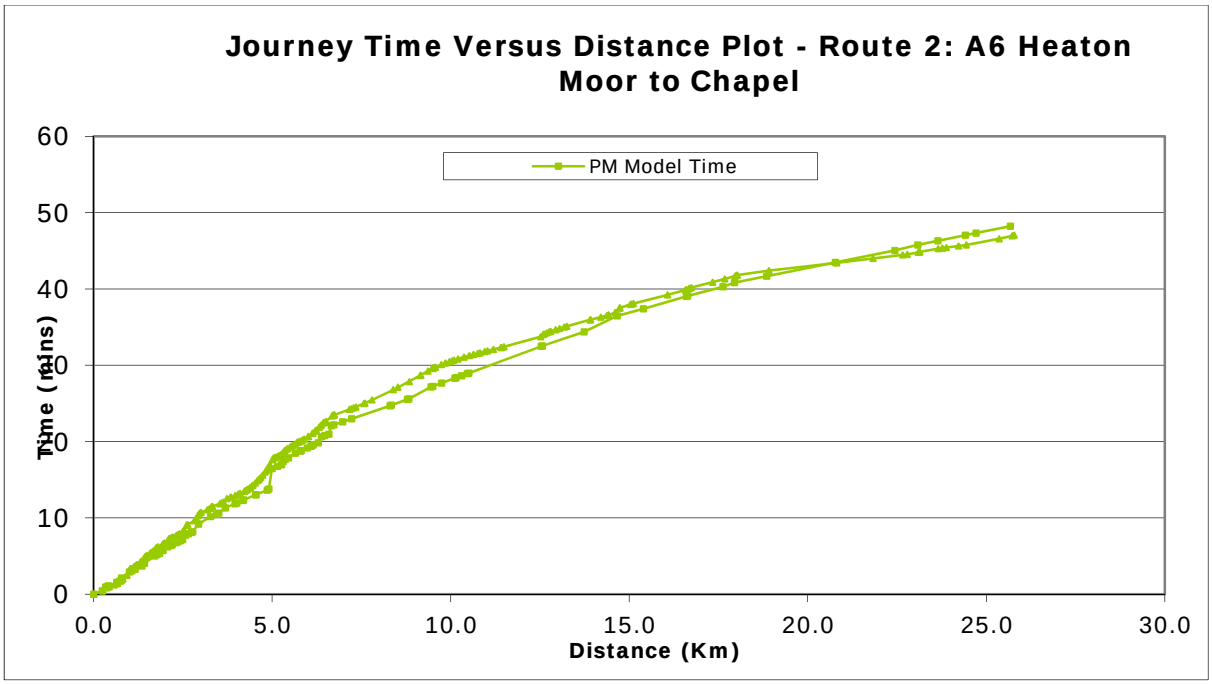


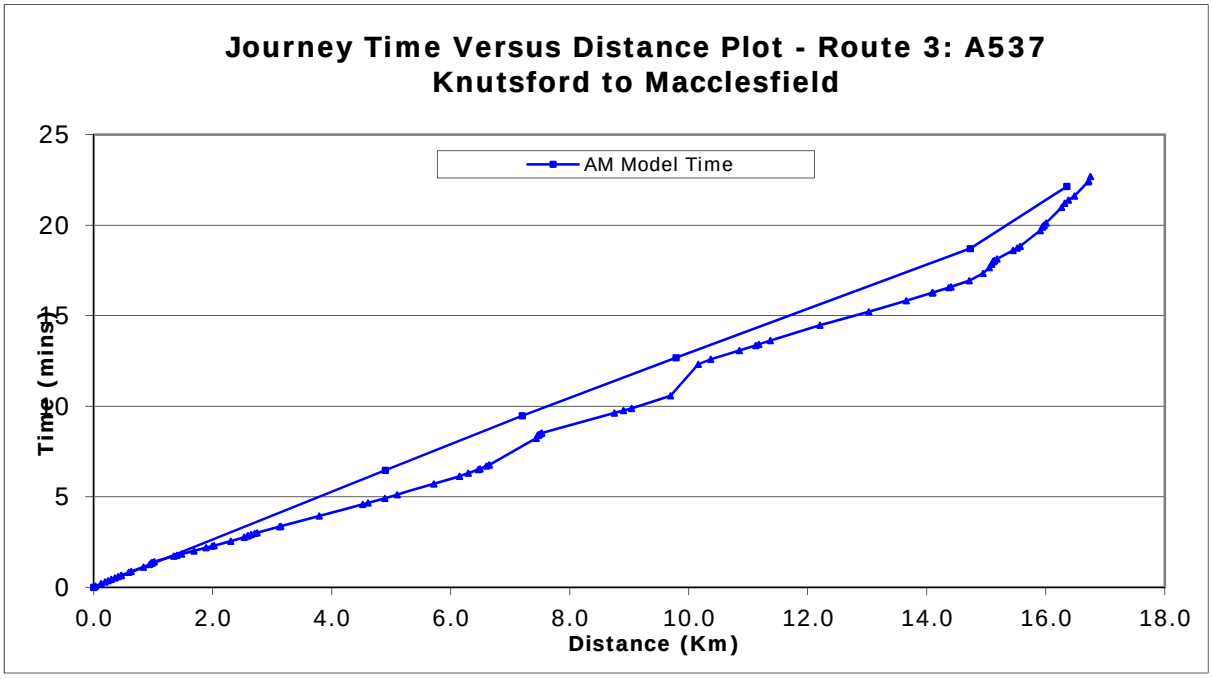


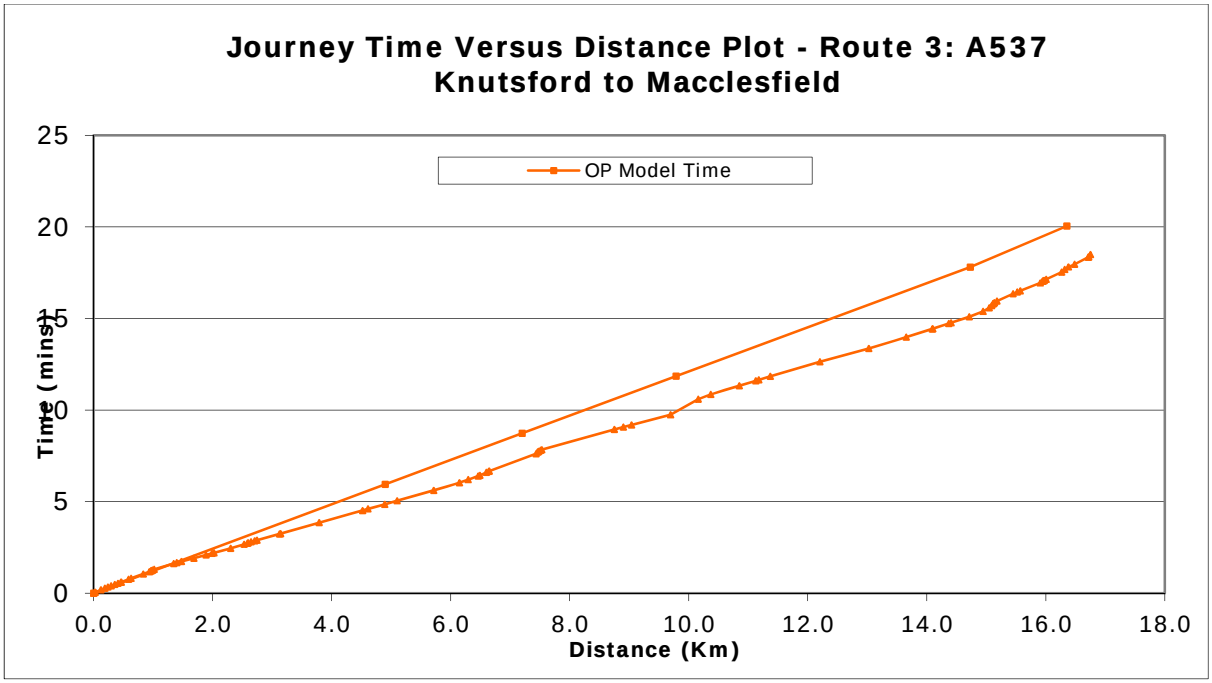

Journey Time Versus Distance Plot - Route 1: A6 Chapel to Heaton Moor
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
40
45
50
0.0
5.0
10.0
15.0
20.0
25.0
30.0

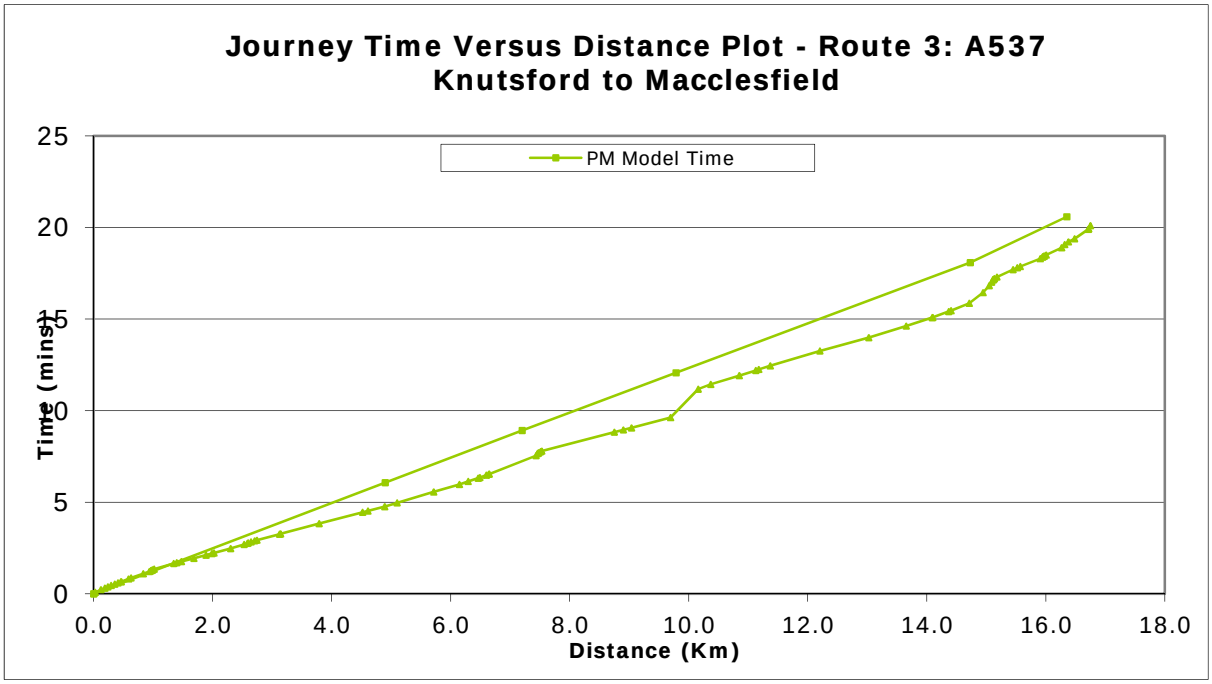

Journey Time Versus Distance Plot - Route 2: A6 Heaton Moor to Chapel
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
40
45
50
0.0
5.0
10.0
15.0
20.0
25.0
30.0

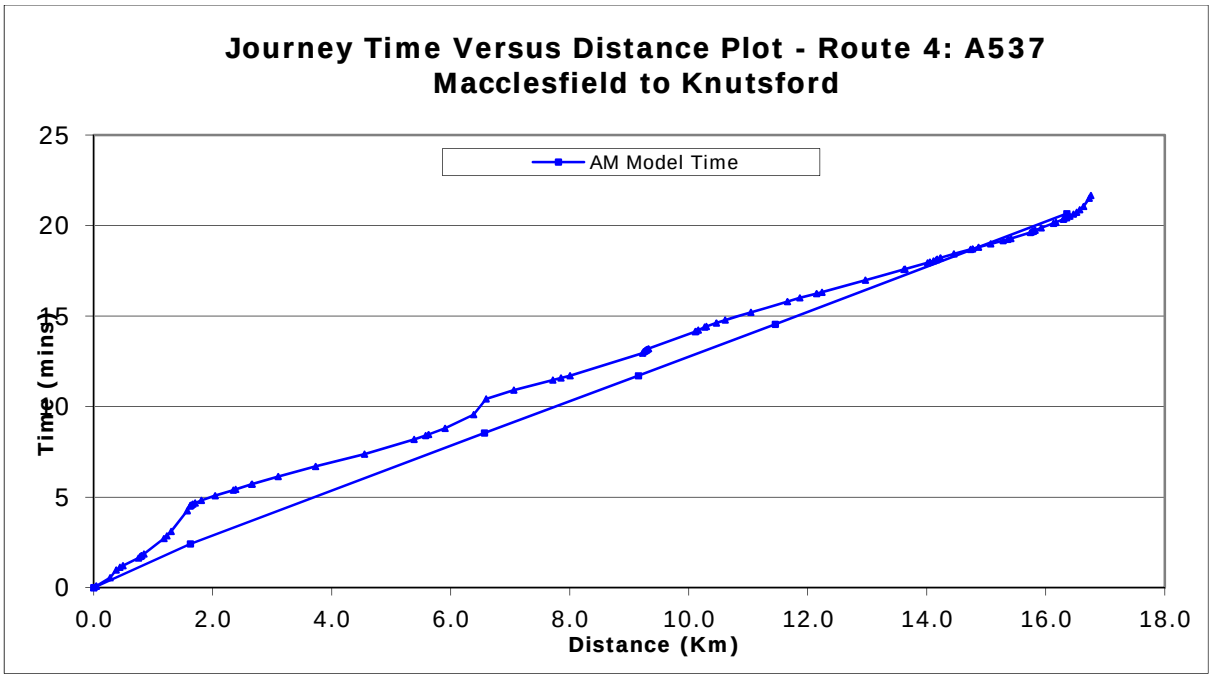

Journey Time Versus Distance Plot - Route 2: A6 Heaton Moor to Chapel
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
40
45
0.0
5.0
10.0
15.0
20.0
25.0
30.0

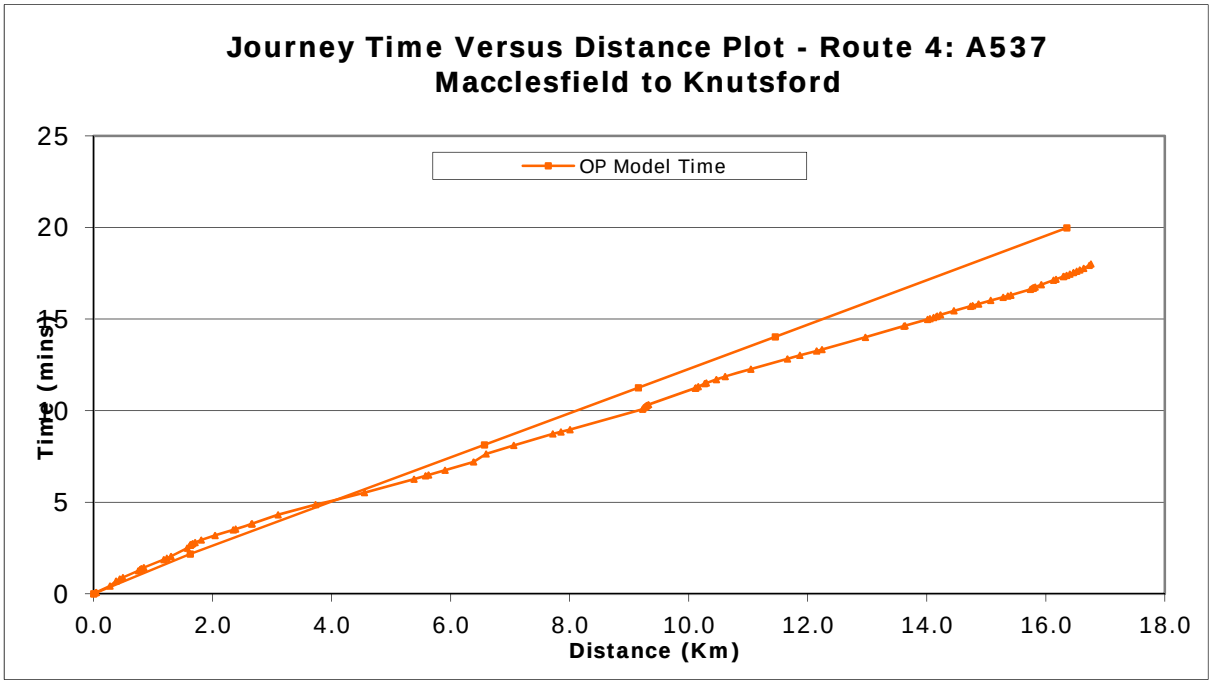

Journey Time Versus Distance Plot - Route 2: A6 Heaton Moor to Chapel
PM Model Time
Time (mins)
Distance (Km)
0
10
20
30
40
50
60
0.0
5.0
10.0
15.0
20.0
25.0
30.0

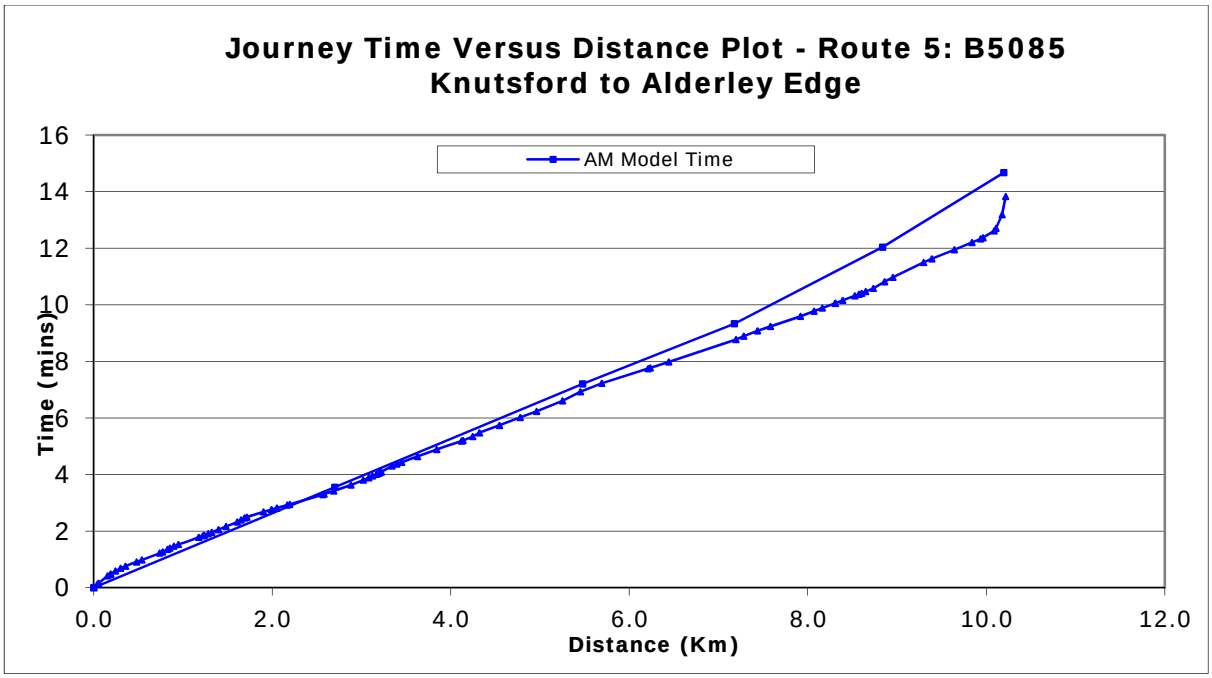

Journey Time Versus Distance Plot - Route 3: A537
Knutsford to Macclesfield
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

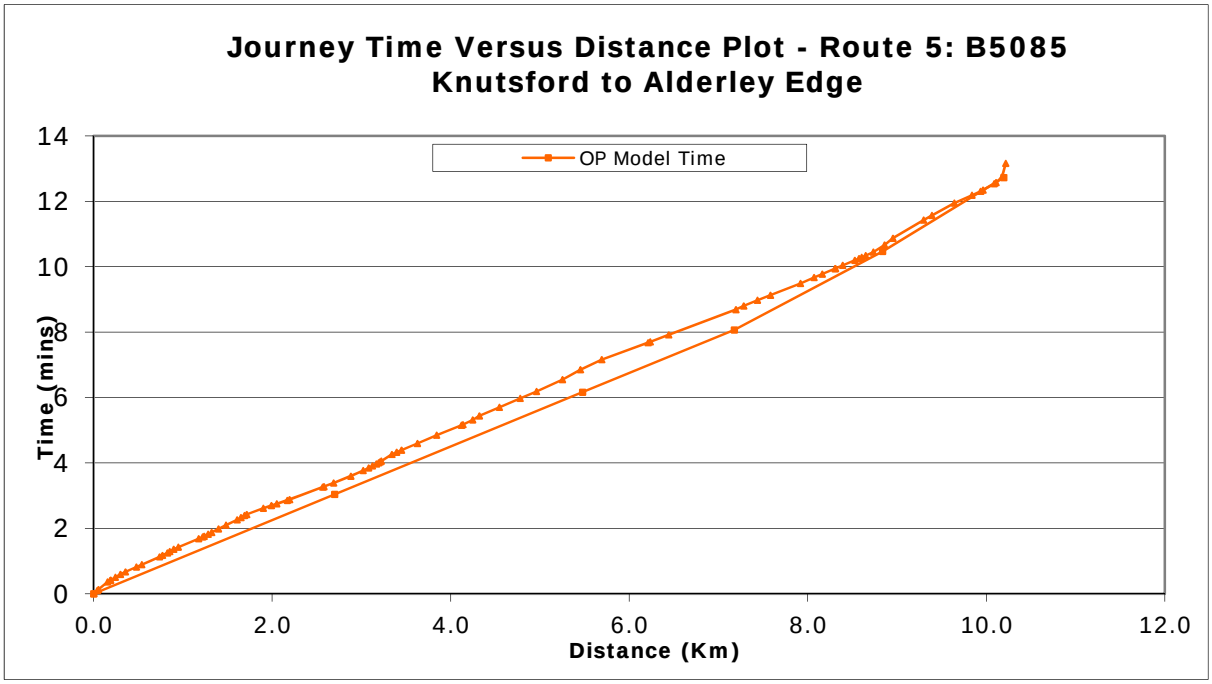

Journey Time Versus Distance Plot - Route 3: A537
Knutsford to Macclesfield
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0


Journey Time Versus Distance Plot - Route 3: A537
Knutsford to Macclesfield
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0


Journey Time Versus Distance Plot - Route 4: A537
Macclesfield to Knutsford
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0


Journey Time Versus Distance Plot - Route 4: A537
Macclesfield to Knutsford
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0


Journey Time Versus Distance Plot - Route 5: B5085
Knutsford to Alderley Edge
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 5: B5085
Knutsford to Alderley Edge
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
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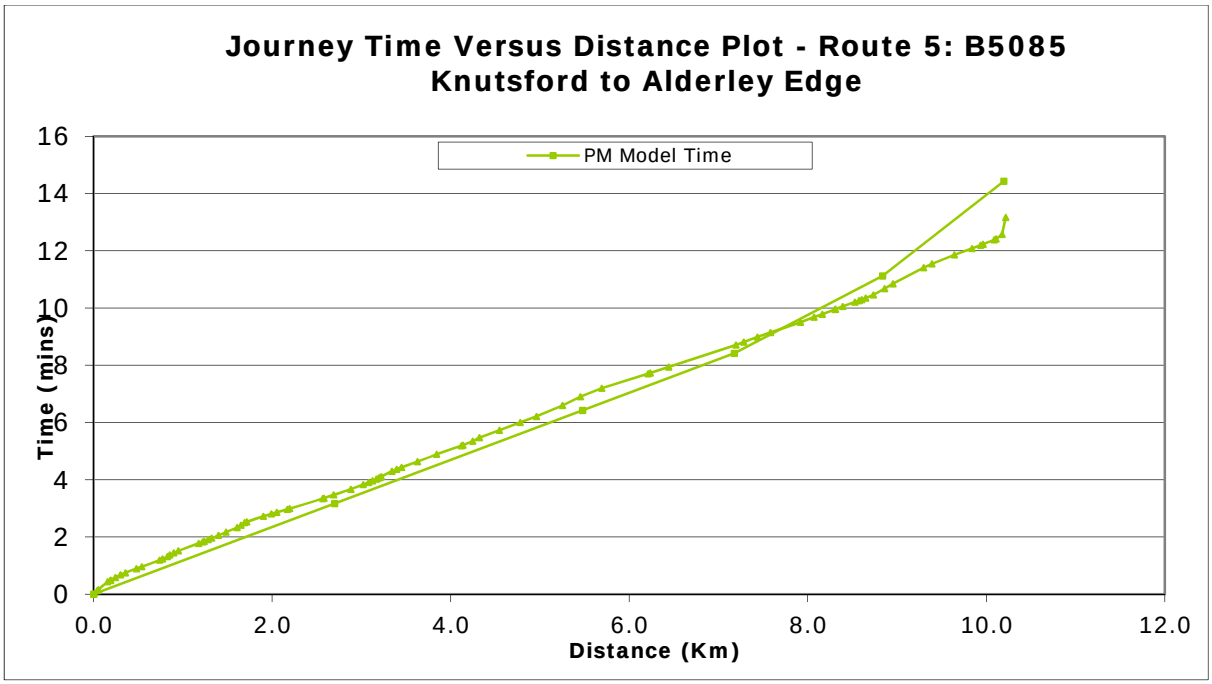
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 5: B5085
Knutsford to Alderley Edge
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
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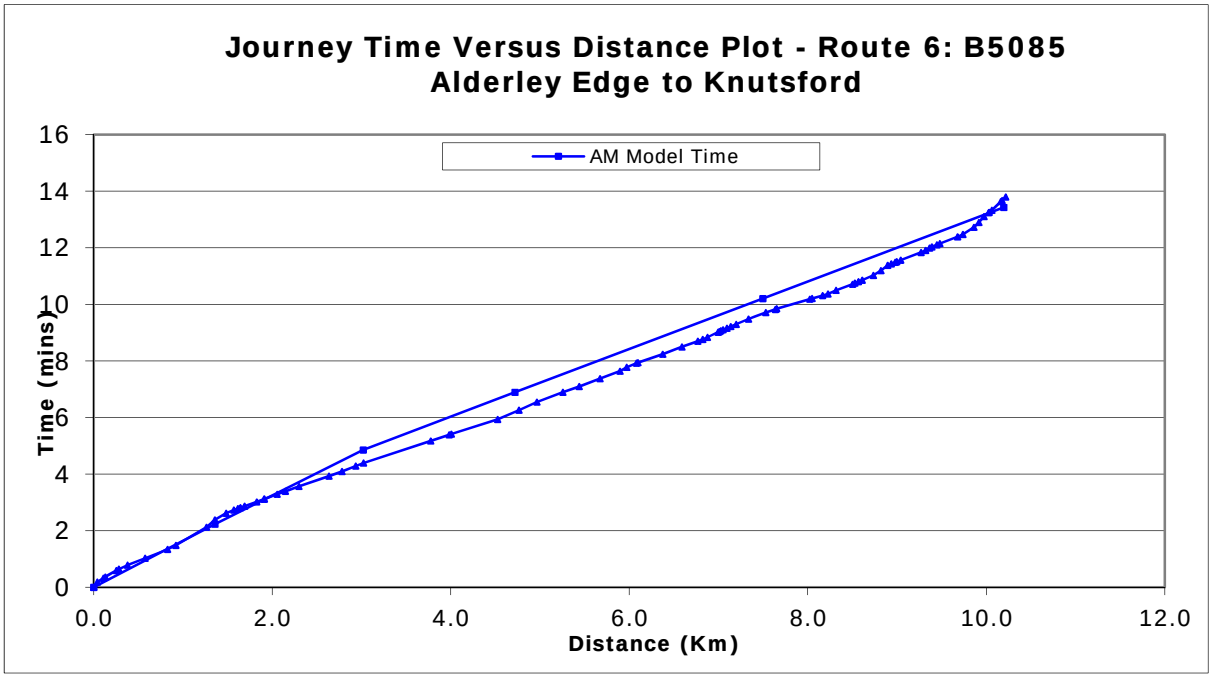
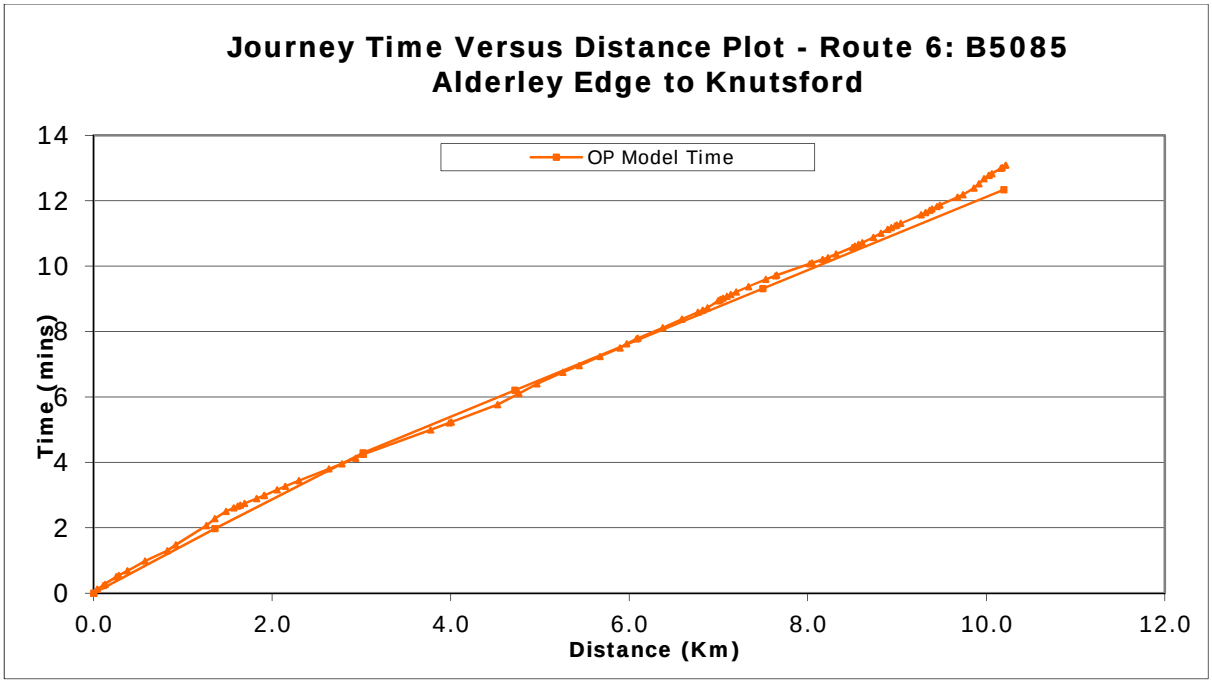
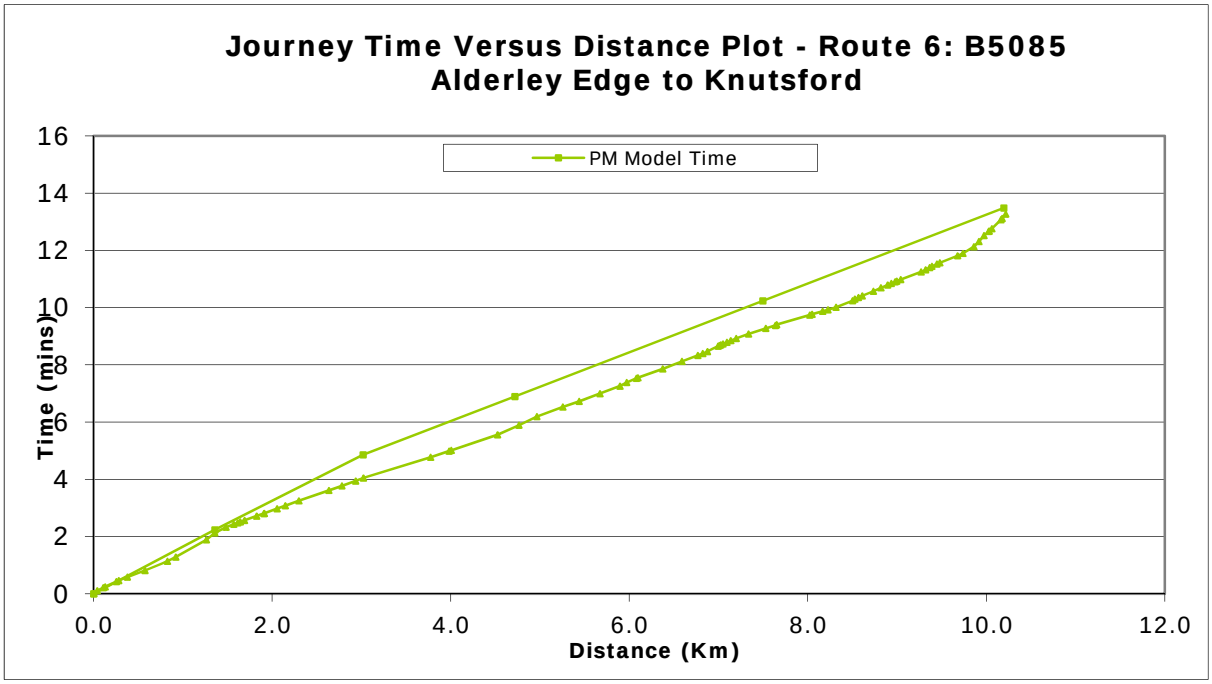
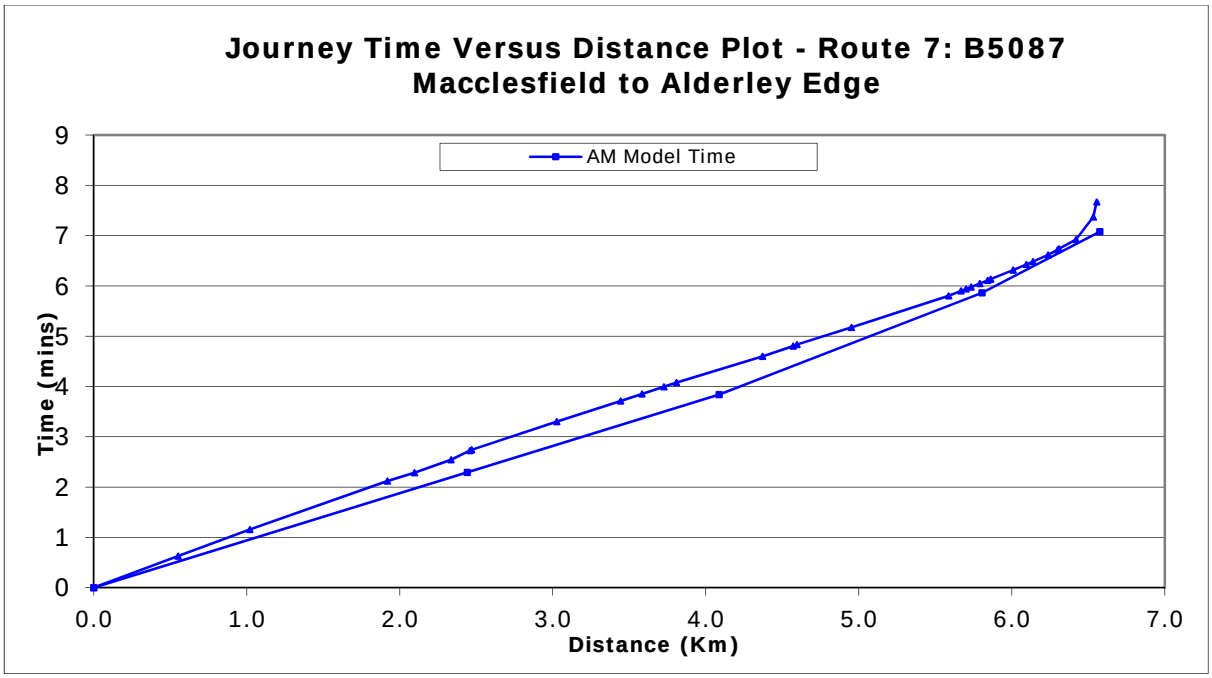
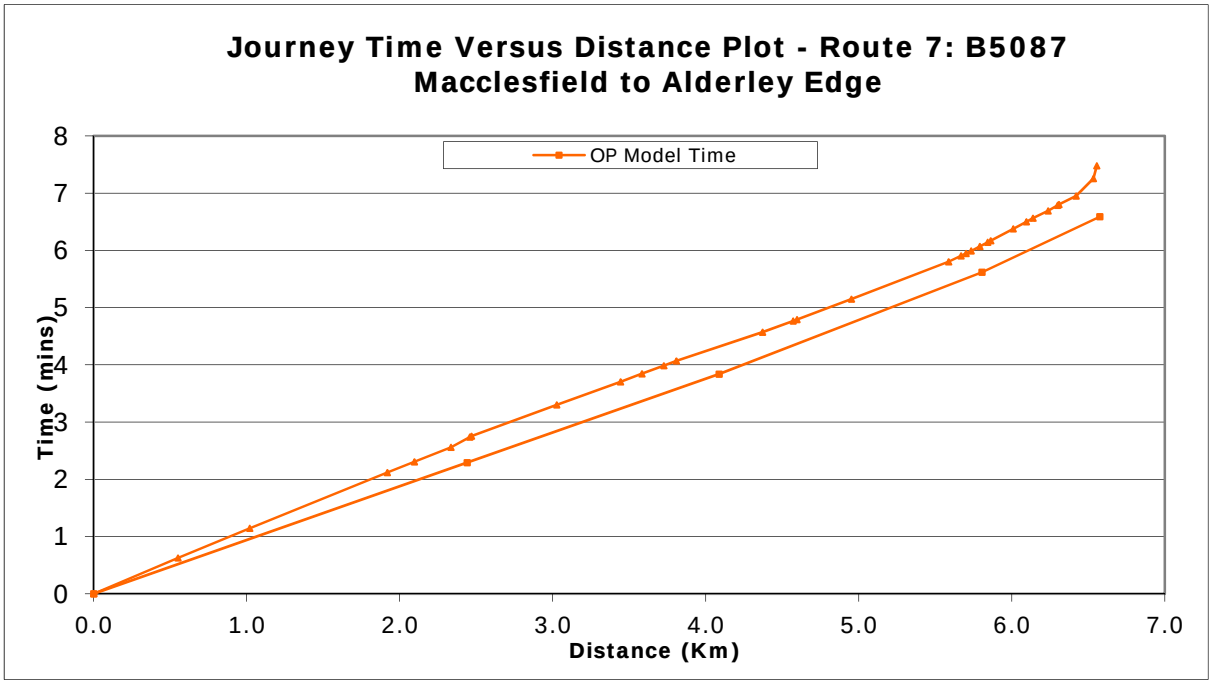
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 6: B5085
Alderley Edge to Knutsford
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 6: B5085
Alderley Edge to Knutsford
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 6: B5085
Alderley Edge to Knutsford
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 7: B5087
Macclesfield to Alderley Edge
AM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 7: B5087
Macclesfield to Alderley Edge
OP Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
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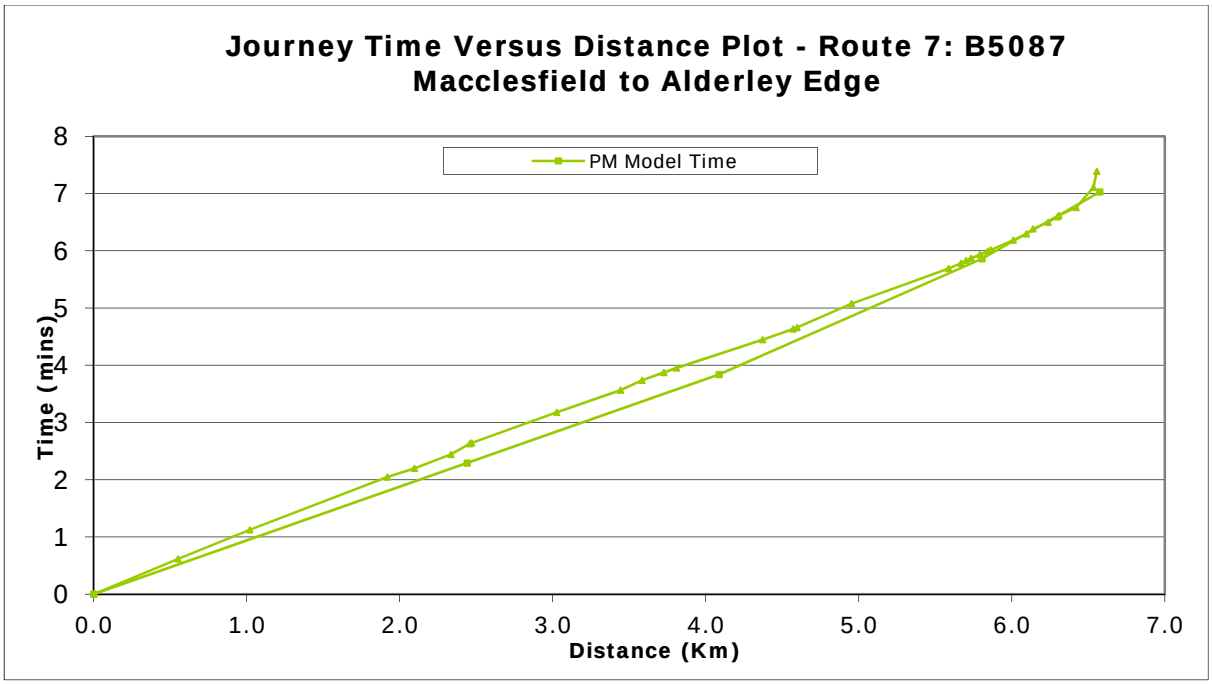
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 7: B5087
Macclesfield to Alderley Edge
PM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
0.0
1.0
2.0
3.0
4.0
5.0
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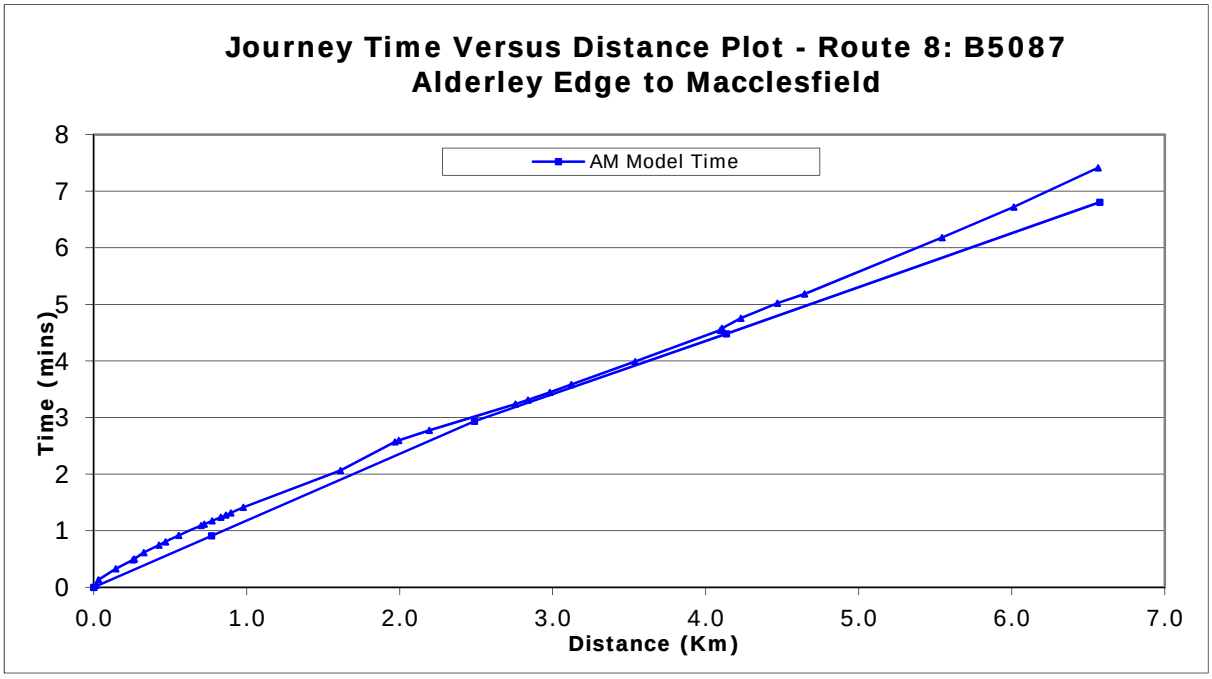
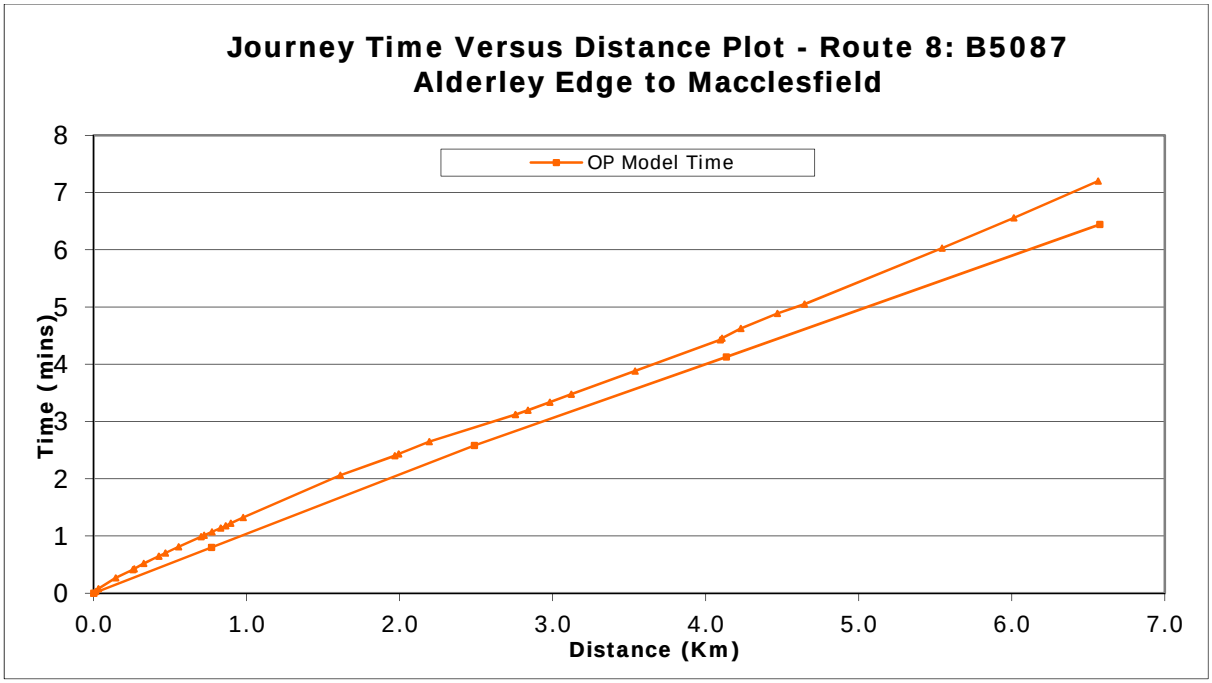
7.0


Journey Time Versus Distance Plot - Route 8: B5087
Alderley Edge to Macclesfield
AM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 8: B5087
Alderley Edge to Macclesfield
OP Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
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1.0
2.0
3.0
4.0
5.0
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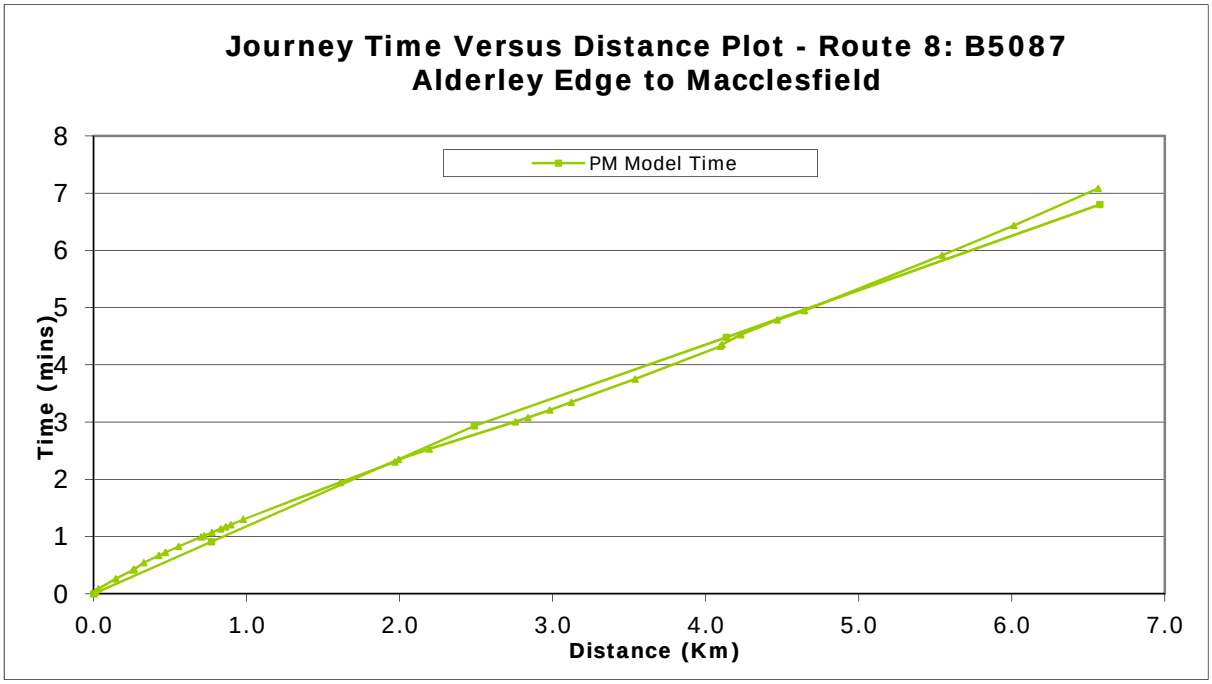
7.0


Journey Time Versus Distance Plot - Route 8: B5087
Alderley Edge to Macclesfield
PM Model Time
Time (mins)
Distance (Km)
0
1
2
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6
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3.0
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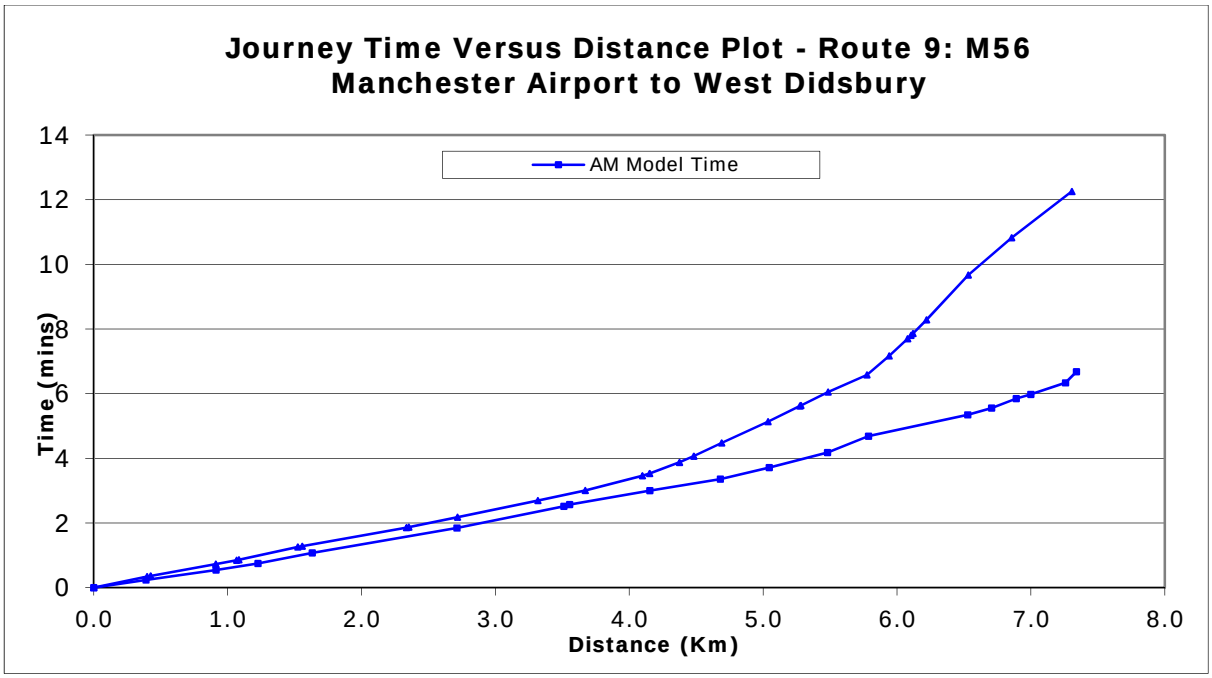
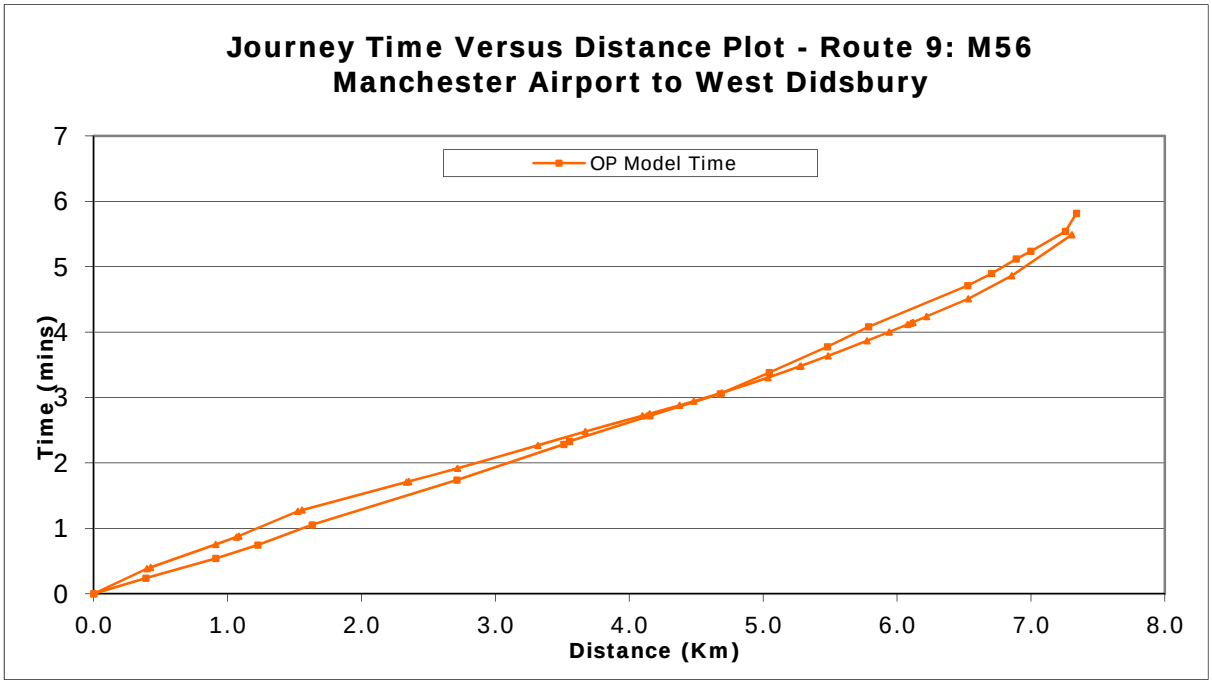
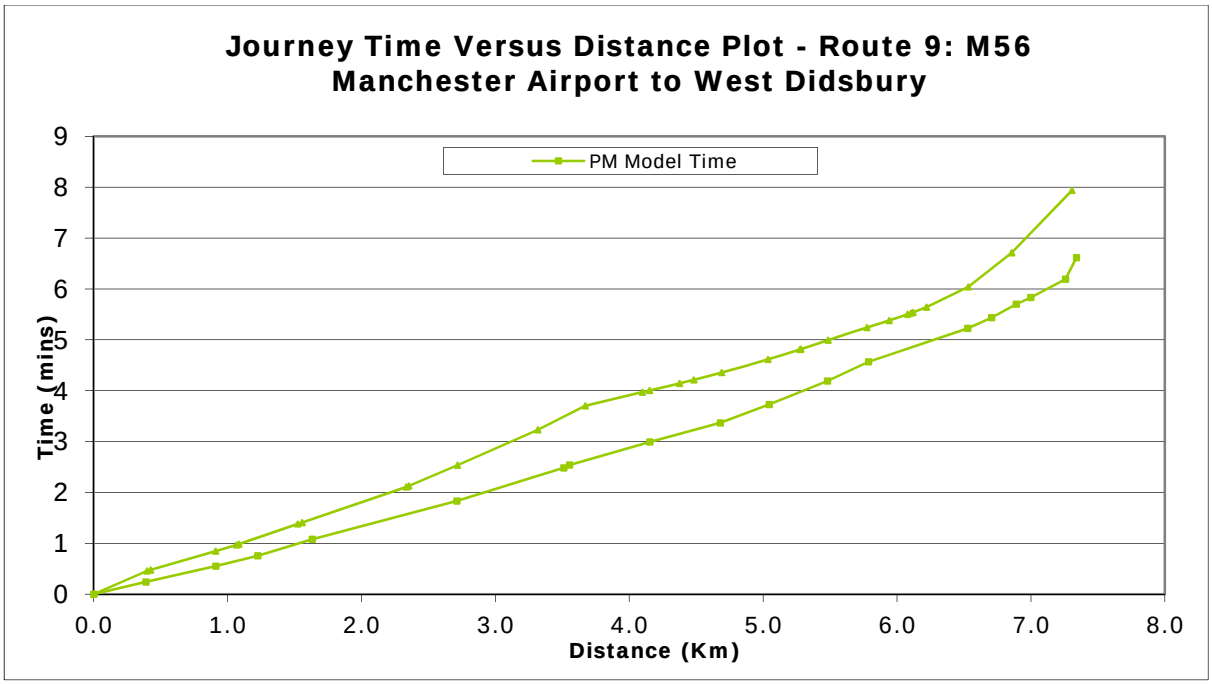

Journey Time Versus Distance Plot - Route 9: M56
Manchester Airport to West Didsbury
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0


Journey Time Versus Distance Plot - Route 9: M56
Manchester Airport to West Didsbury
OP Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0


Journey Time Versus Distance Plot - Route 9: M56
Manchester Airport to West Didsbury
PM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
9
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1.0
2.0
3.0
4.0
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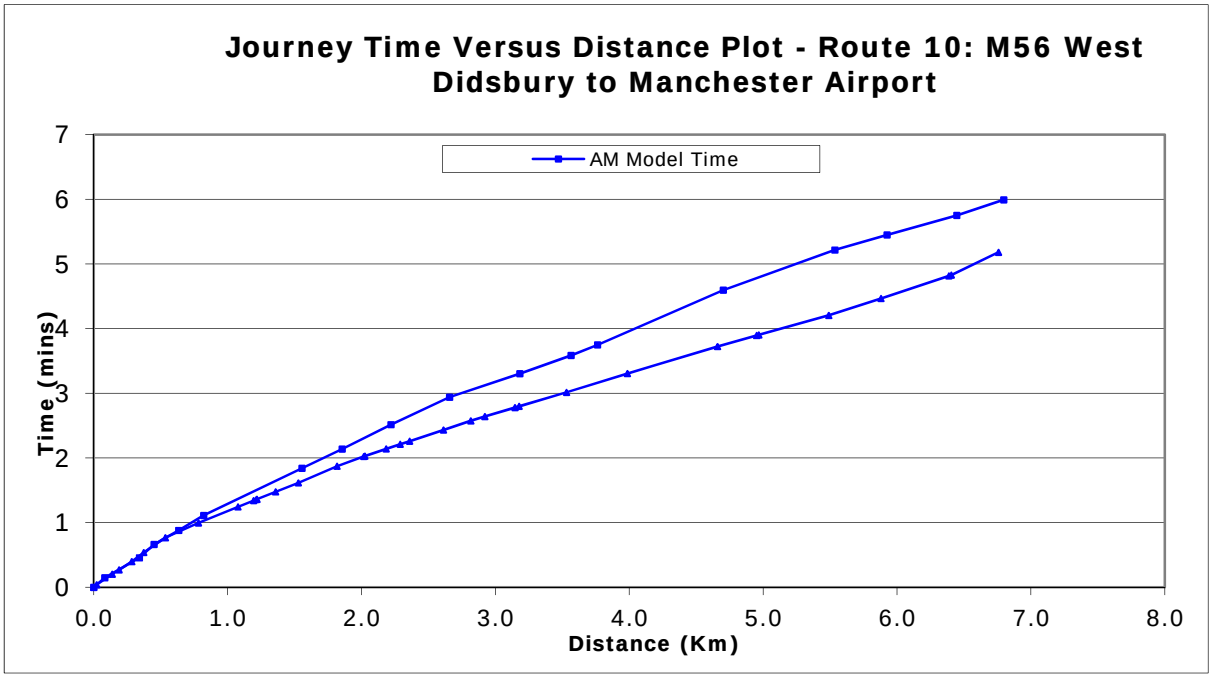
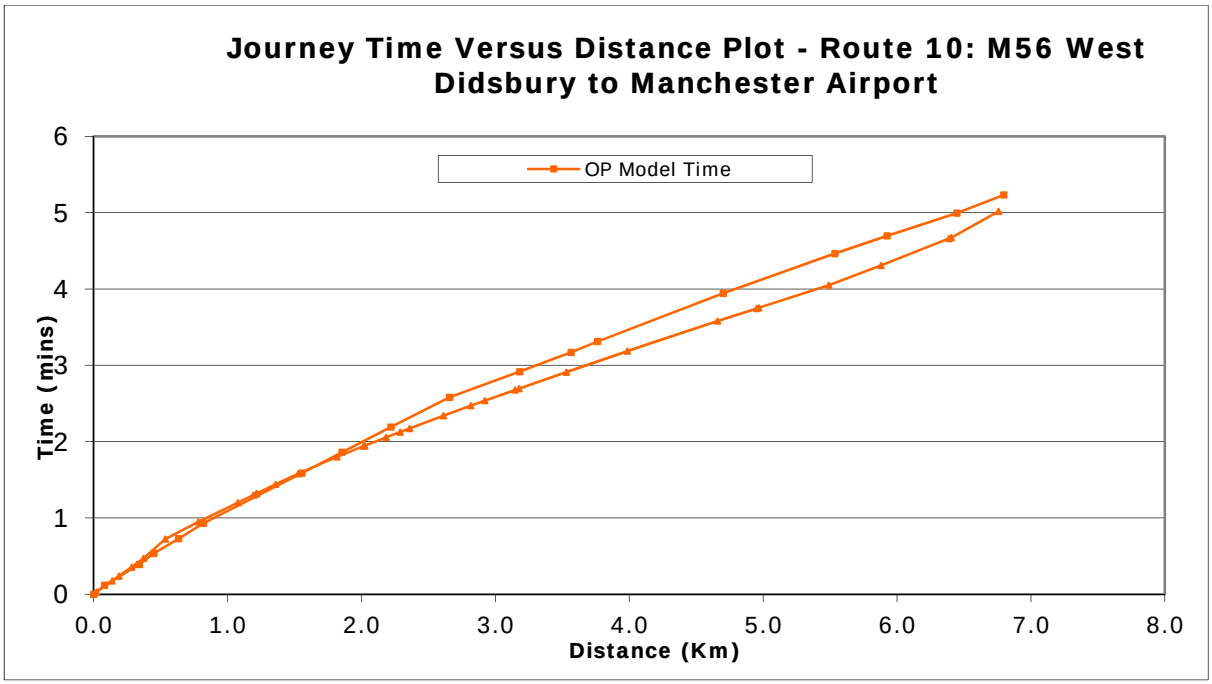
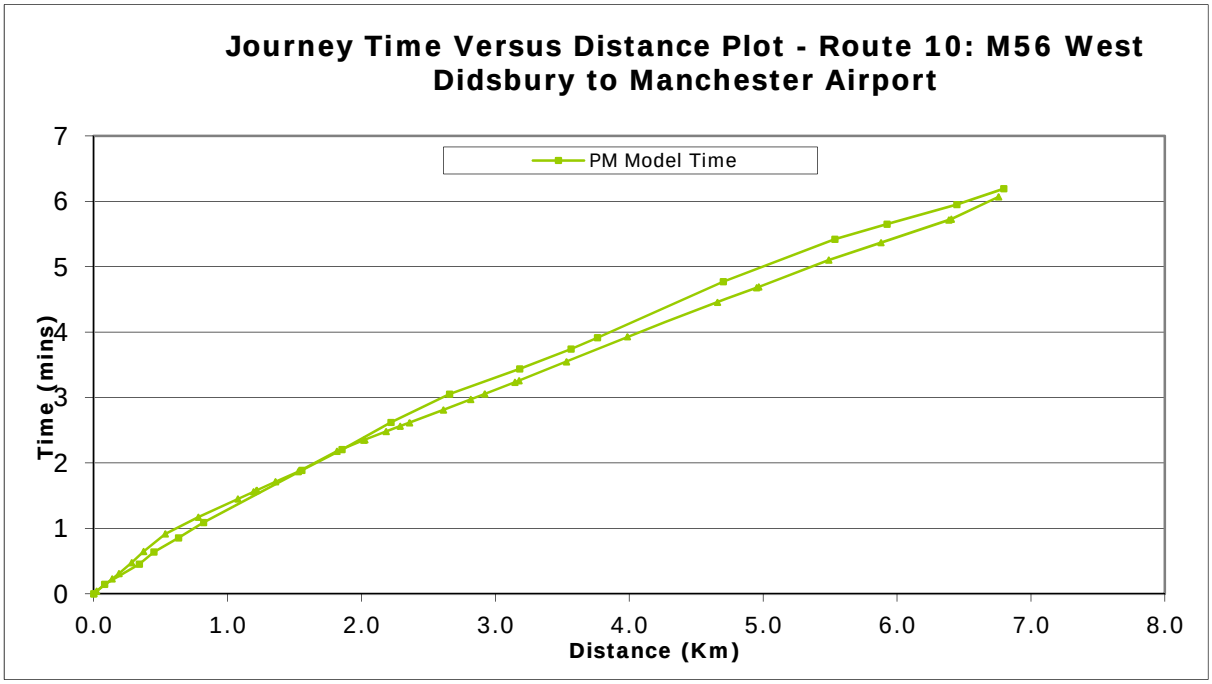
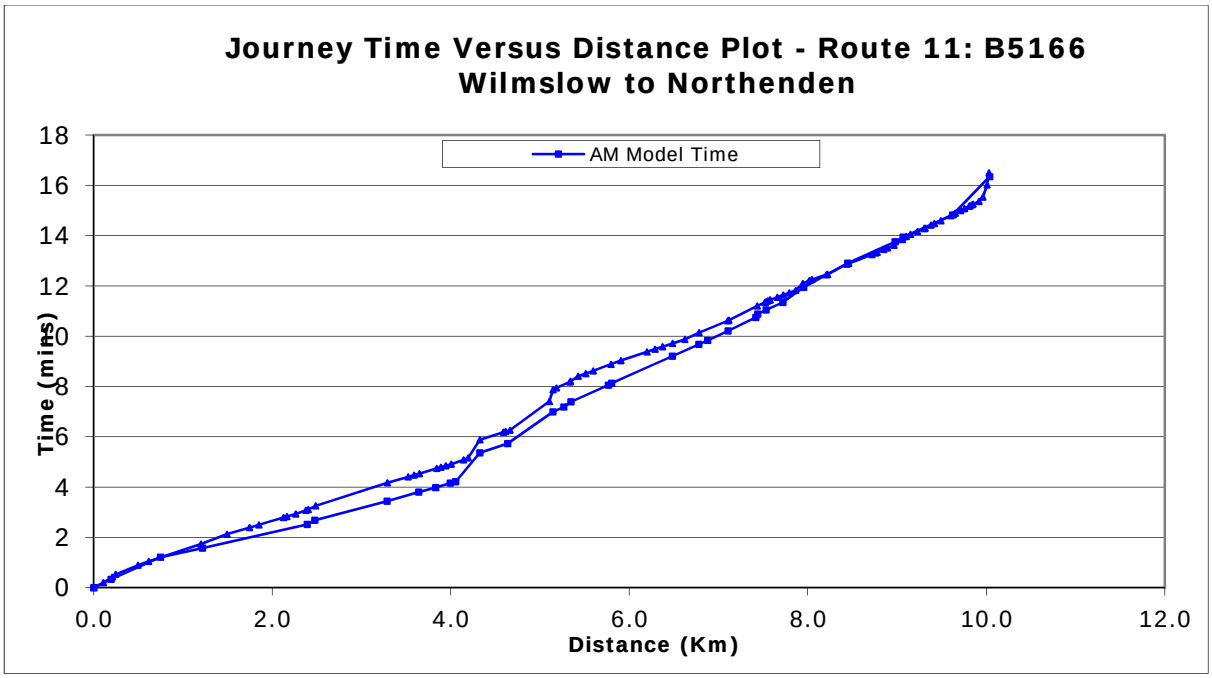
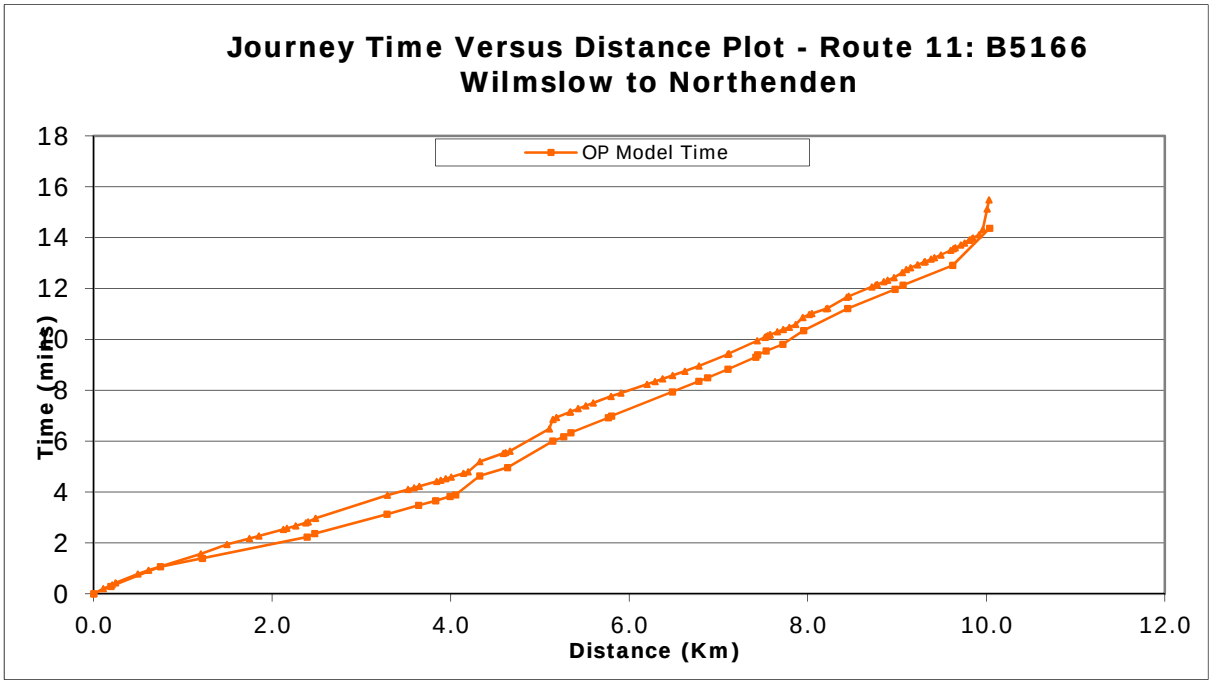
7.0
8.0

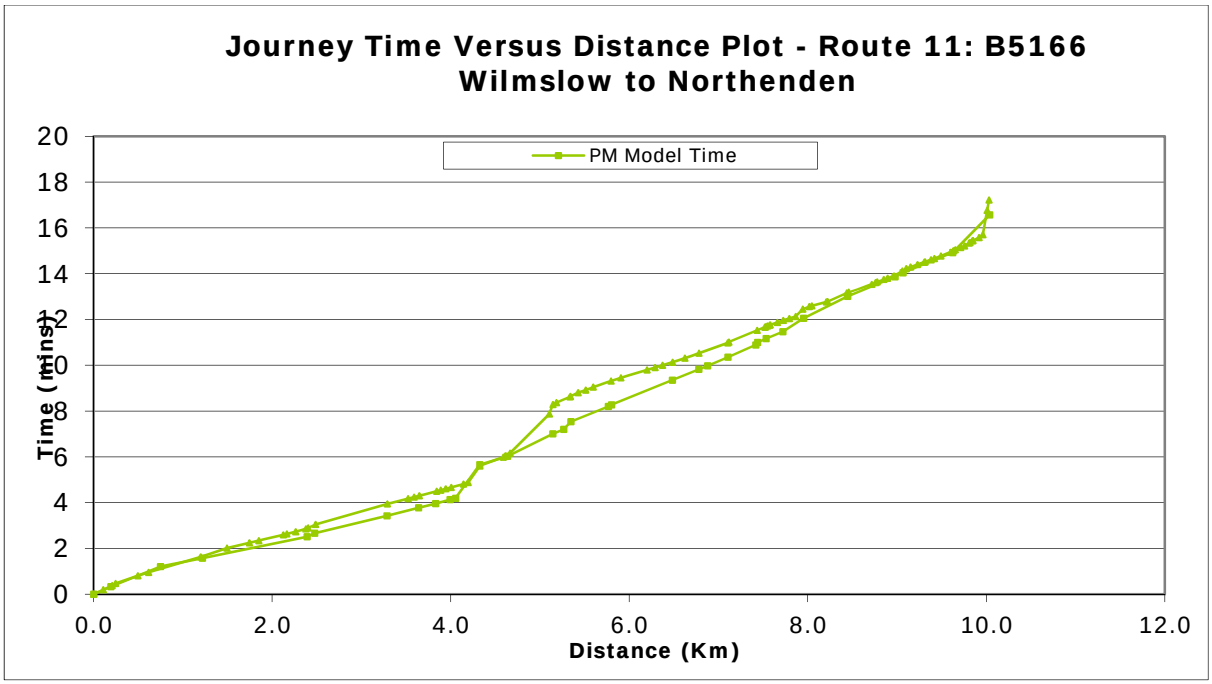

Journey Time Versus Distance Plot - Route 10: M56 West Didsbury to Manchester Airport
AM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

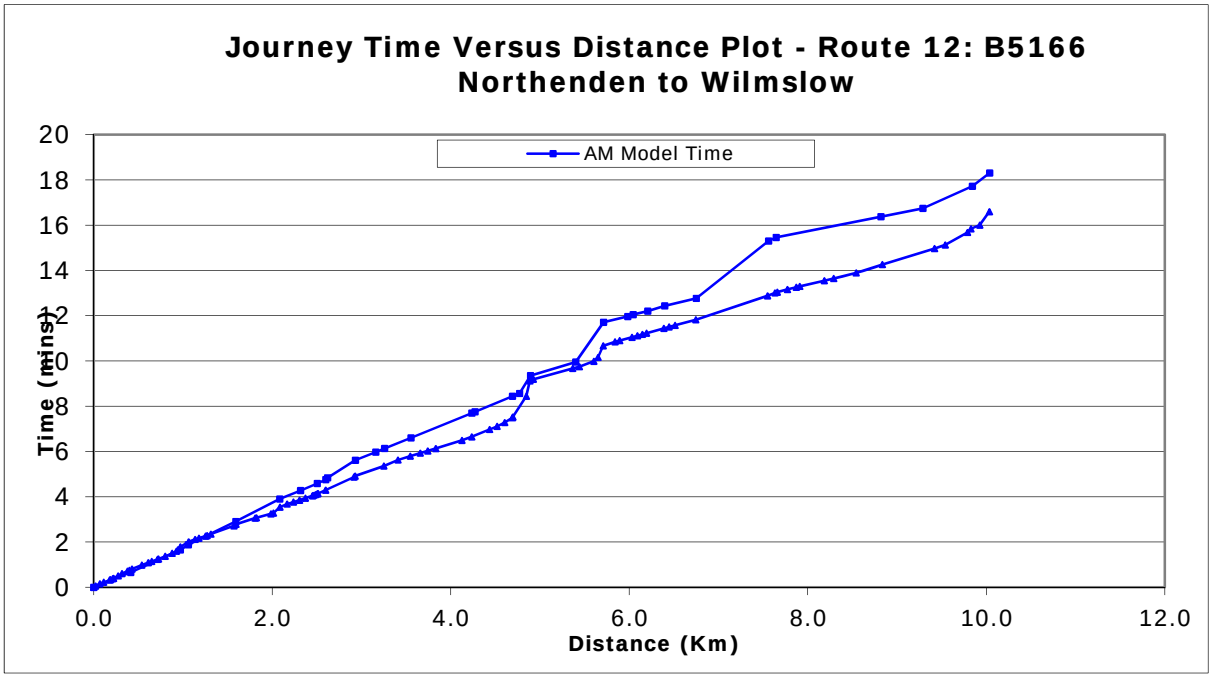

Journey Time Versus Distance Plot - Route 10: M56 West Didsbury to Manchester Airport
OP Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

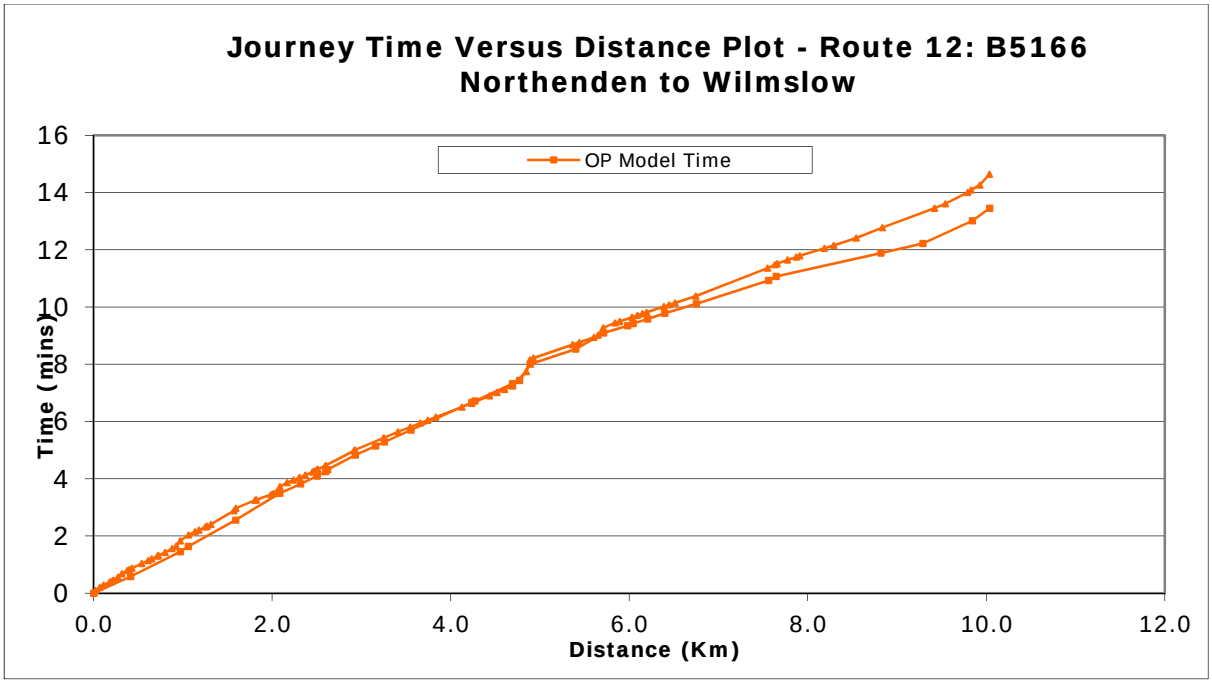

Journey Time Versus Distance Plot - Route 10: M56 West Didsbury to Manchester Airport
PM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

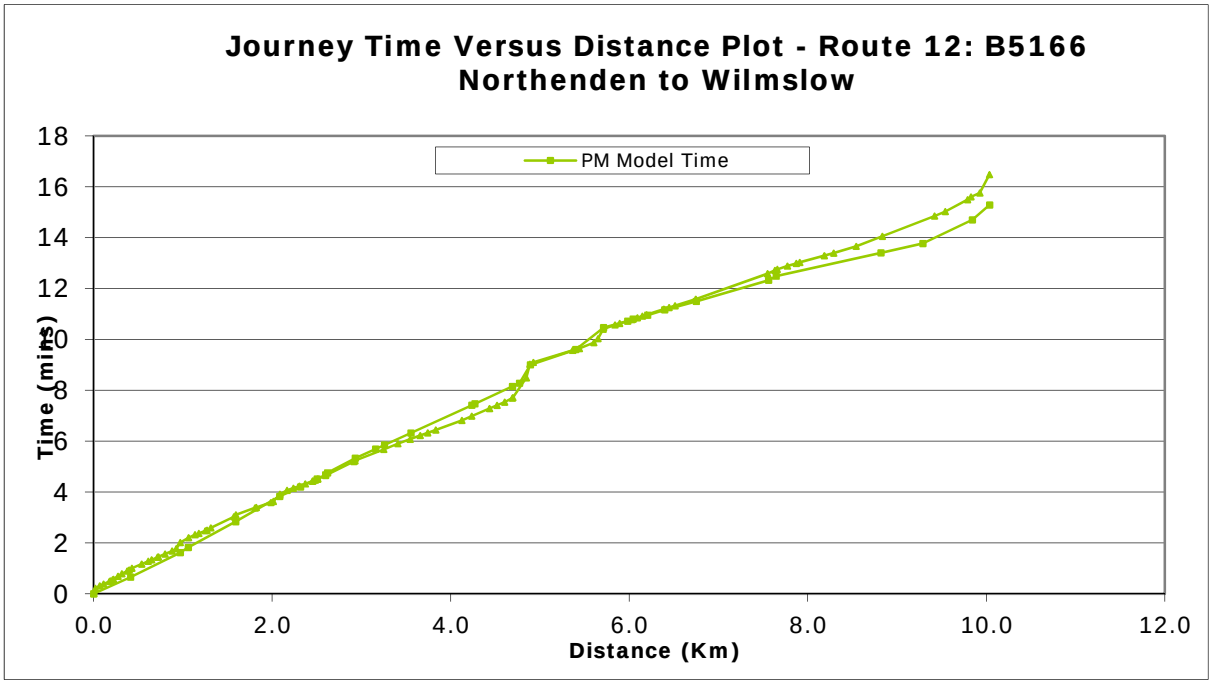

Journey Time Versus Distance Plot - Route 11: B5166 Wilmslow to Northenden
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0
12.0

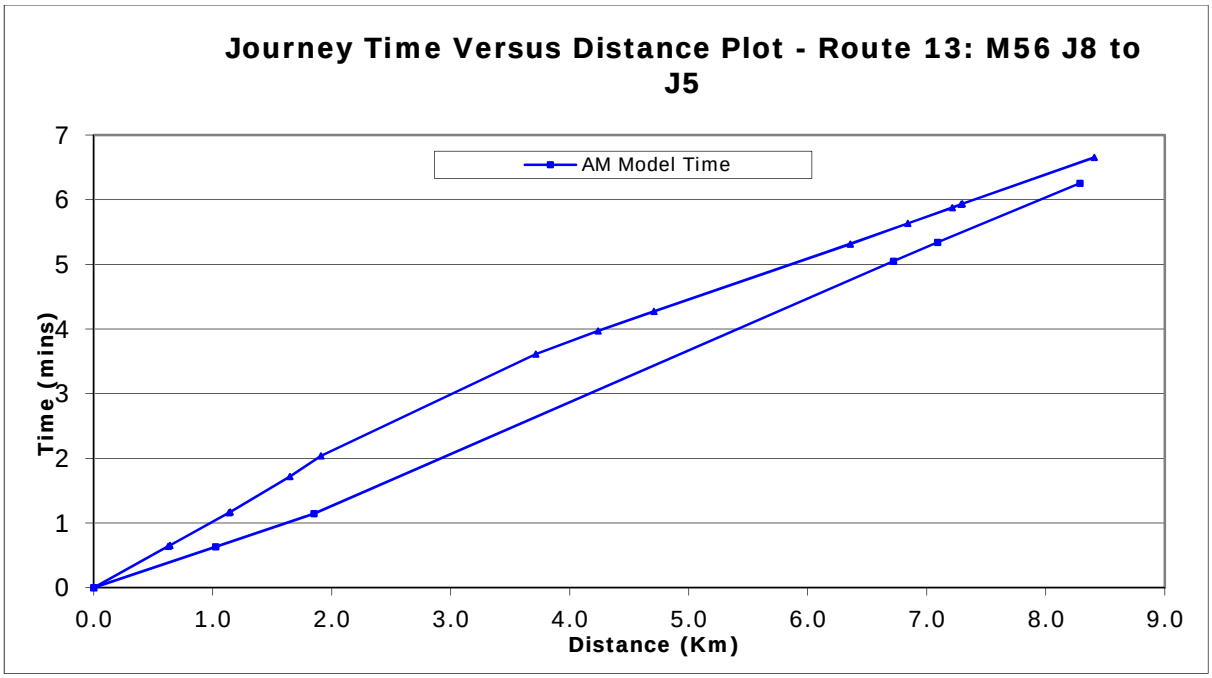

Journey Time Versus Distance Plot - Route 11: B5166
Wilmslow to Northenden
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0
12.0

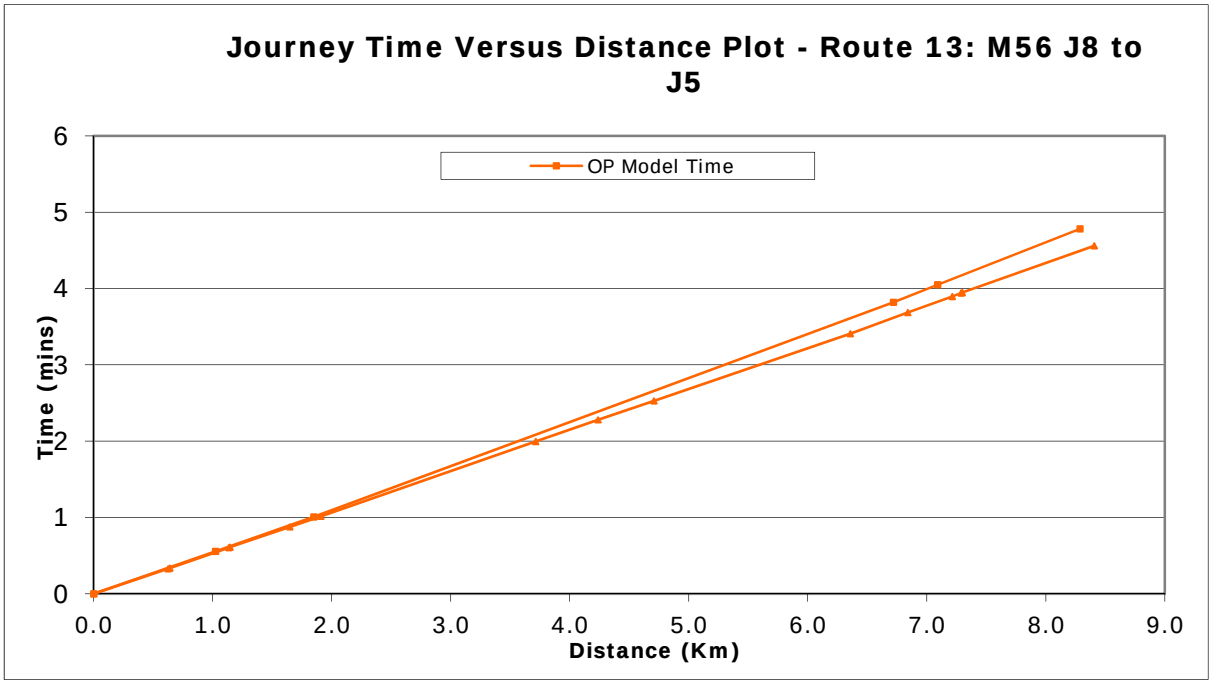

Journey Time Versus Distance Plot - Route 11: B5166
Wilmslow to Northenden
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
20
0.0
2.0
4.0
6.0
8.0
10.0
12.0

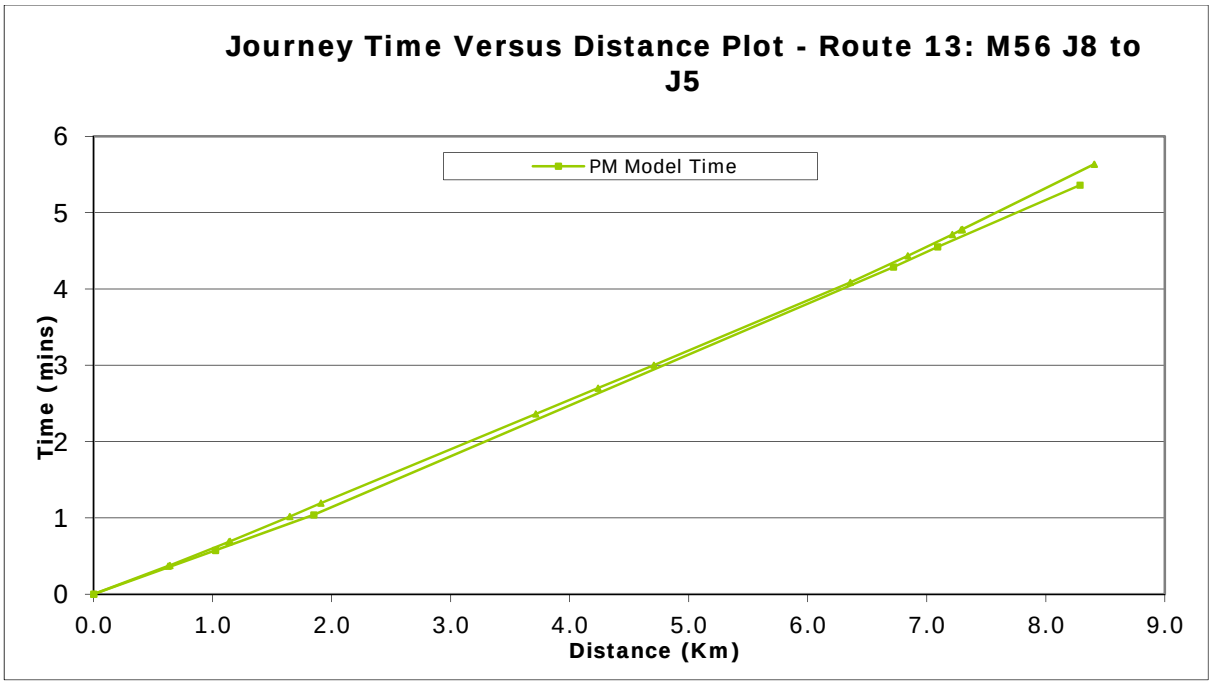

Journey Time Versus Distance Plot - Route 12: B5166
Northenden to Wilmslow
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
20
0.0
2.0
4.0
6.0
8.0
10.0
12.0

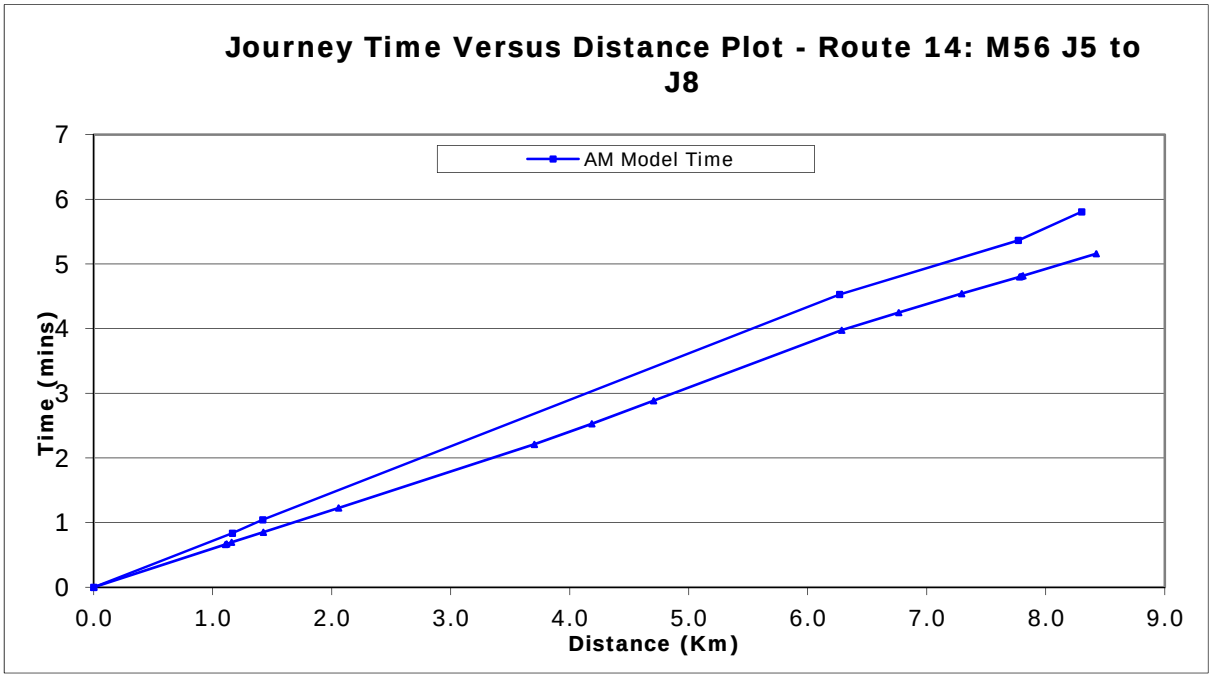

Journey Time Versus Distance Plot - Route 12: B5166
Northenden to Wilmslow
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0

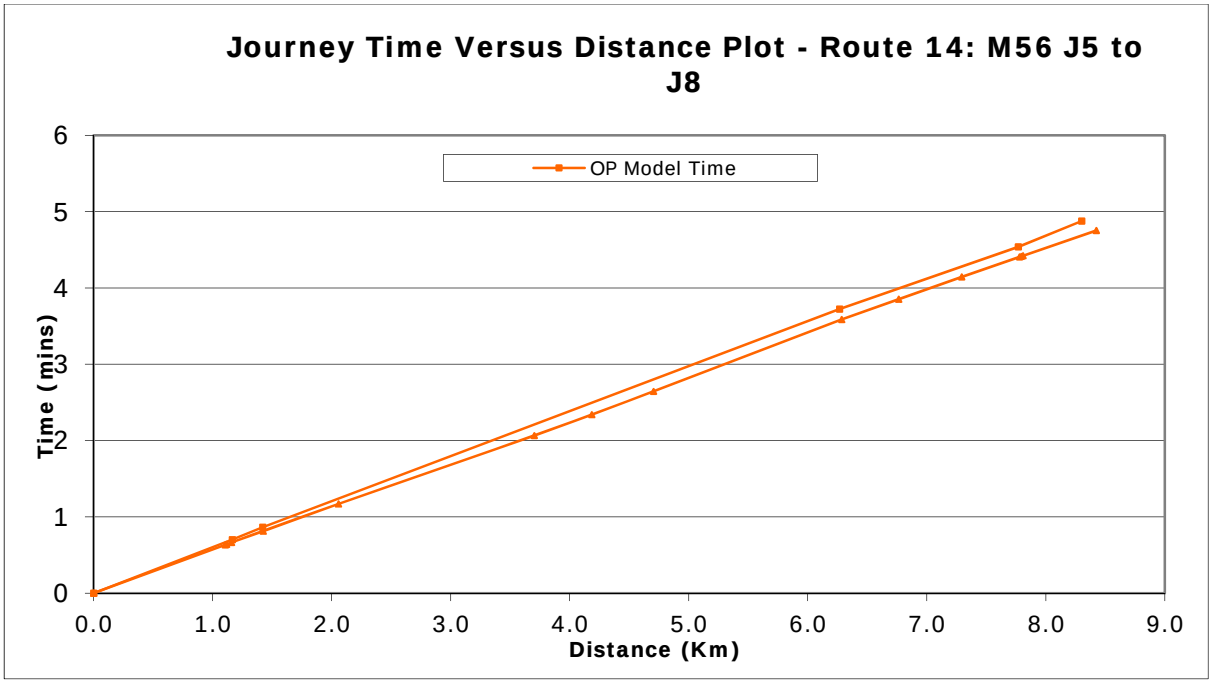

Journey Time Versus Distance Plot - Route 12: B5166 Northenden to Wilmslow
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0
12.0

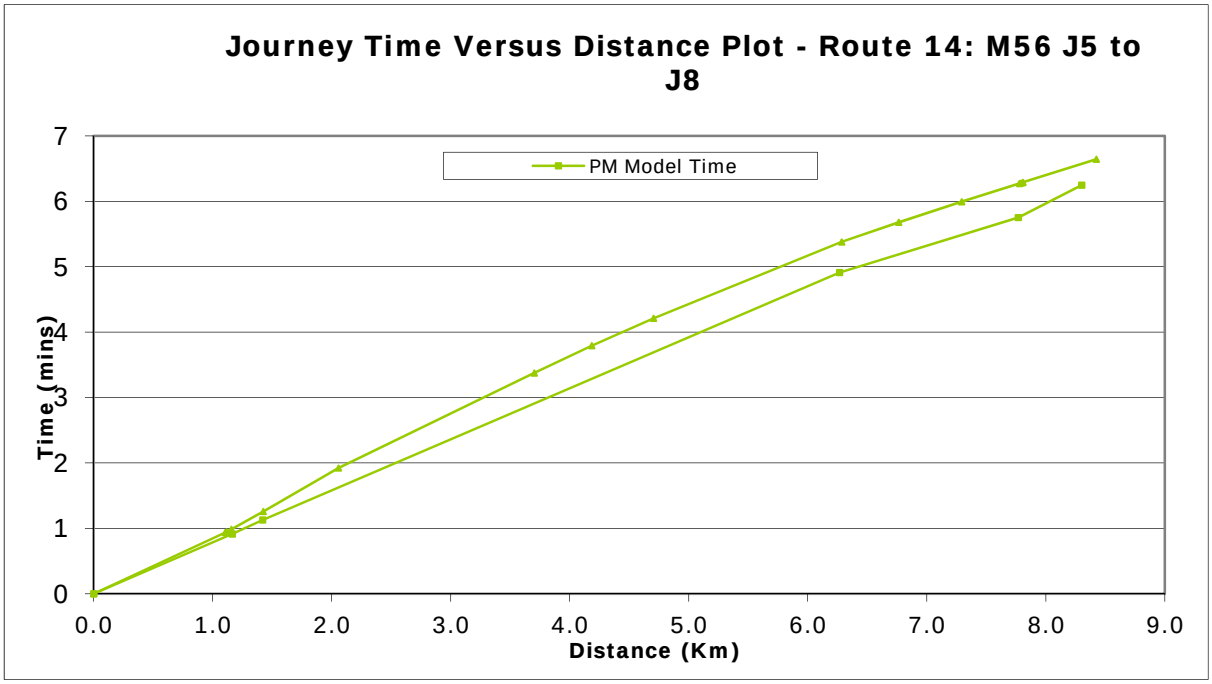

Journey Time Versus Distance Plot - Route 13: M56 J8 to J5
AM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

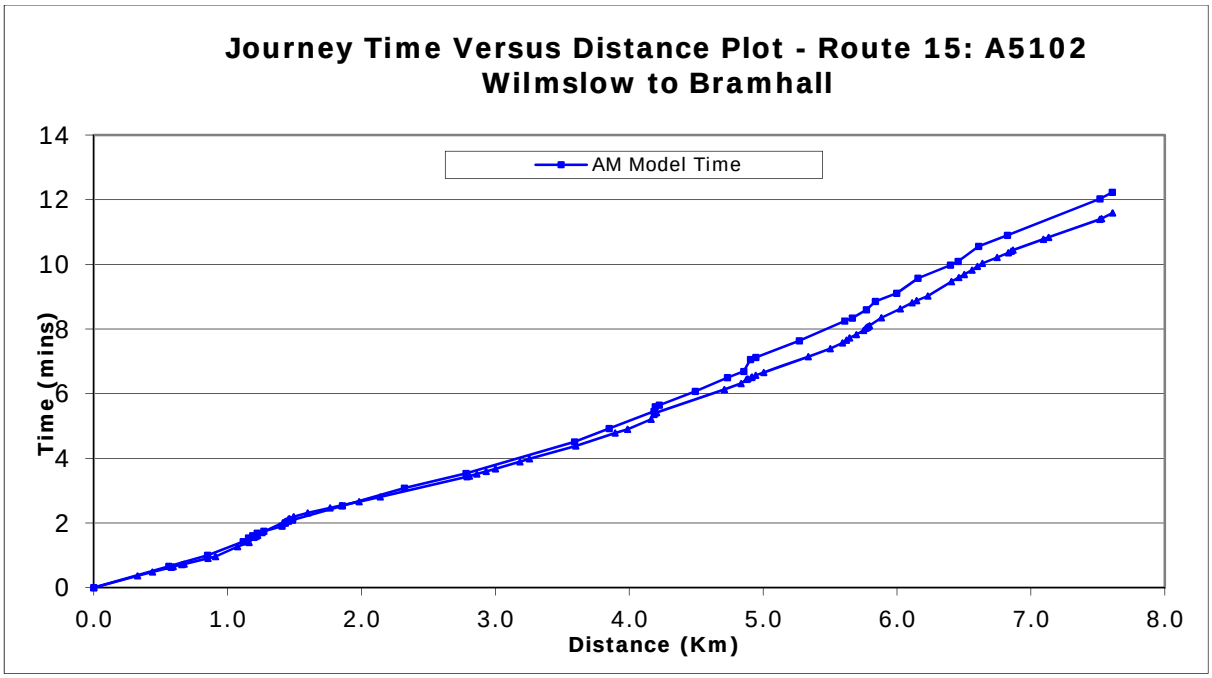

Journey Time Versus Distance Plot - Route 13: M56 J8 to J5
OP Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

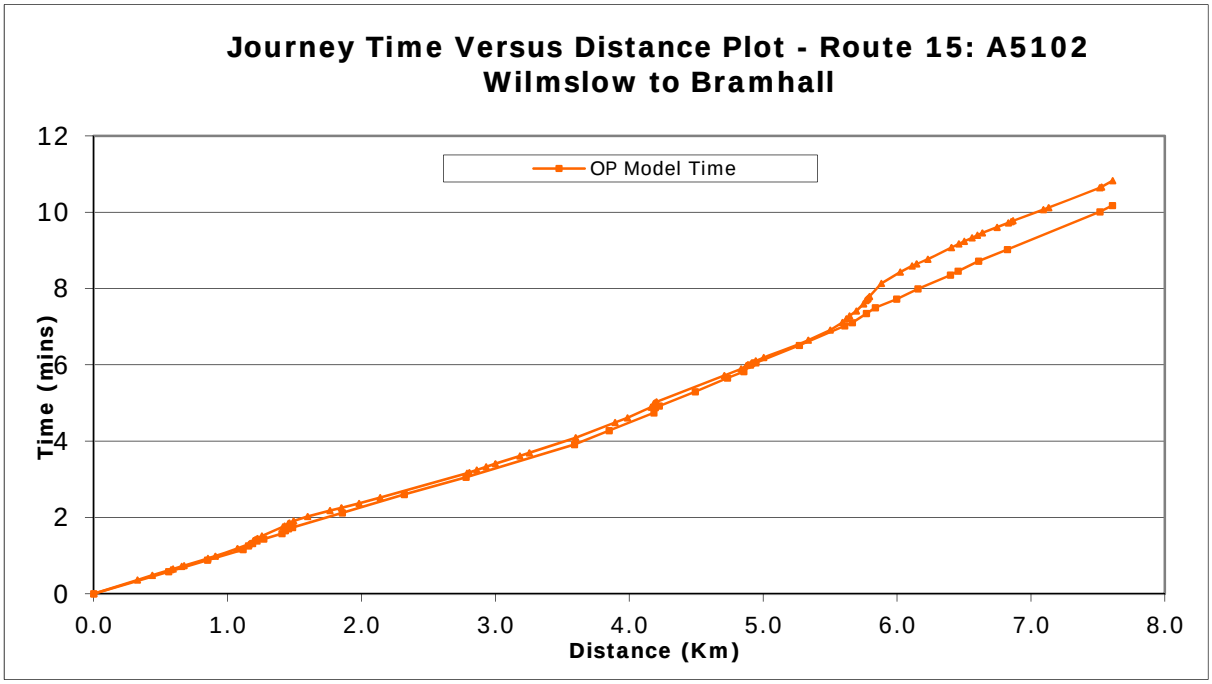

Journey Time Versus Distance Plot - Route 13: M56 J8 to J5
PM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

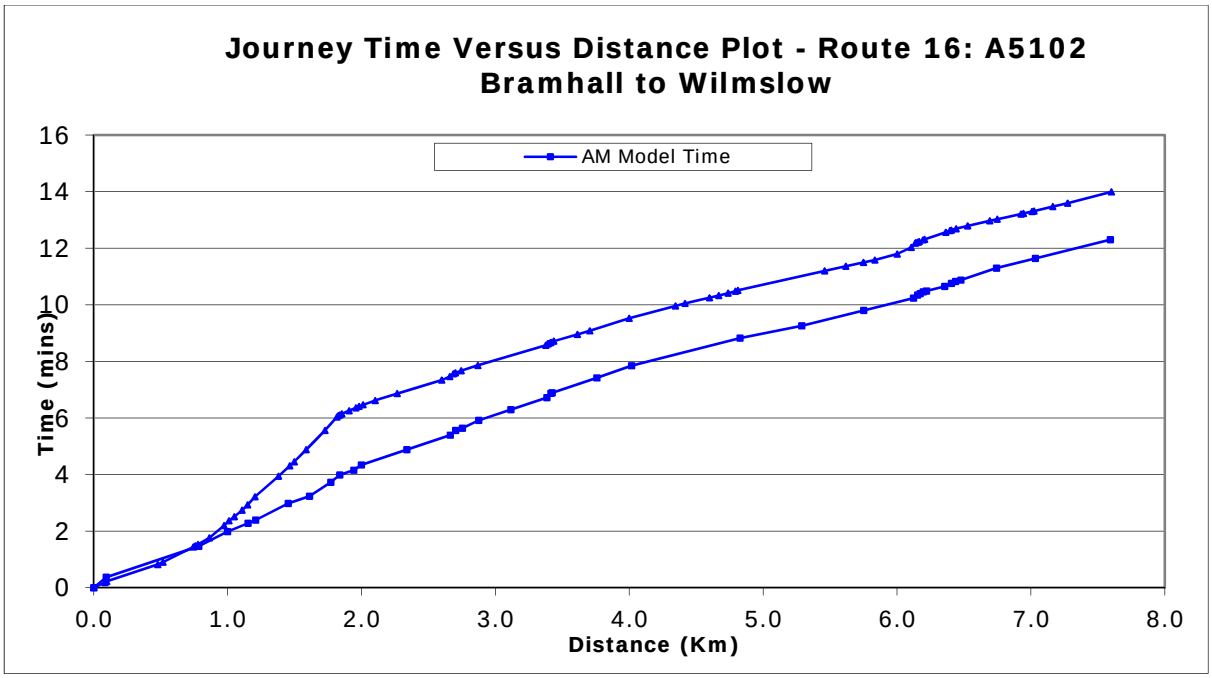

Journey Time Versus Distance Plot - Route 14: M56 J5 to J8
AM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

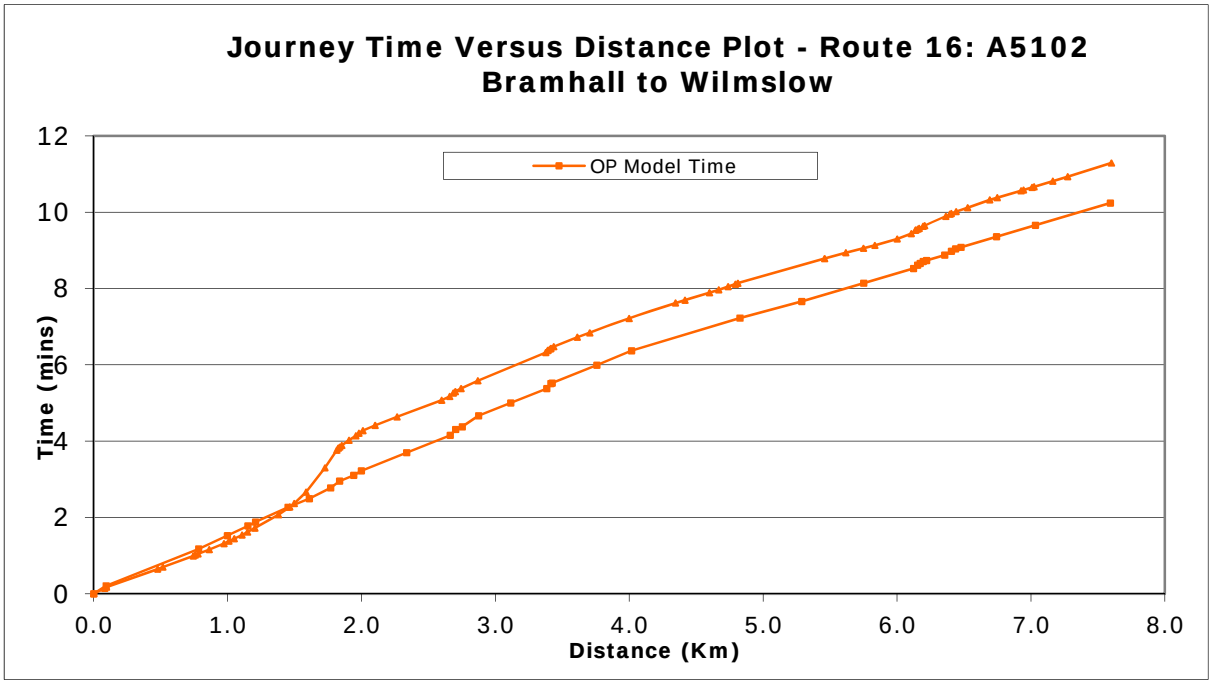

Journey Time Versus Distance Plot - Route 14: M56 J5 to J8
OP Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

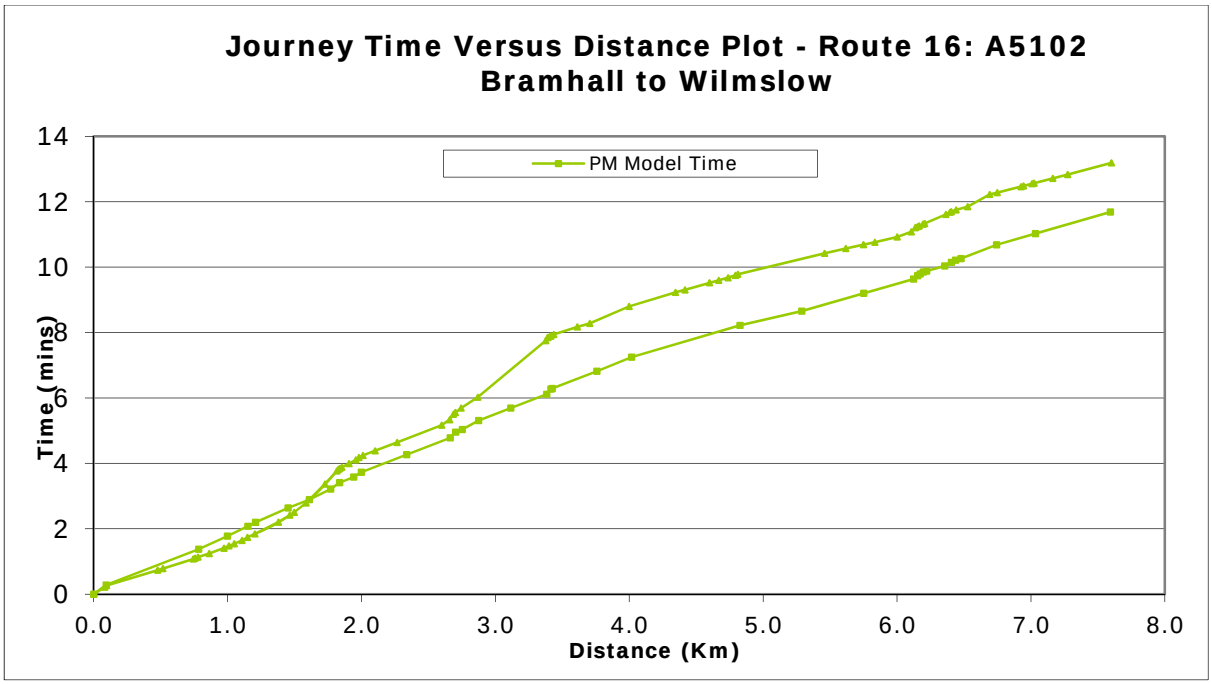

Journey Time Versus Distance Plot - Route 14: M56 J5 to J8
PM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0


Journey Time Versus Distance Plot - Route 15: A5102 Wilmslow to Bramhall
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

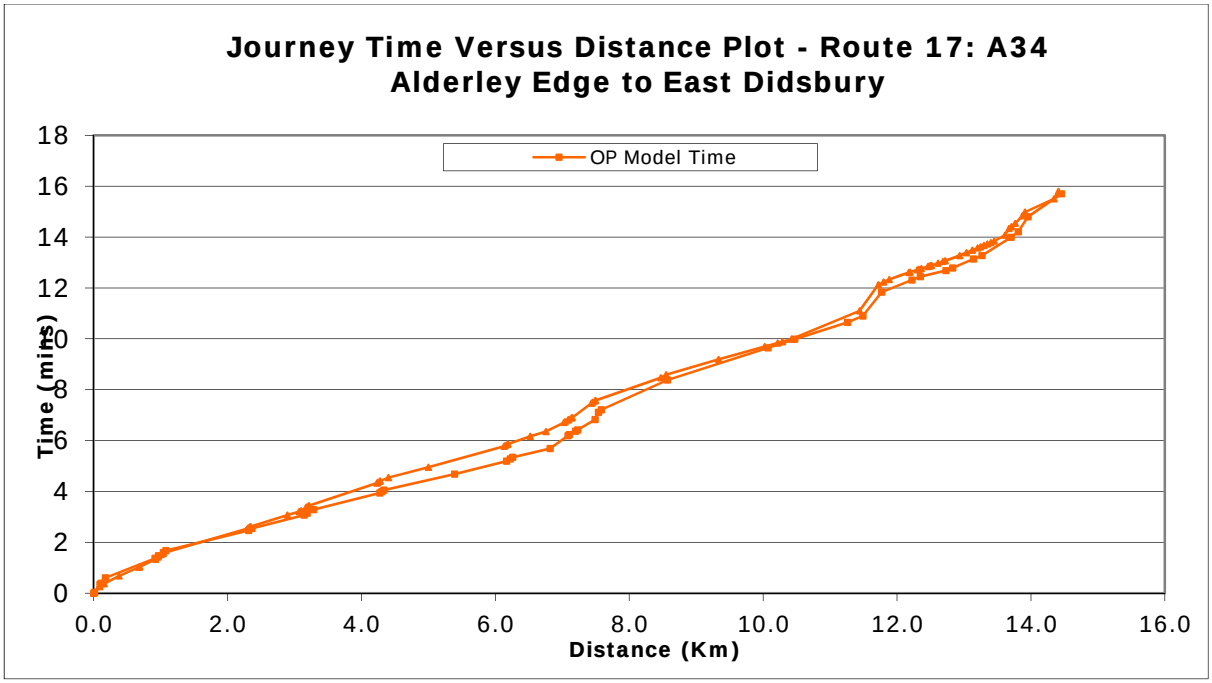

Journey Time Versus Distance Plot - Route 15: A5102 Wilmslow to Bramhall
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

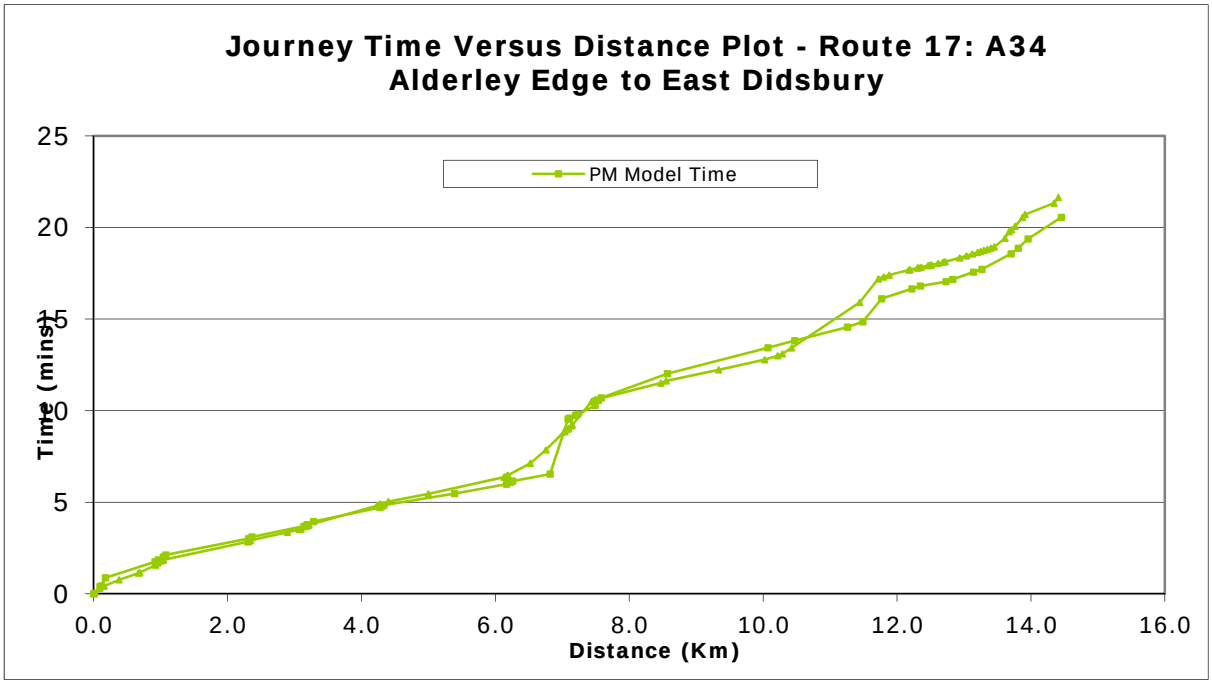

Journey Time Versus Distance Plot - Route 16: A5102 Bramhall to Wilmslow
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

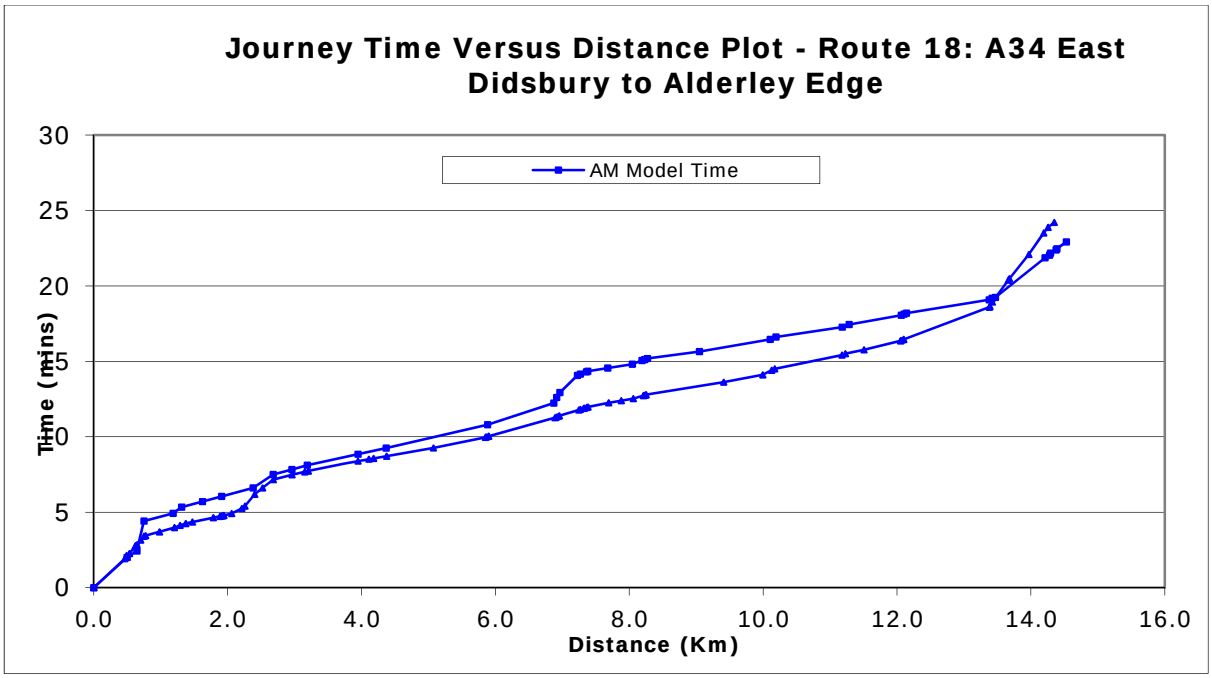

Journey Time Versus Distance Plot - Route 16: A5102
Bramhall to Wilmslow
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

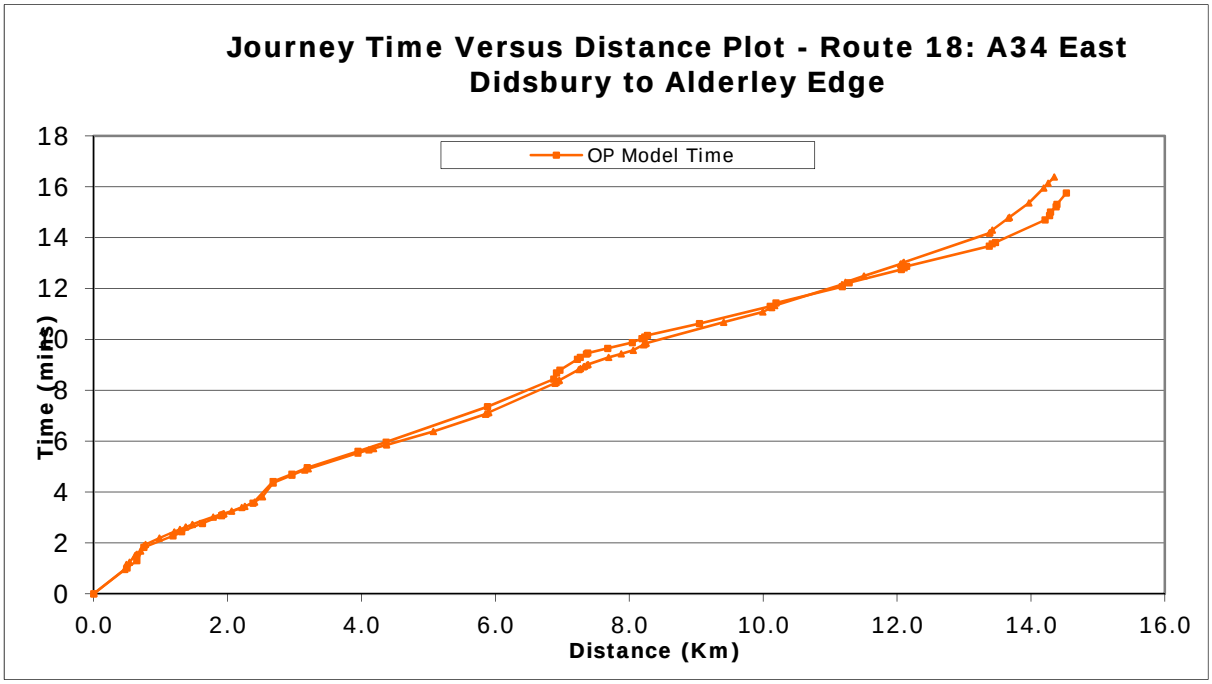

Journey Time Versus Distance Plot - Route 16: A5102
Bramhall to Wilmslow
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

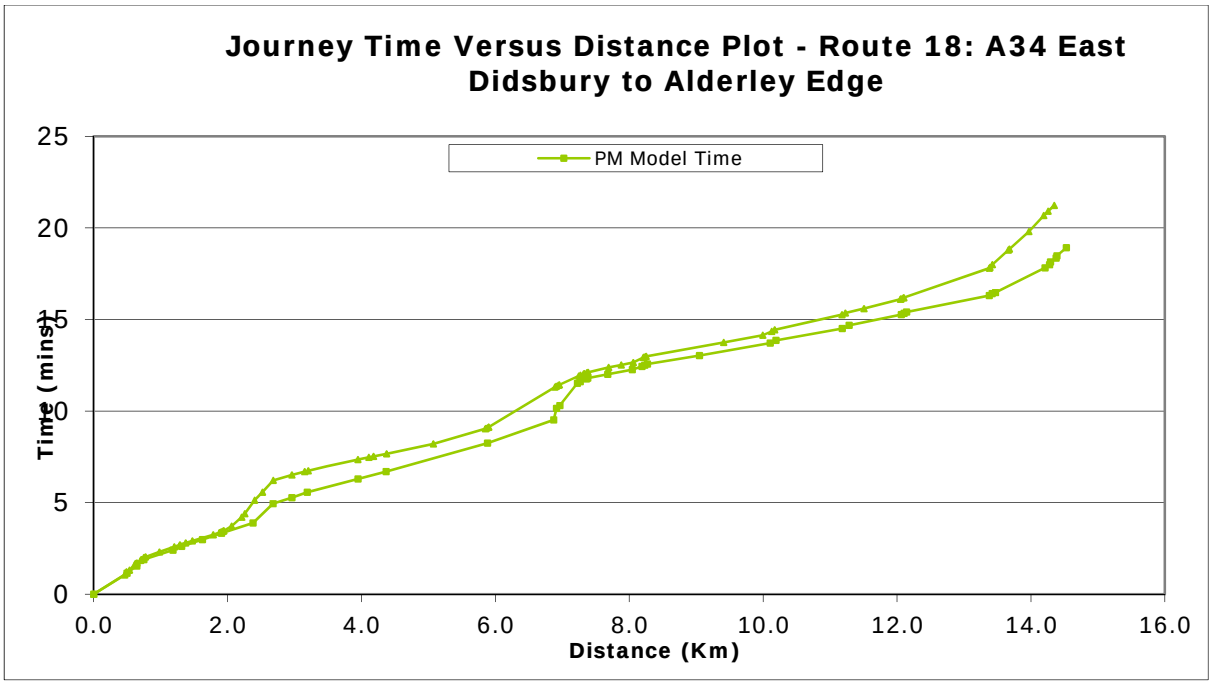

Journey Time Versus Distance Plot - Route 17: A34
Alderley Edge to East Didsbury
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0

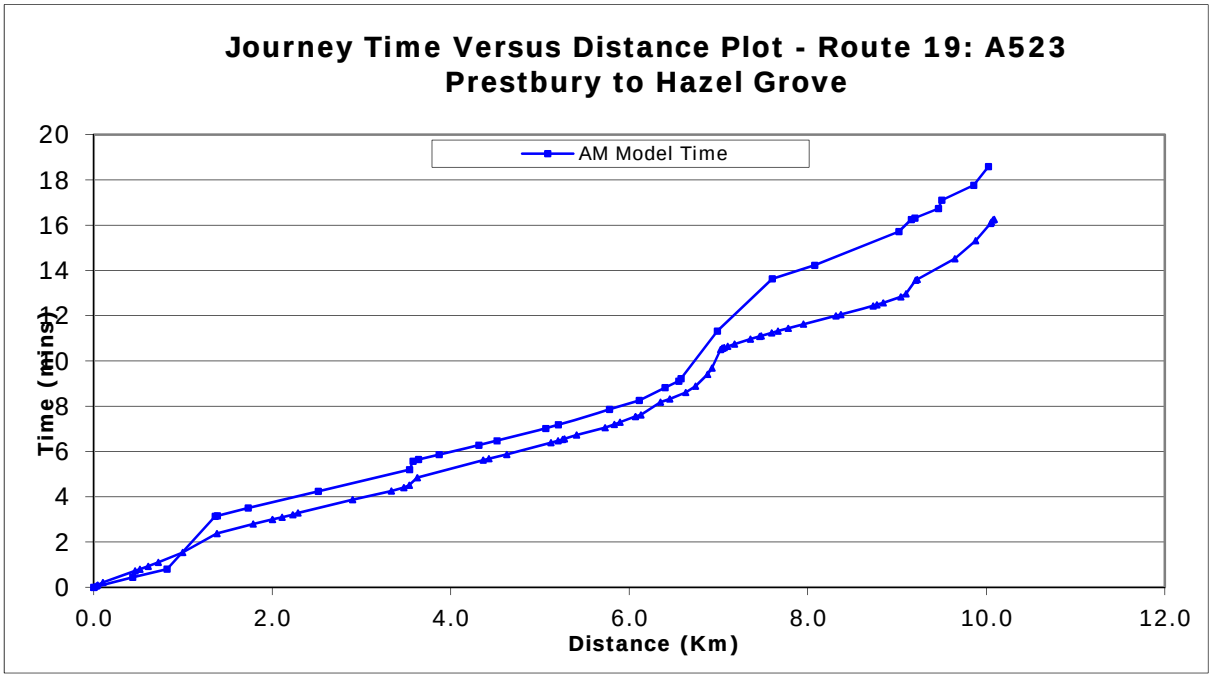

Journey Time Versus Distance Plot - Route 17: A34
Alderley Edge to East Didsbury
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0

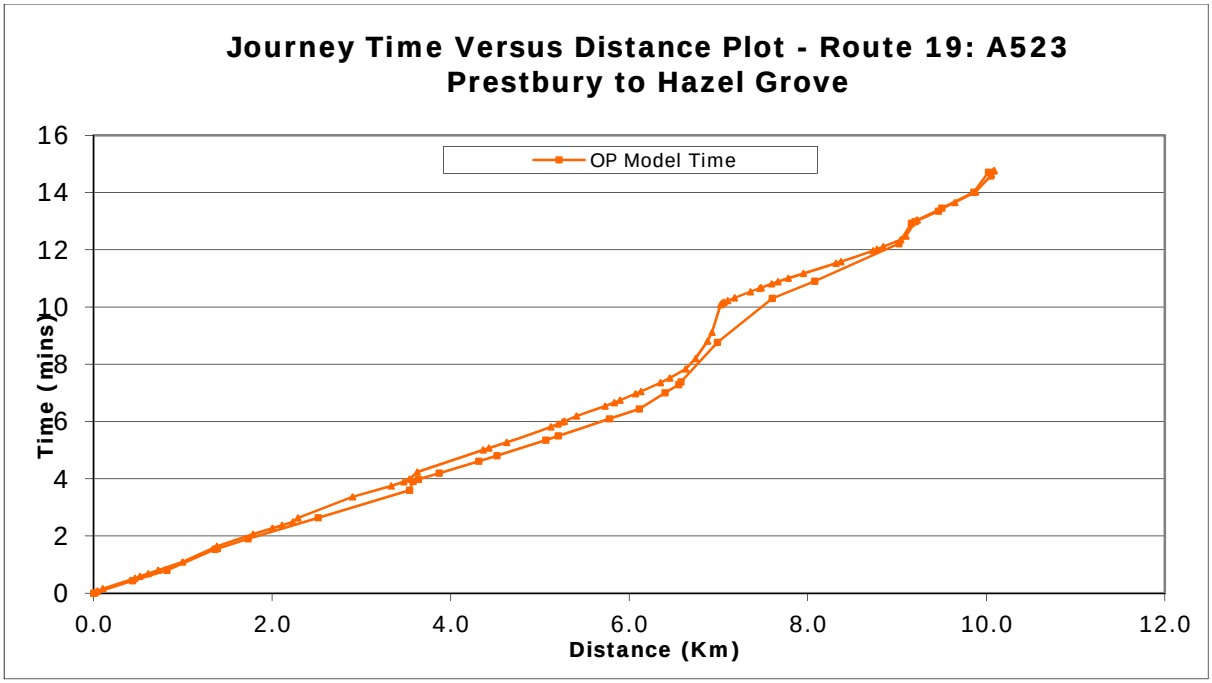

Journey Time Versus Distance Plot - Route 17: A34 Alderley Edge to East Didsbury
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0

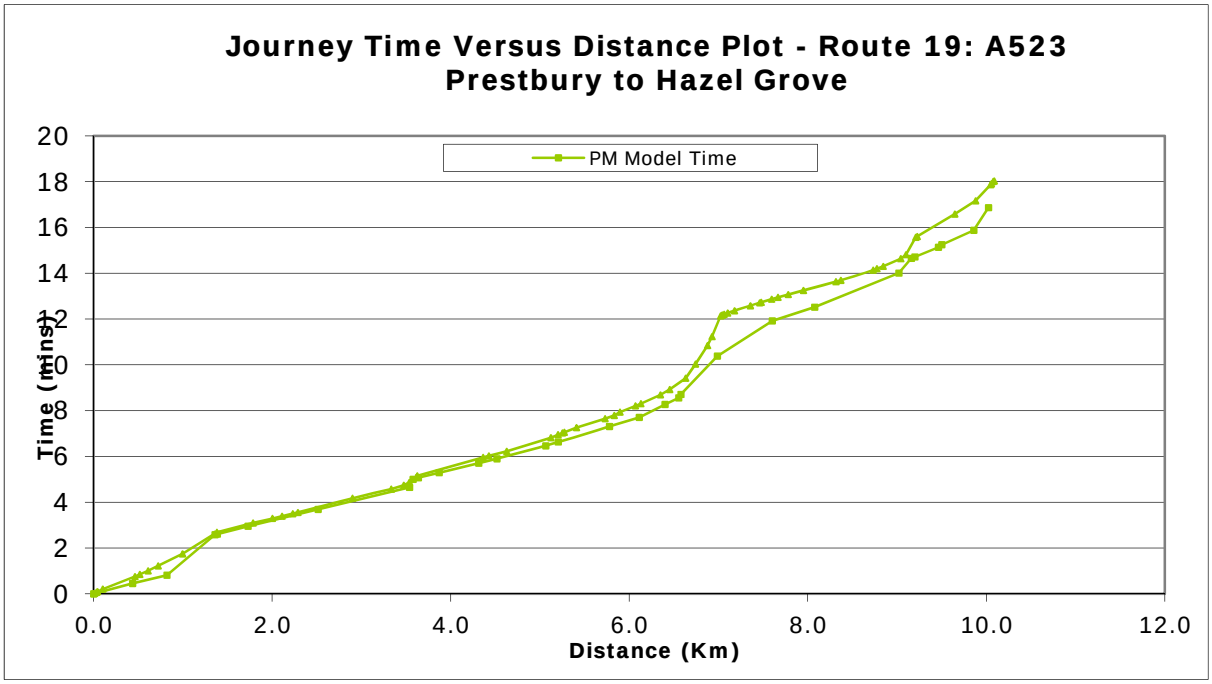

Journey Time Versus Distance Plot - Route 18: A34 East Didsbury to Alderley Edge
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0

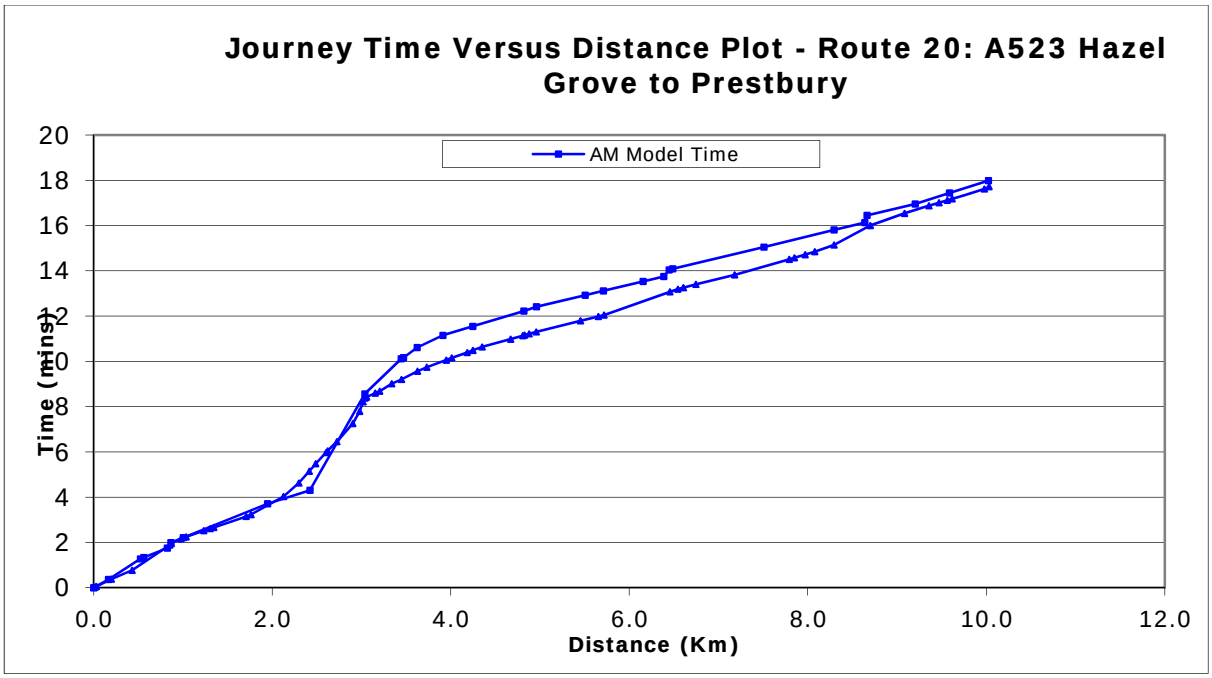

Journey Time Versus Distance Plot - Route 18: A34 East Didsbury to Alderley Edge
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0

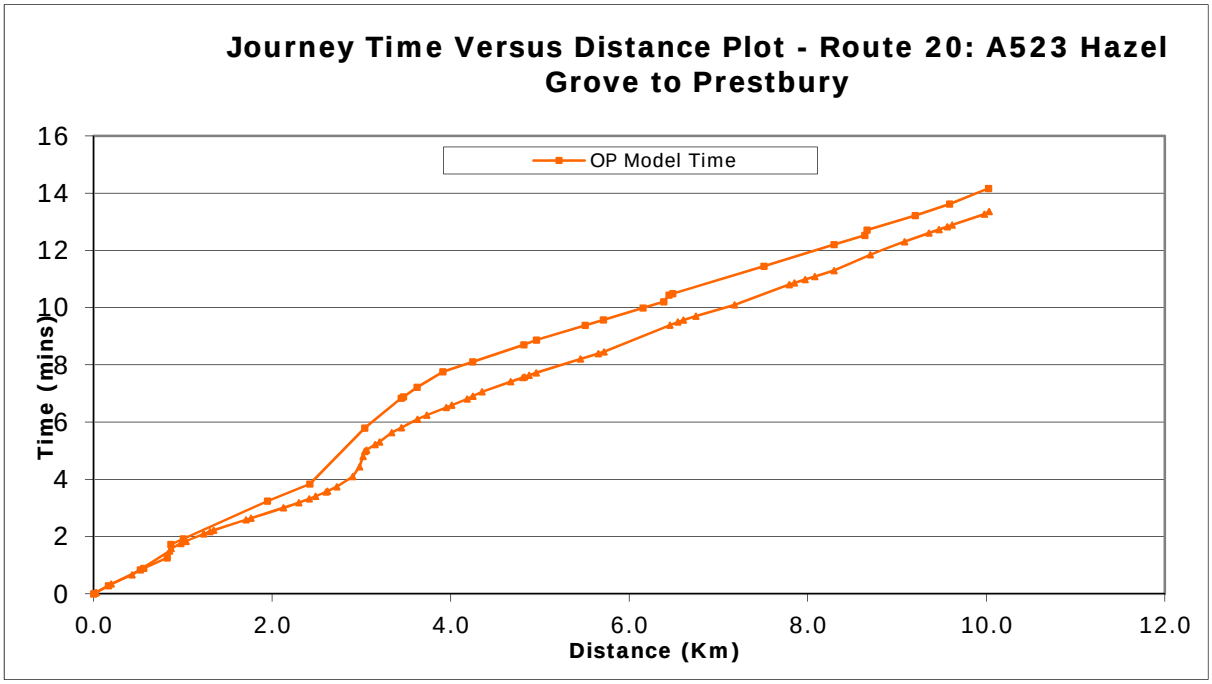

Journey Time Versus Distance Plot - Route 18: A34 East Didsbury to Alderley Edge
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0

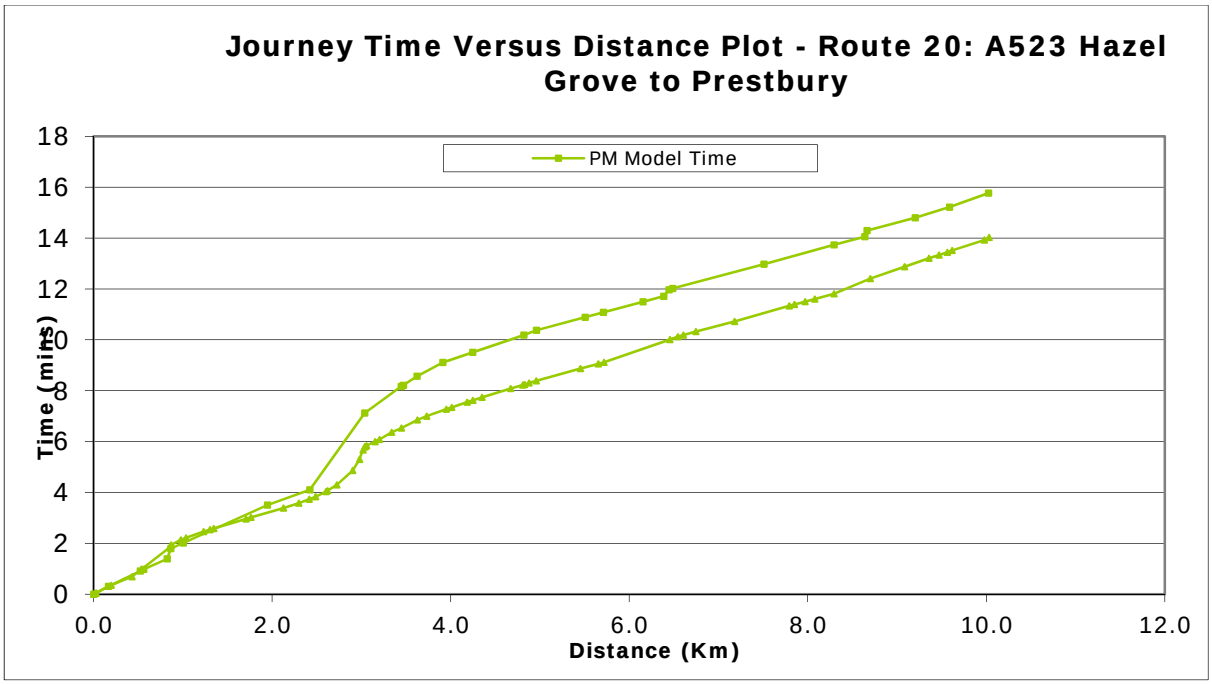

Journey Time Versus Distance Plot - Route 19: A523
Prestbury to Hazel Grove
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
20
0.0
2.0
4.0
6.0
8.0
10.0
12.0

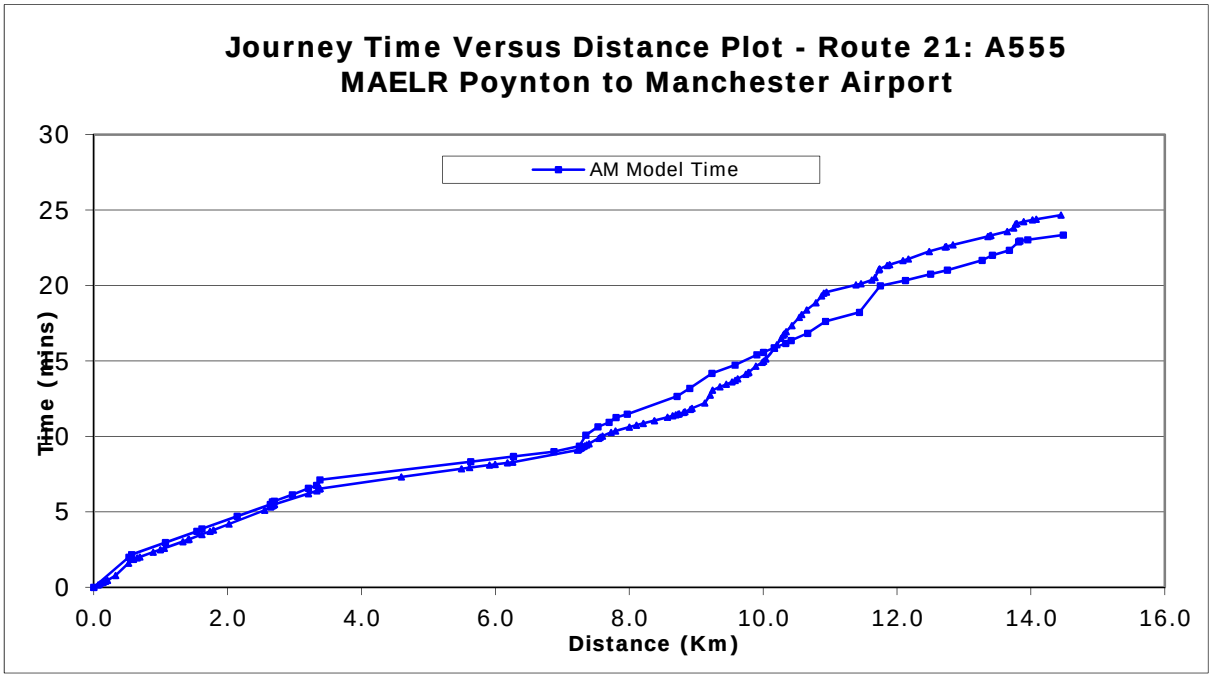

Journey Time Versus Distance Plot - Route 19: A523
Prestbury to Hazel Grove
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0

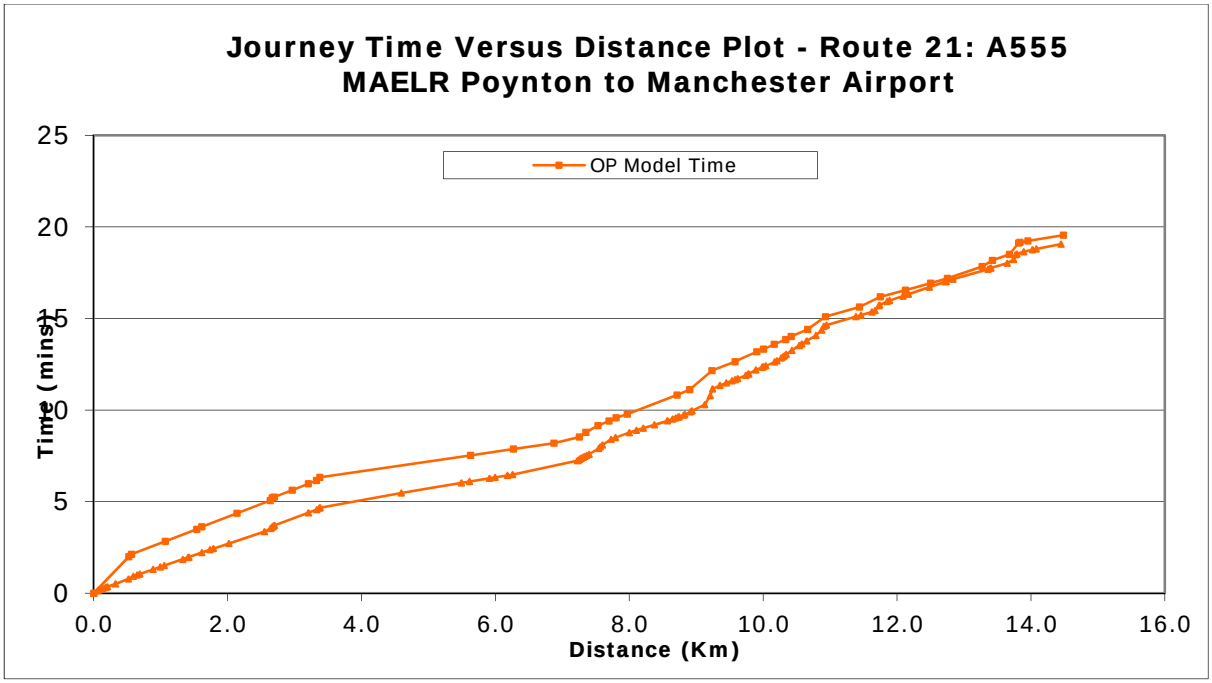

Journey Time Versus Distance Plot - Route 19: A523 Prestbury to Hazel Grove
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
20
0.0
2.0
4.0
6.0
8.0
10.0
12.0

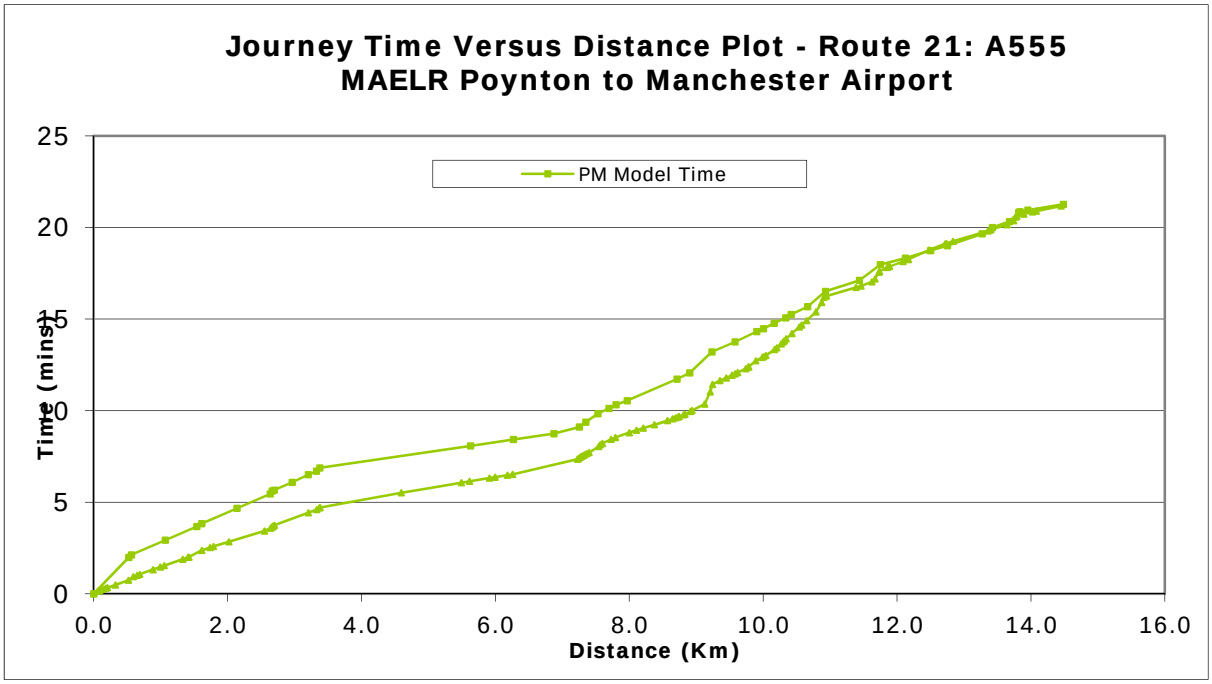

Journey Time Versus Distance Plot - Route 20: A523 Hazel Grove to Prestbury
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
20
0.0
2.0
4.0
6.0
8.0
10.0
12.0

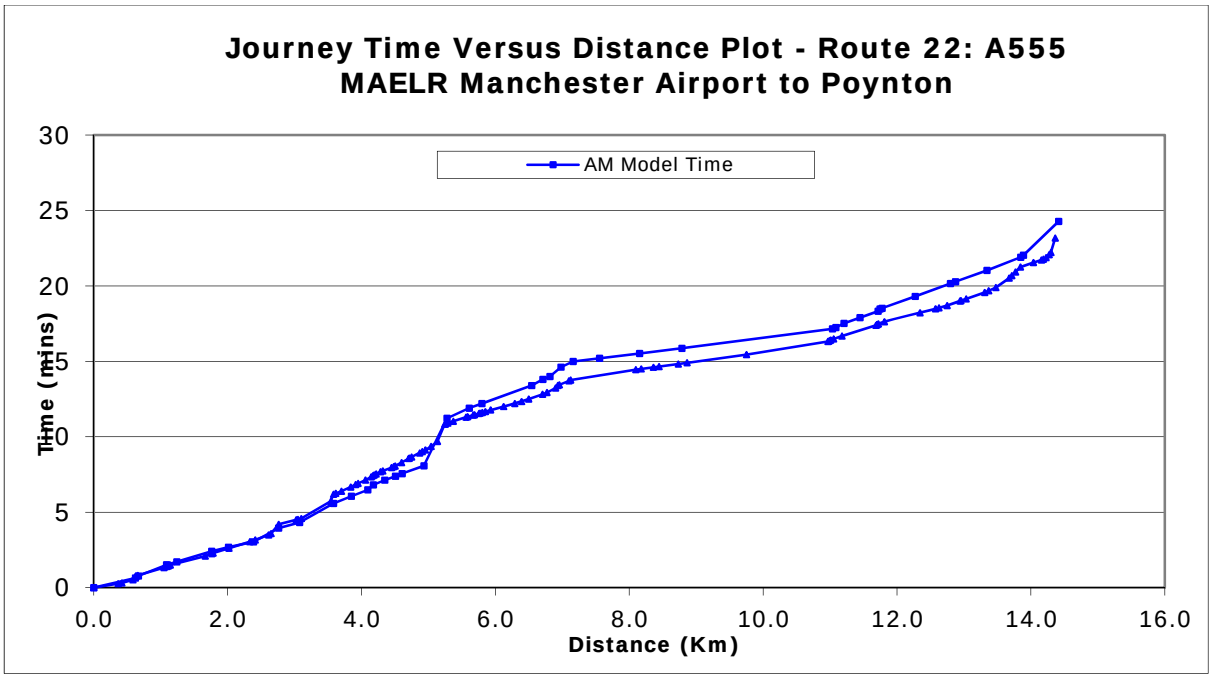

Journey Time Versus Distance Plot - Route 20: A523 Hazel Grove to Prestbury
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0

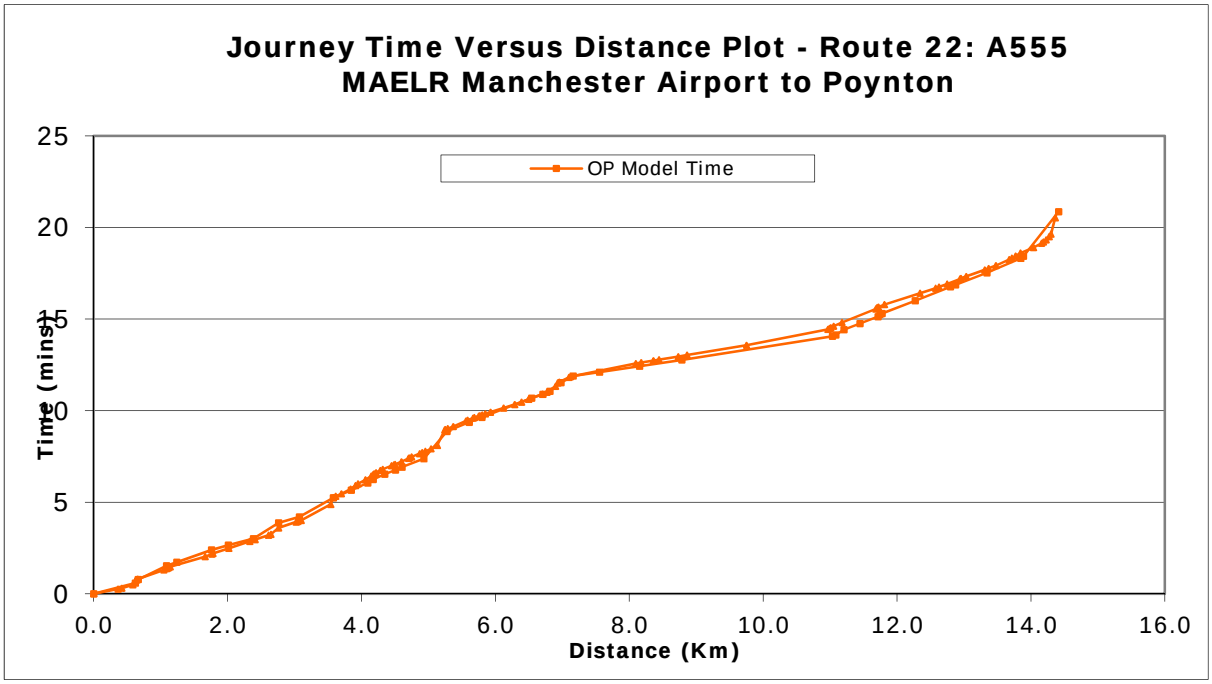

Journey Time Versus Distance Plot - Route 20: A523 Hazel Grove to Prestbury
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0
12.0

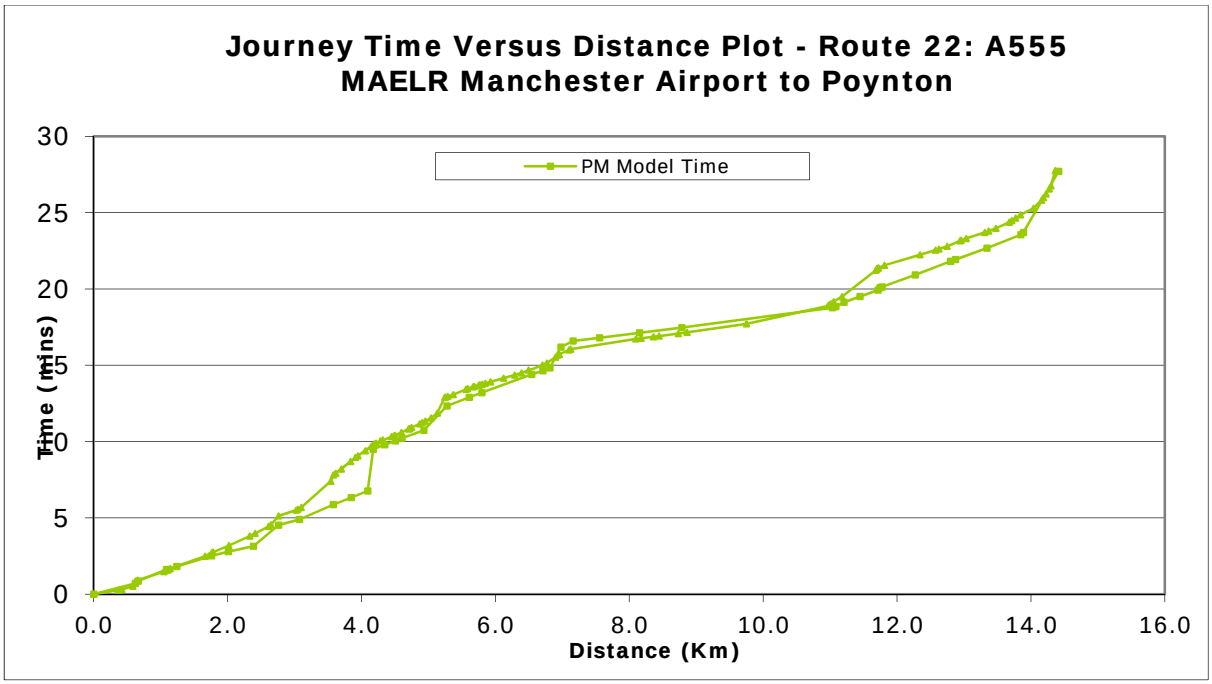

Journey Time Versus Distance Plot - Route 21: A555
MAELR Poynton to Manchester Airport
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0


Journey Time Versus Distance Plot - Route 21: A555
MAELR Poynton to Manchester Airport
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0


Journey Time Versus Distance Plot - Route 21: A555
MAELR Poynton to Manchester Airport
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0


Journey Time Versus Distance Plot - Route 22: A555
MAELR Manchester Airport to Poynton
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0


Journey Time Versus Distance Plot - Route 22: A555
MAELR Manchester Airport to Poynton
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0


Journey Time Versus Distance Plot - Route 22: A555
MAELR Manchester Airport to Poynton
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
0.0
2.0
4.0
6.0
8.0
10.0
12.0
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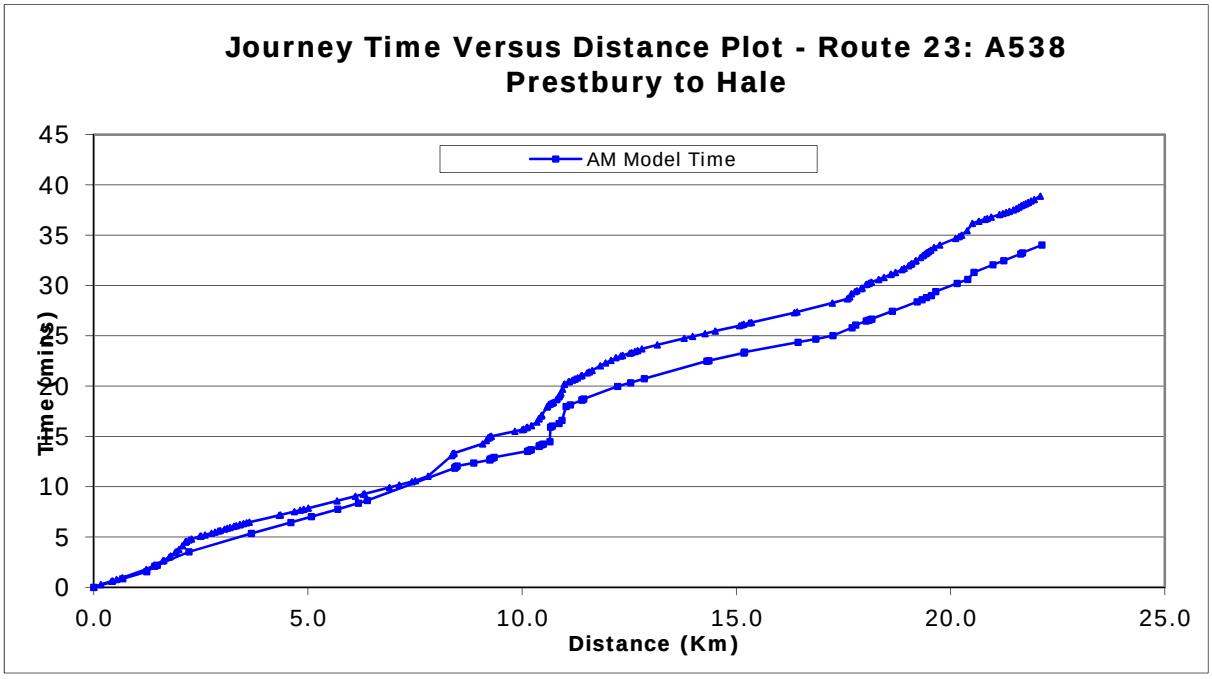
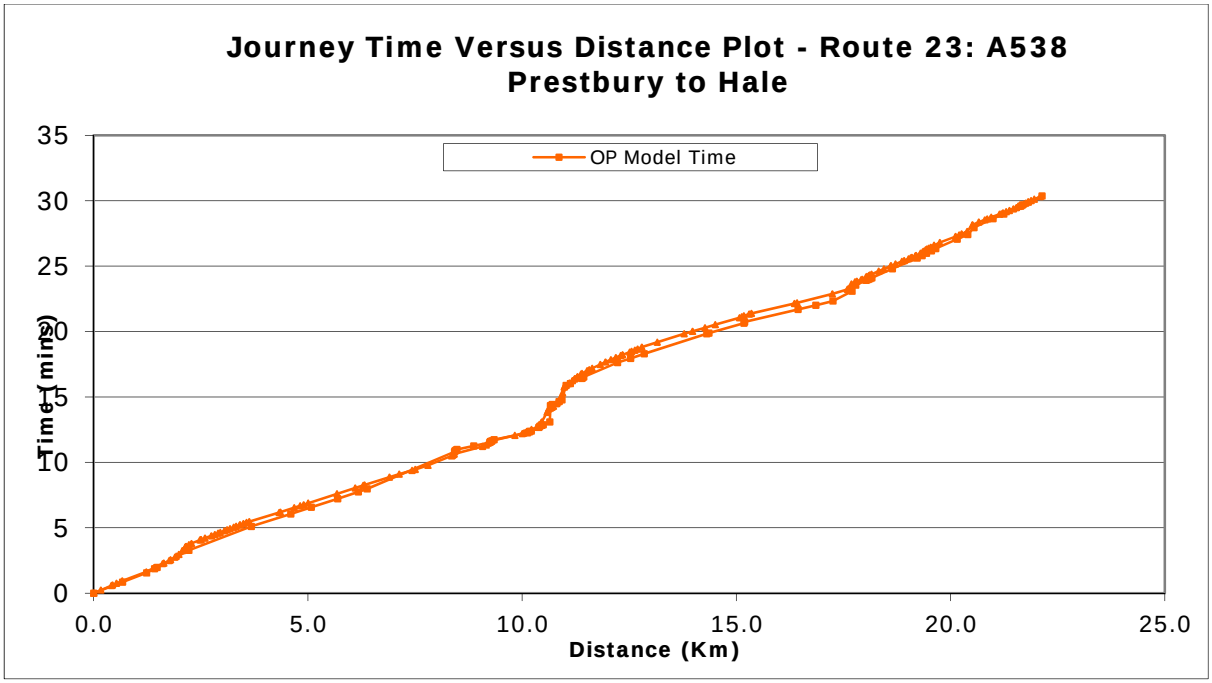
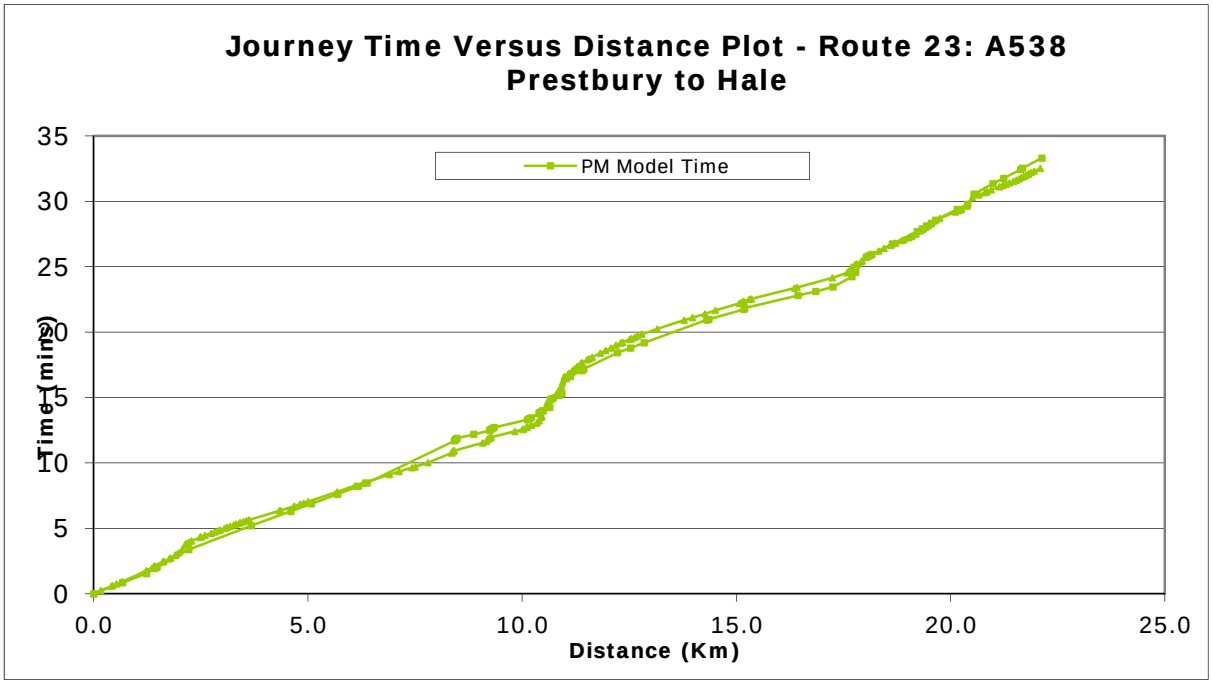
16.0


Journey Time Versus Distance Plot - Route 23: A538
Prestbury to Hale
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
40
45
0.0
5.0
10.0
15.0
20.0
25.0


Journey Time Versus Distance Plot - Route 23: A538
Prestbury to Hale
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
0.0
5.0
10.0
15.0
20.0
25.0


Journey Time Versus Distance Plot - Route 23: A538 Prestbury to Hale
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
0.0
5.0
10.0
15.0
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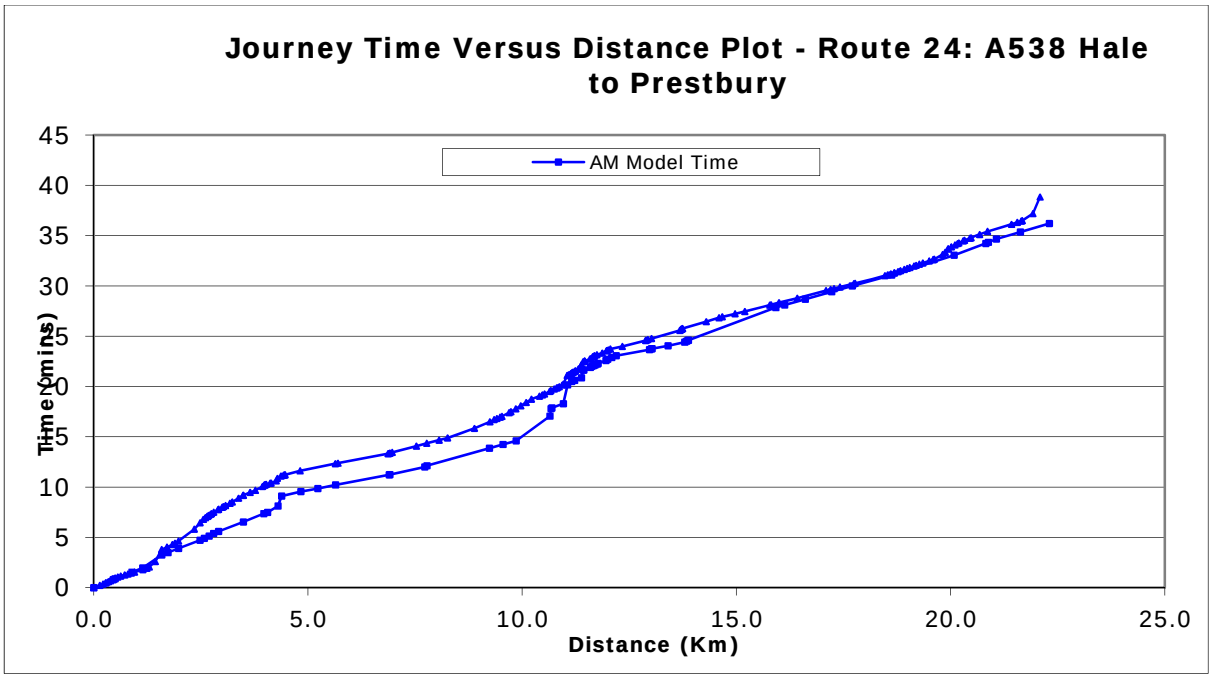
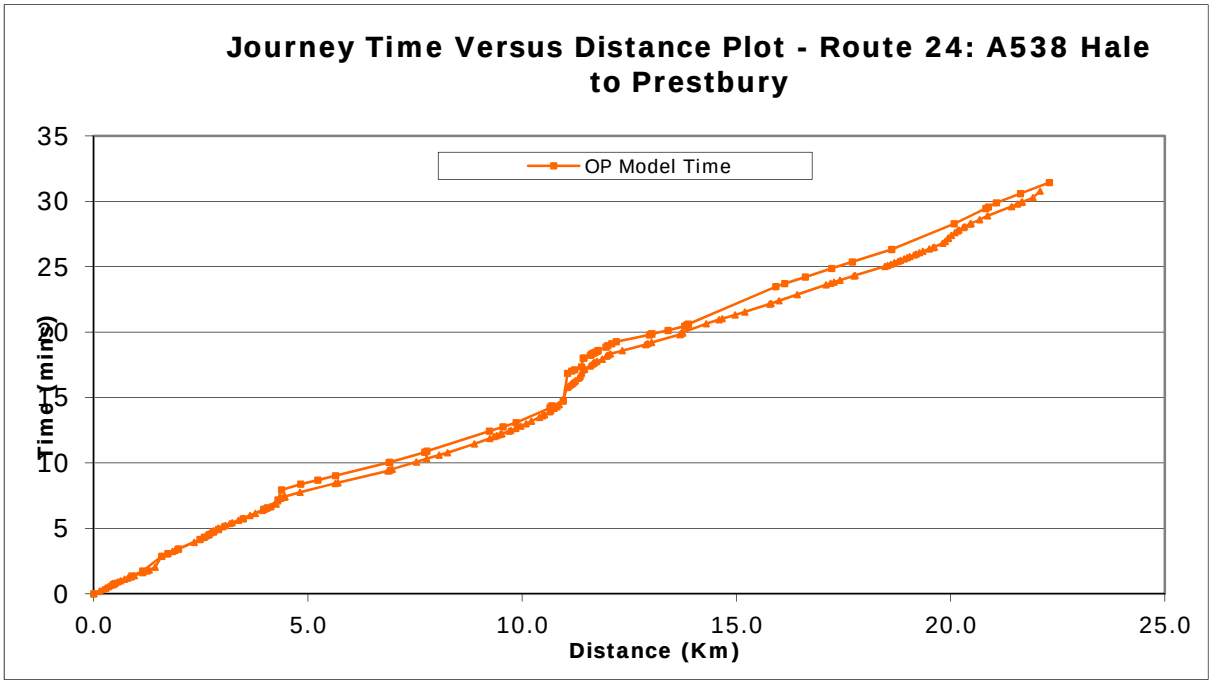
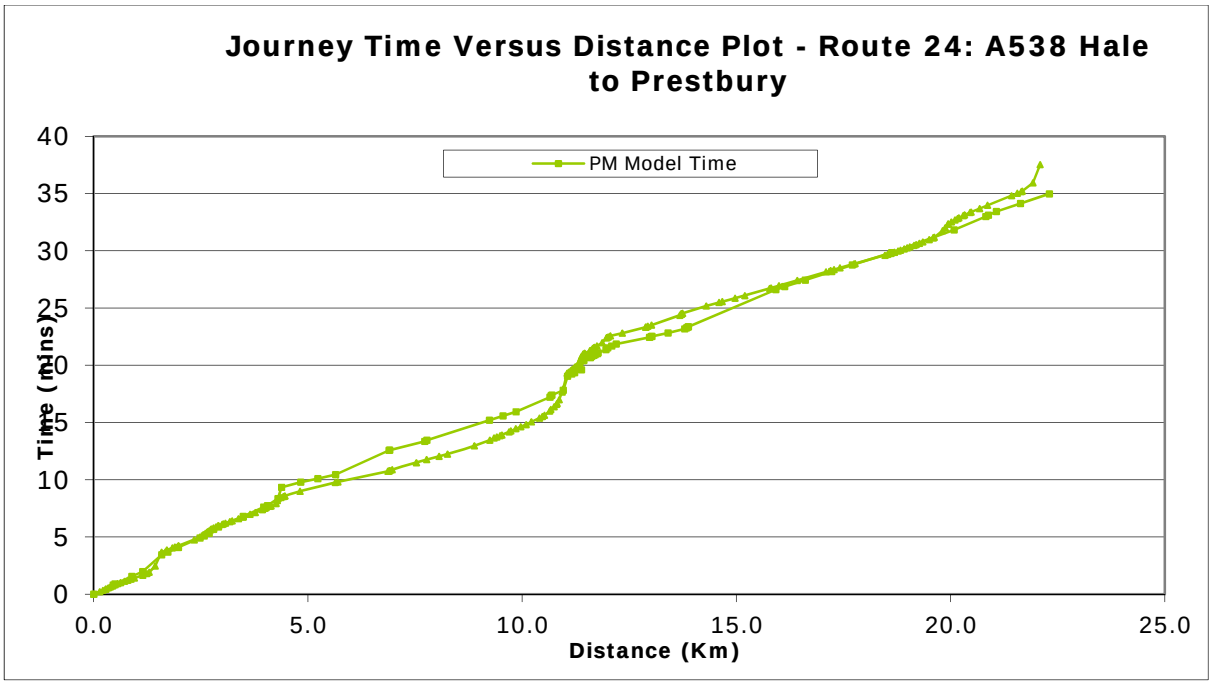
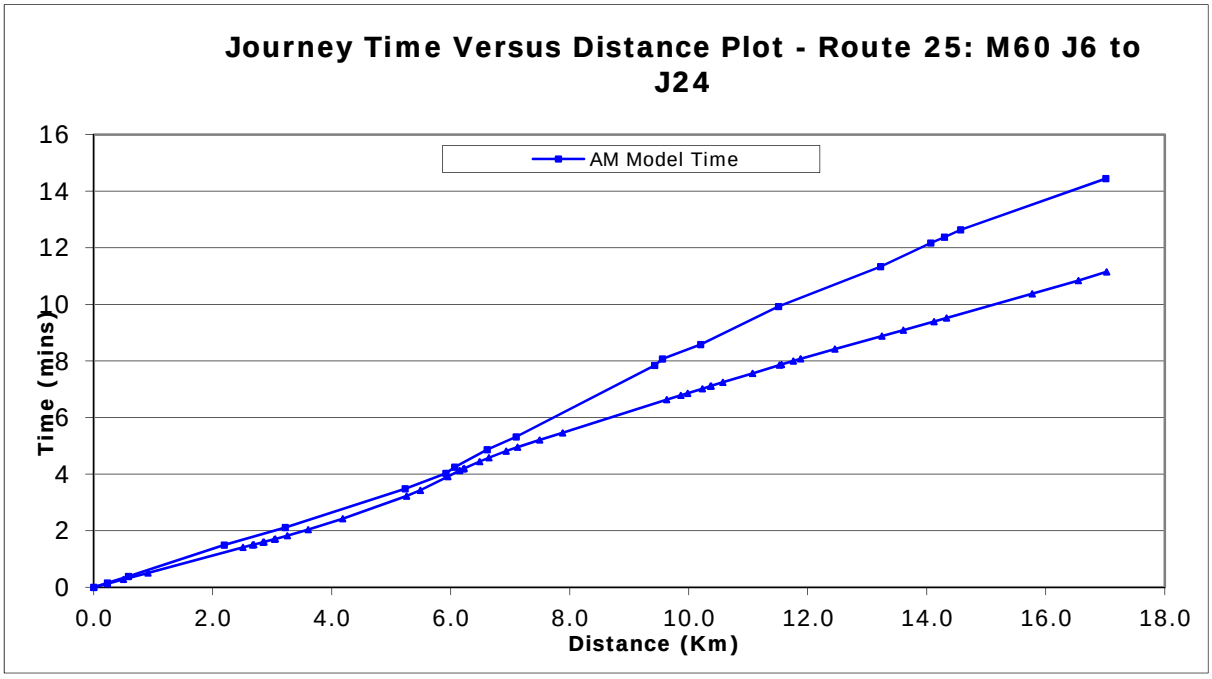
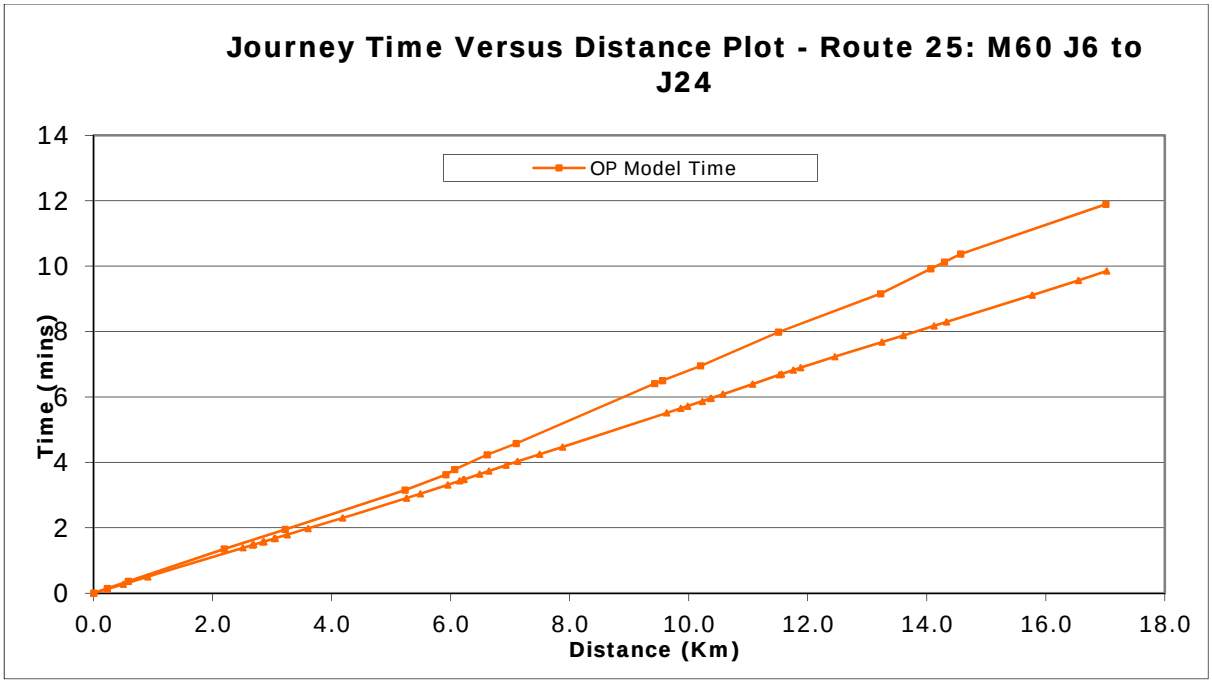
25.0

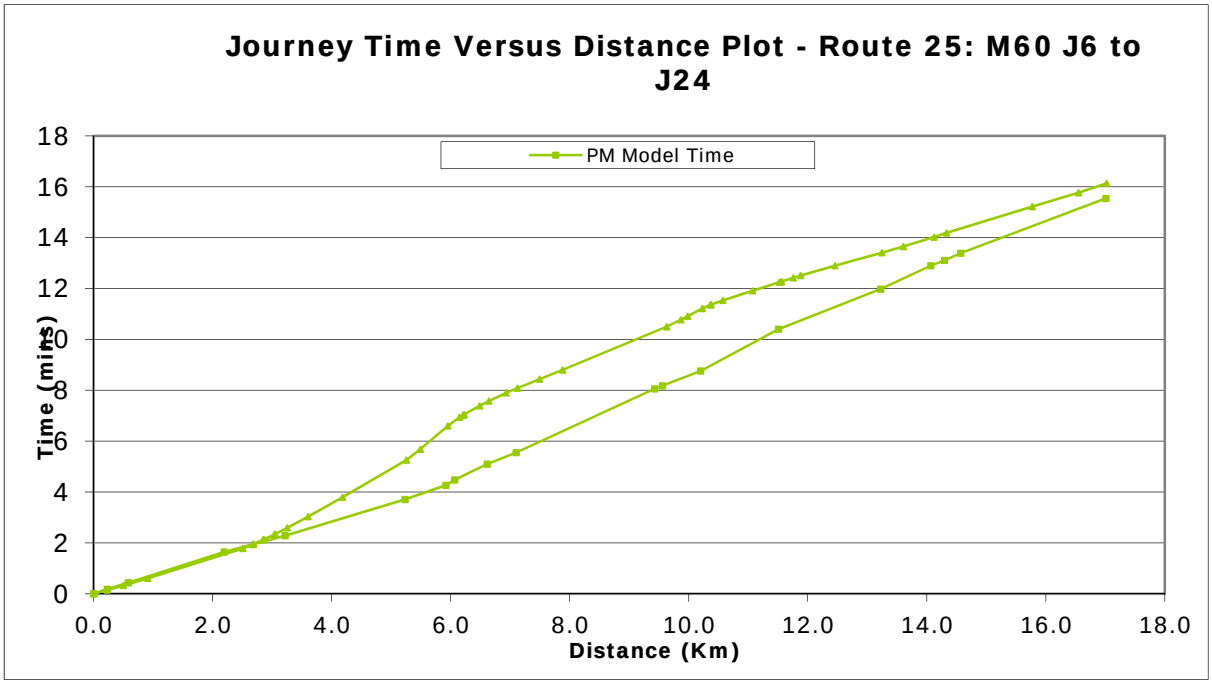

Journey Time Versus Distance Plot - Route 24: A538 Hale to Prestbury
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
40
45
0.0
5.0
10.0
15.0
20.0
25.0

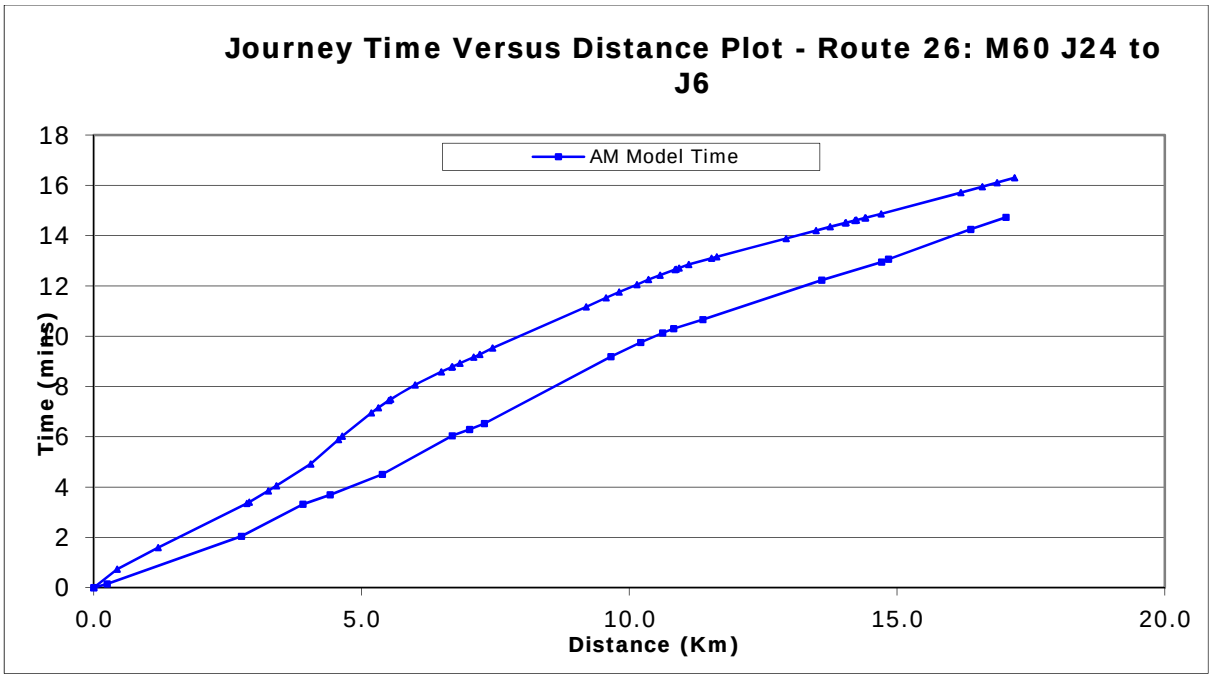

Journey Time Versus Distance Plot - Route 24: A538 Hale to Prestbury
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
0.0
5.0
10.0
15.0
20.0
25.0

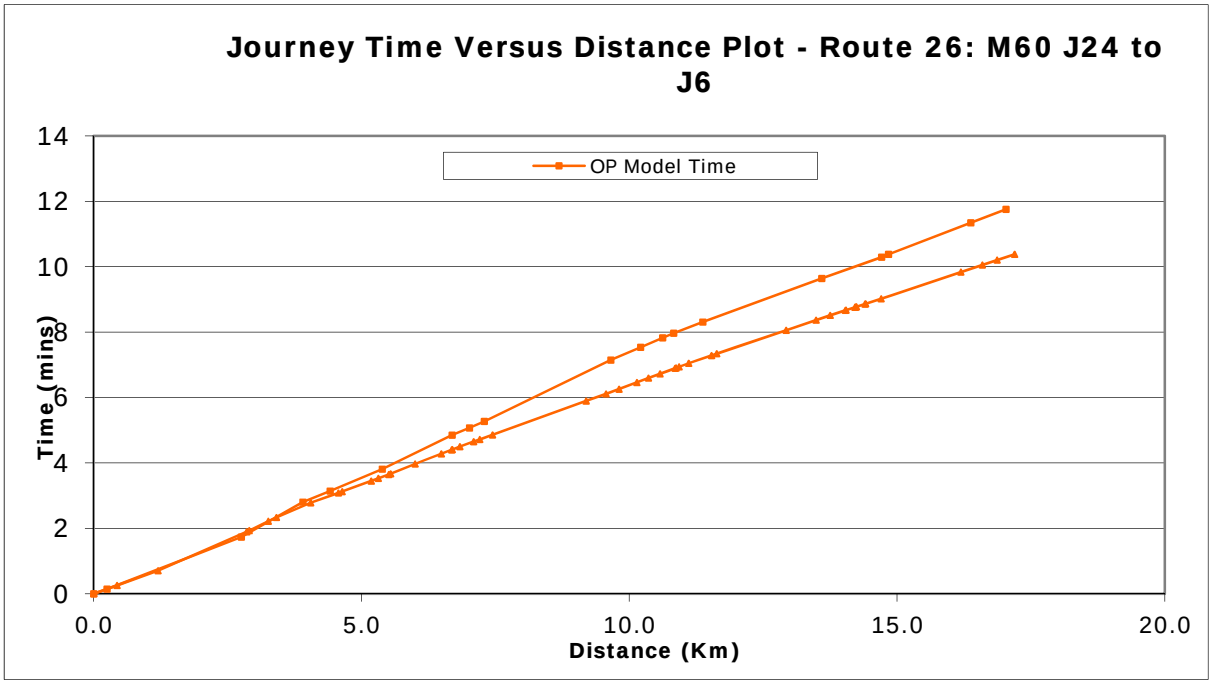

Journey Time Versus Distance Plot - Route 24: A538 Hale to Prestbury
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
30
35
40
0.0
5.0
10.0
15.0
20.0
25.0

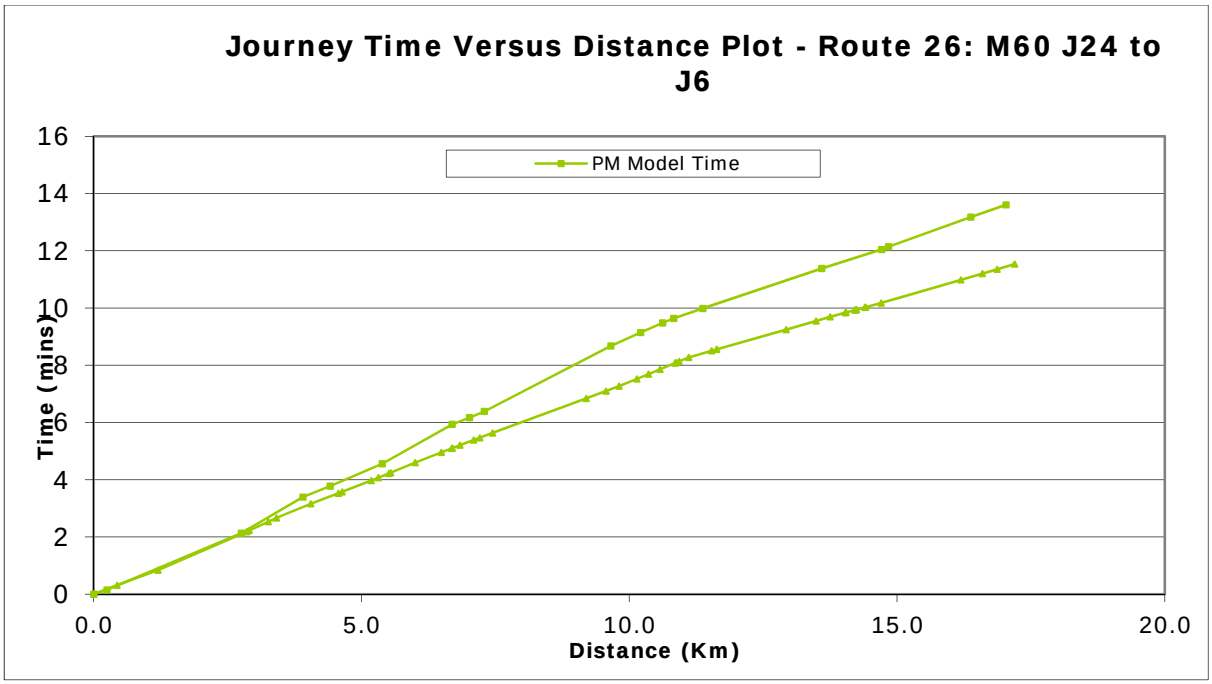

Journey Time Versus Distance Plot - Route 25: M60 J6 to J24
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

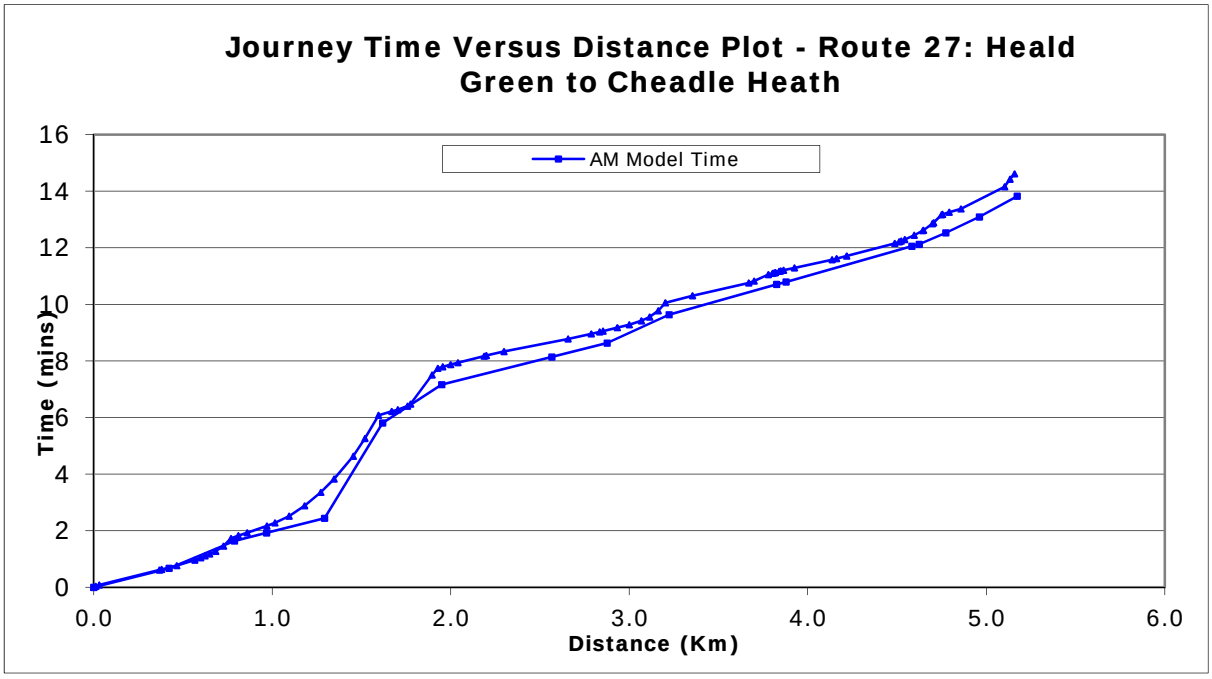

Journey Time Versus Distance Plot - Route 25: M60 J6 to J24
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

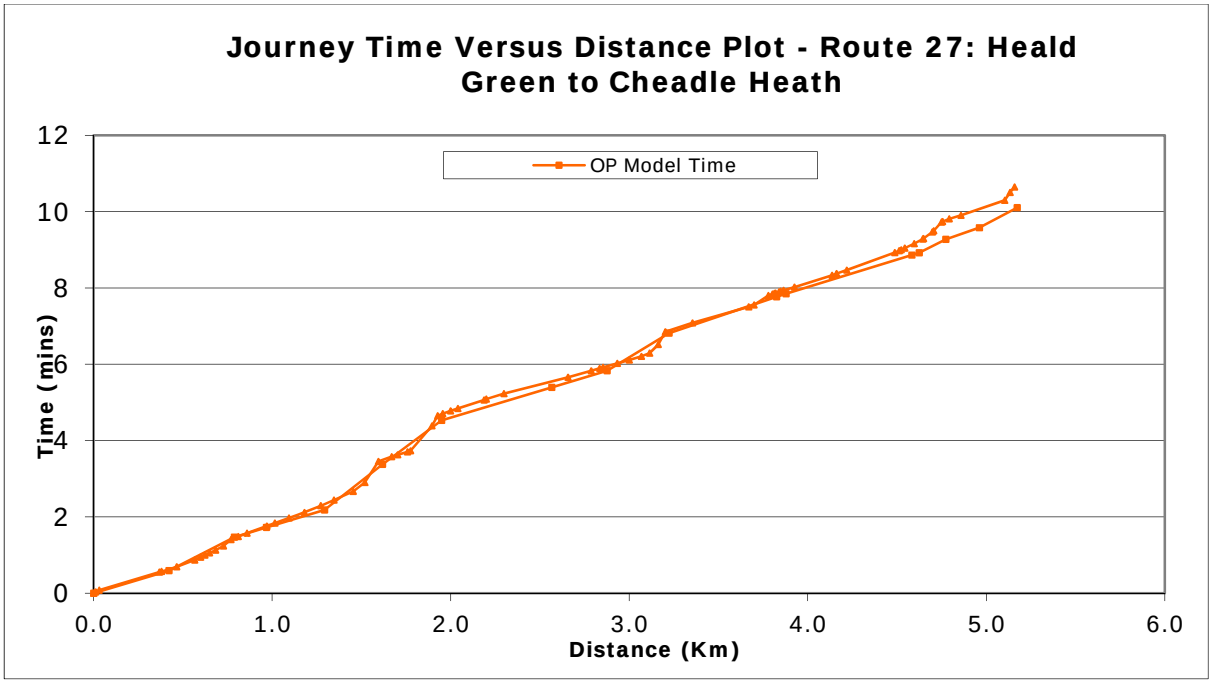

Journey Time Versus Distance Plot - Route 25: M60 J6 to J24
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

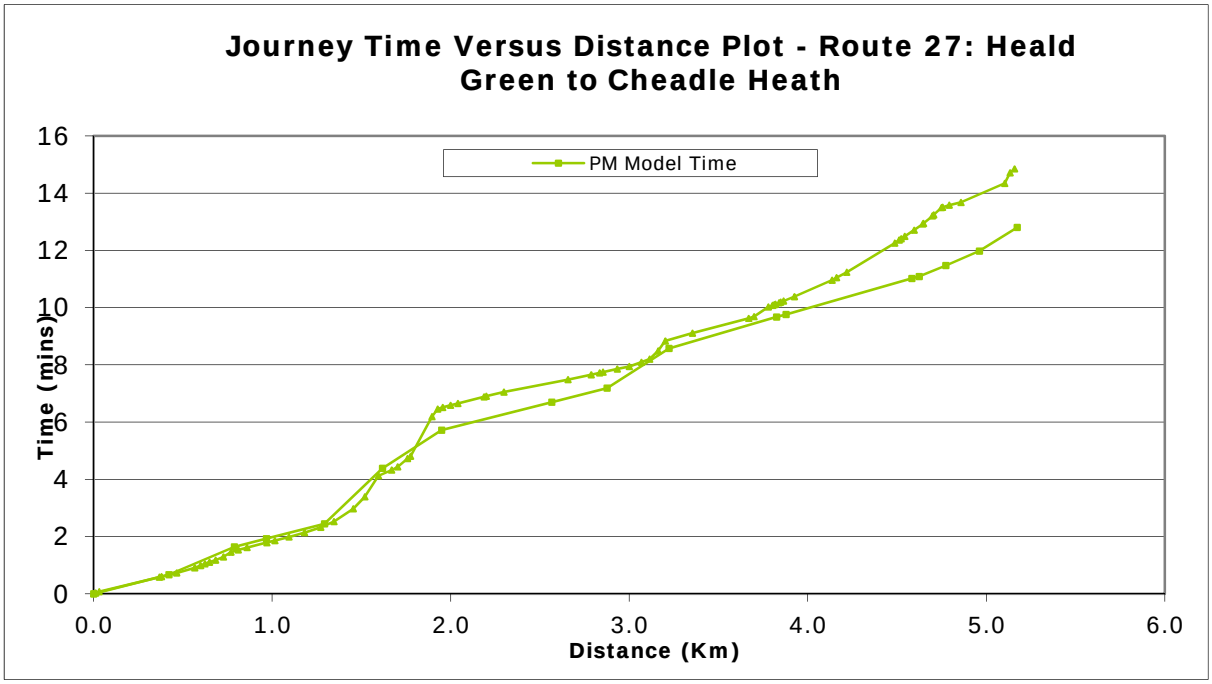

Journey Time Versus Distance Plot - Route 26: M60 J24 to J6
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
5.0
10.0
15.0
20.0

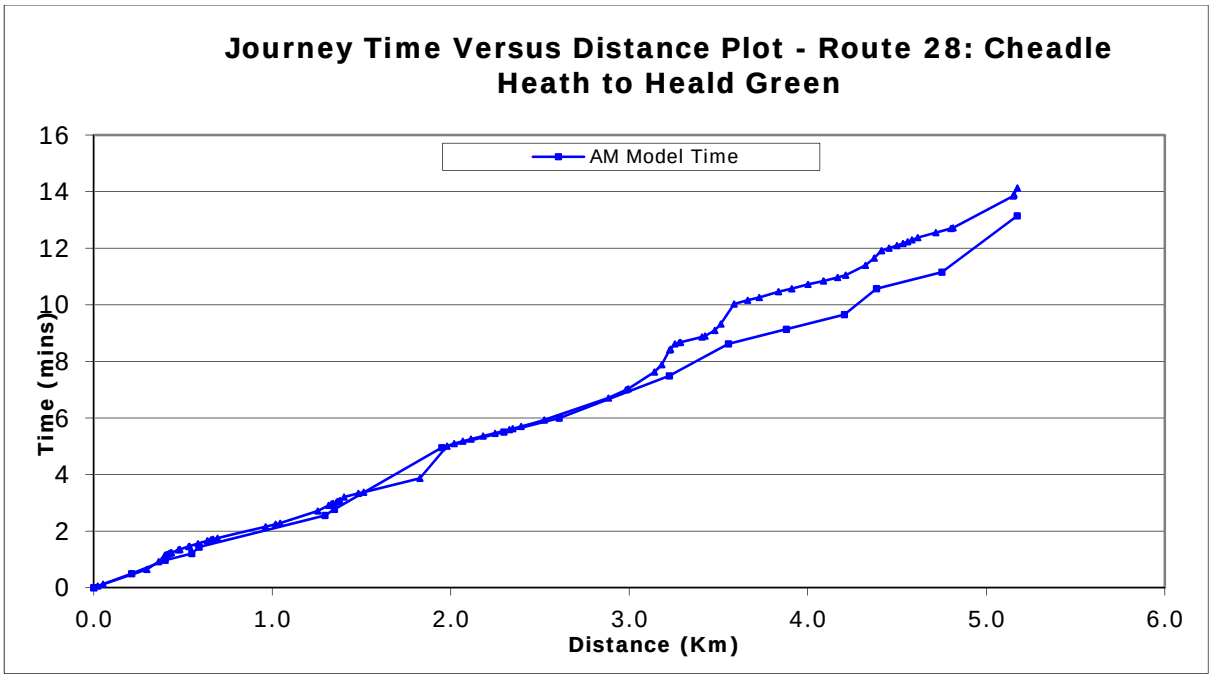

Journey Time Versus Distance Plot - Route 26: M60 J24 to J6
OP Model Time
Time (mins)
0
2
4
6
8
10
12
14
0.0
5.0
10.0
15.0
20.0
Distance (Km)

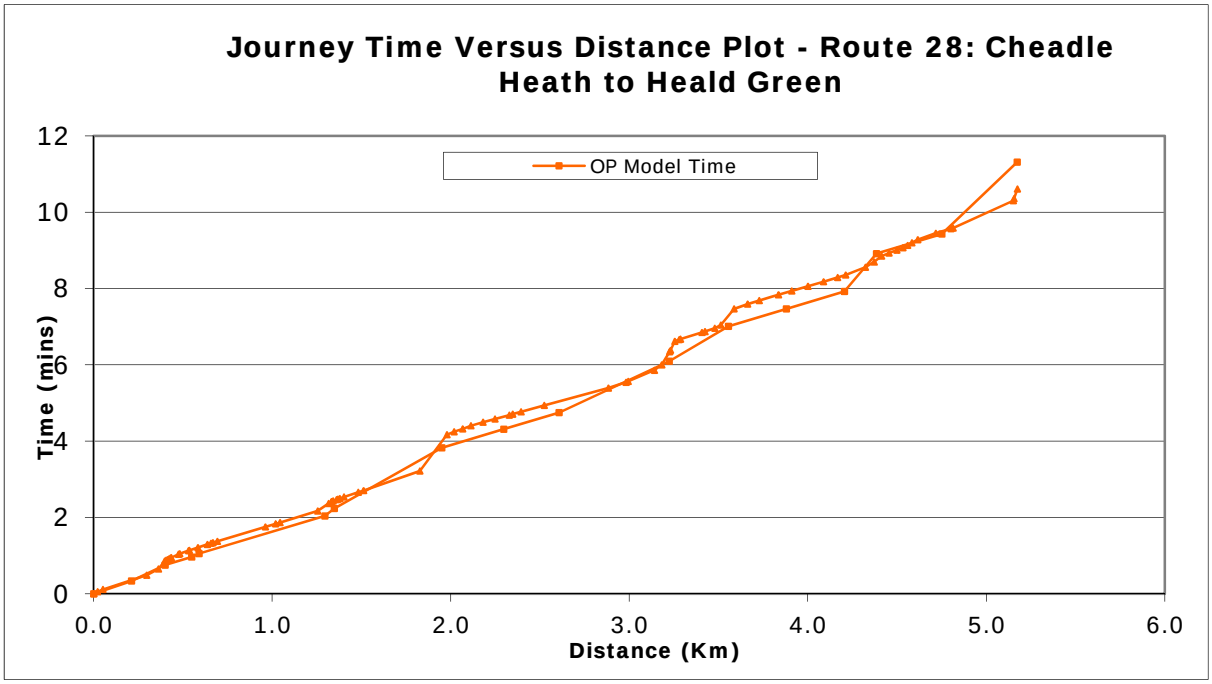

Journey Time Versus Distance Plot - Route 26: M60 J24 to J6
PM Model Time
Time (mins)
0
2
4
6
8
10
12
14
16
0.0
5.0
10.0
15.0
20.0
Distance (Km)

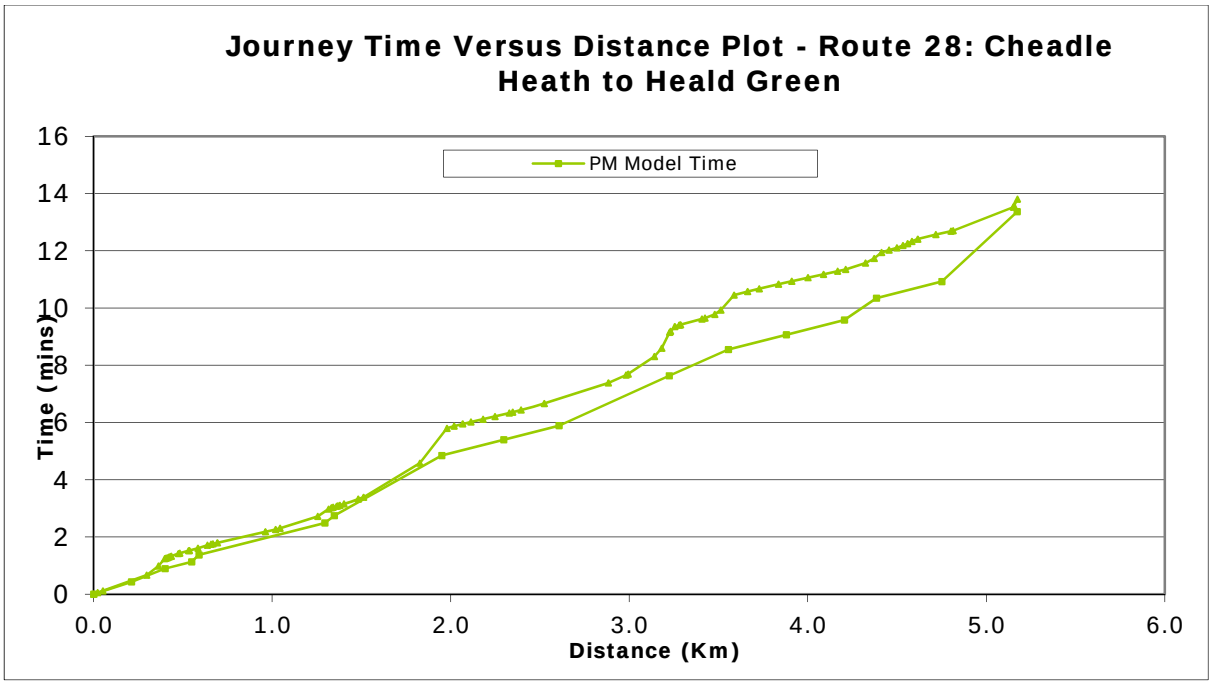

Journey Time Versus Distance Plot - Route 27: Heald Green to Cheadle Heath
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
1.0
2.0
3.0
4.0
5.0
6.0


Journey Time Versus Distance Plot - Route 27: Heald Green to Cheadle Heath
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
0.0
1.0
2.0
3.0
4.0
5.0
6.0


Journey Time Versus Distance Plot - Route 27: Heald Green to Cheadle Heath
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
1.0
2.0
3.0
4.0
5.0
6.0


Journey Time Versus Distance Plot - Route 28: Cheadle Heath to Heald Green
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
1.0
2.0
3.0
4.0
5.0
6.0


Journey Time Versus Distance Plot - Route 28: Cheadle Heath to Heald Green
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
0.0
1.0
2.0
3.0
4.0
5.0
6.0


Journey Time Versus Distance Plot - Route 28: Cheadle Heath to Heald Green
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
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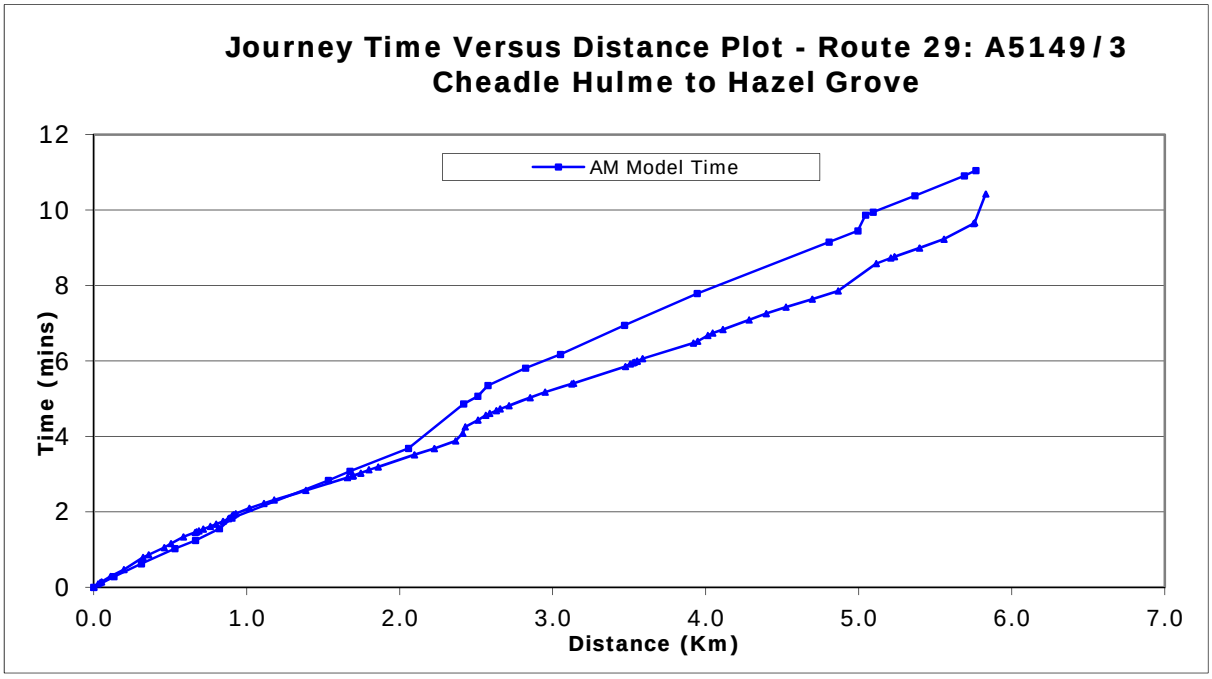
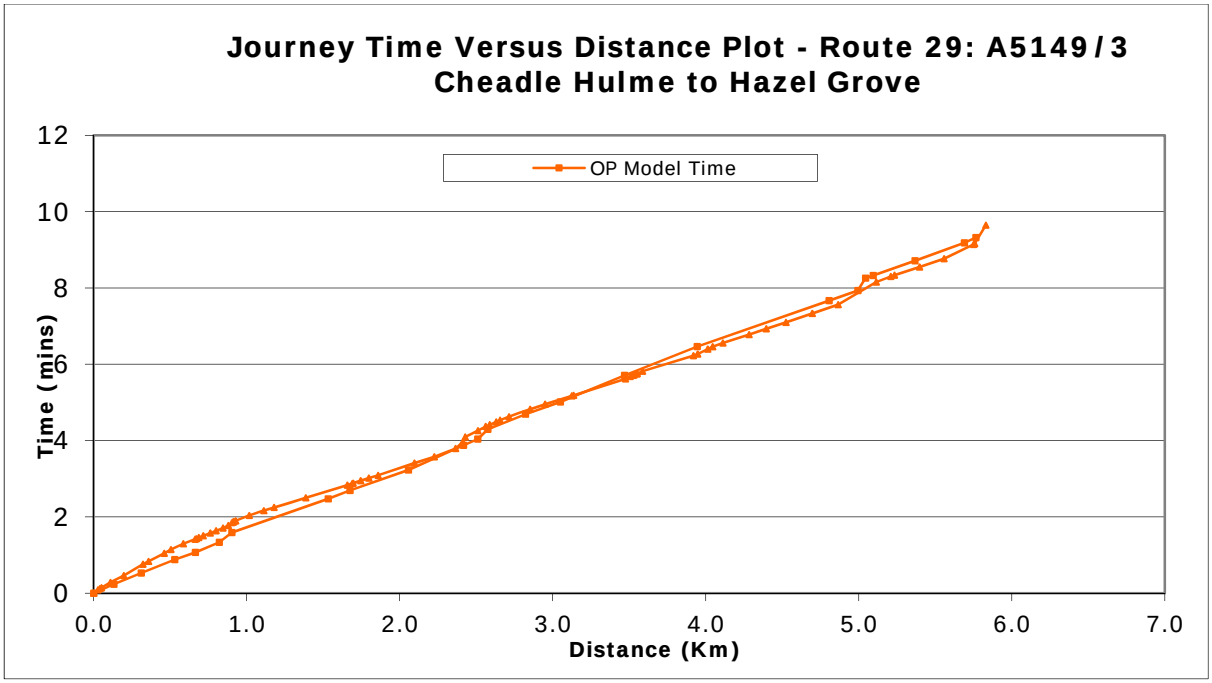
1.0
2.0
3.0
4.0
5.0
6.0


Journey Time Versus Distance Plot - Route 29: A5149/3
Cheadle Hulme to Hazel Grove
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 29: A5149/3
Cheadle Hulme to Hazel Grove
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
0.0
1.0
2.0
3.0
4.0
5.0
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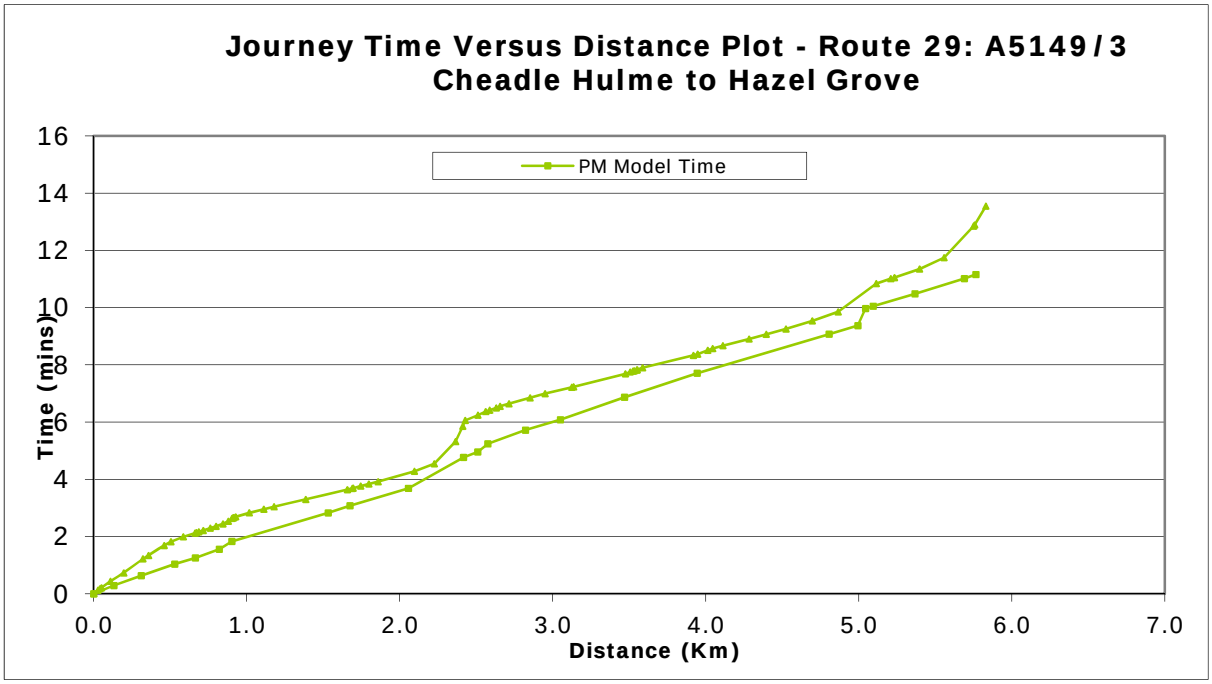
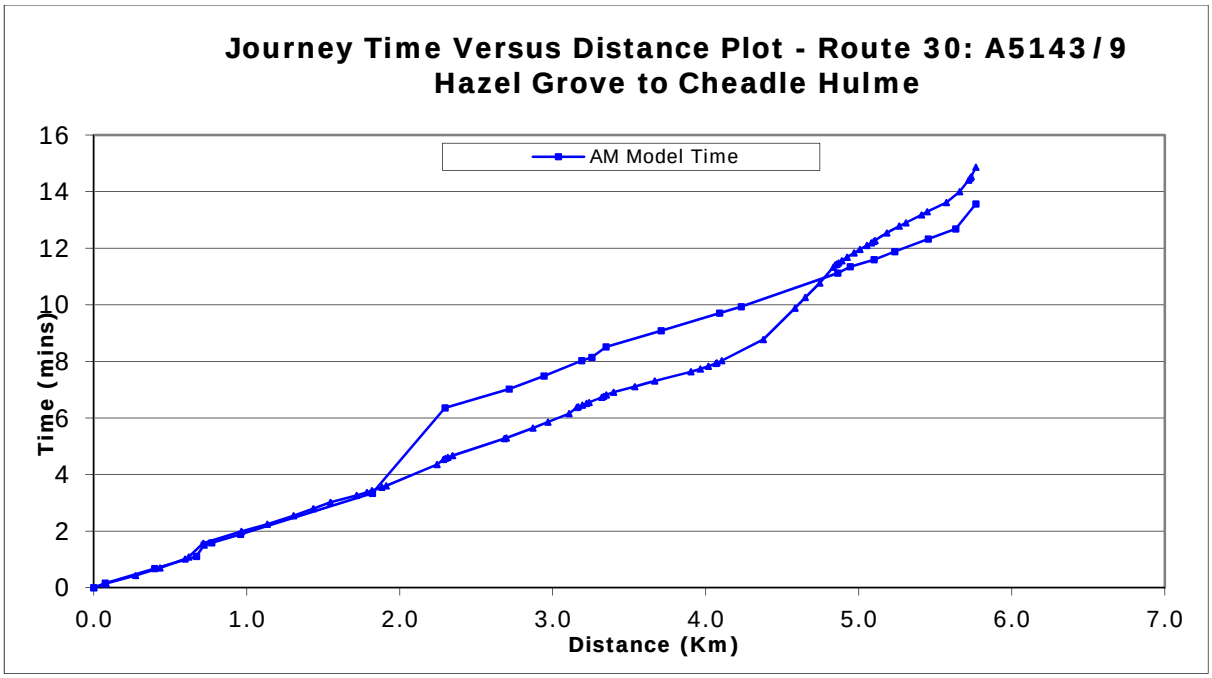
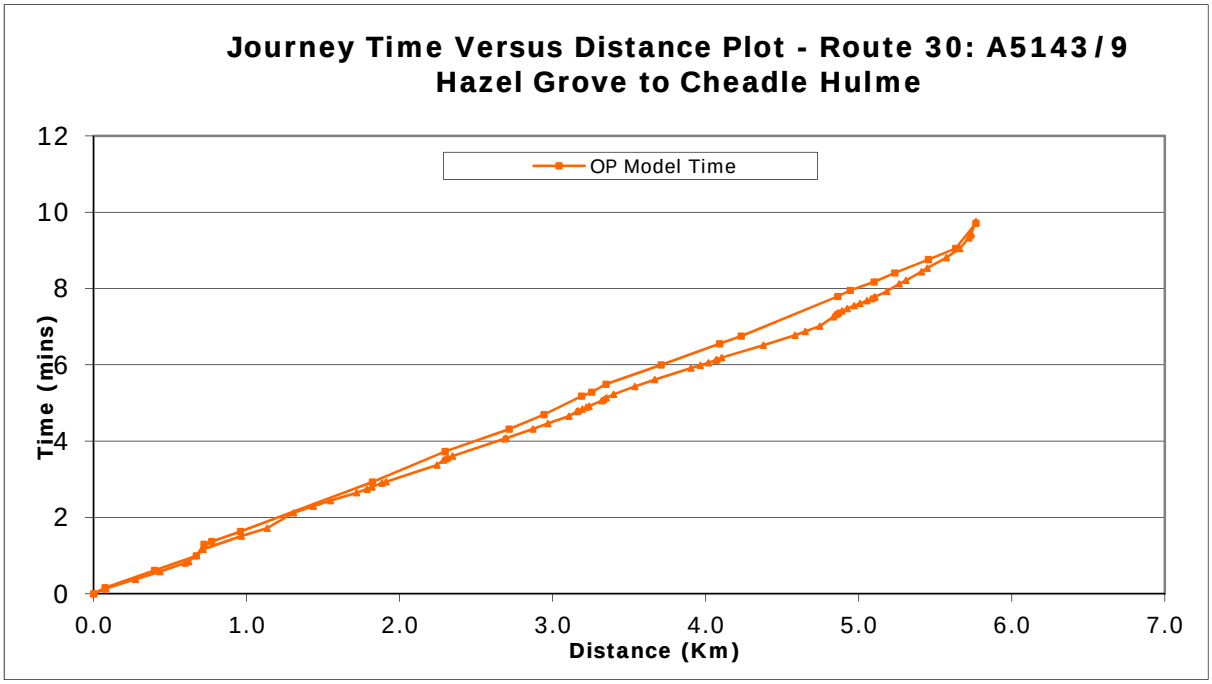
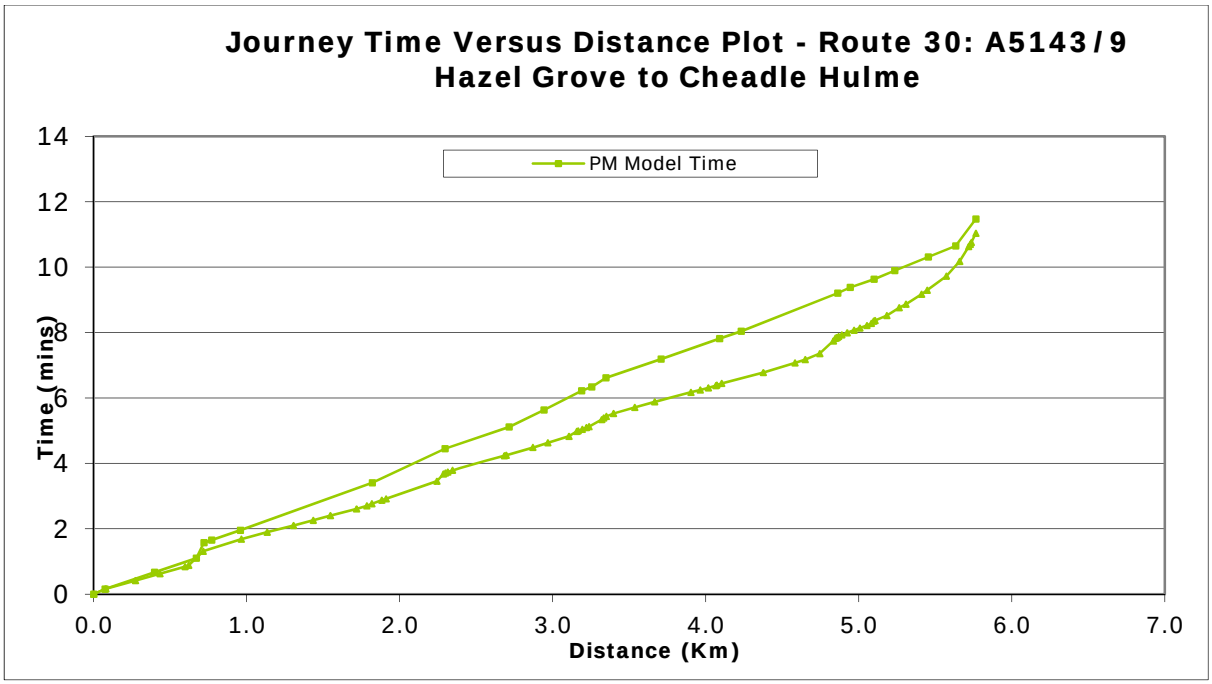
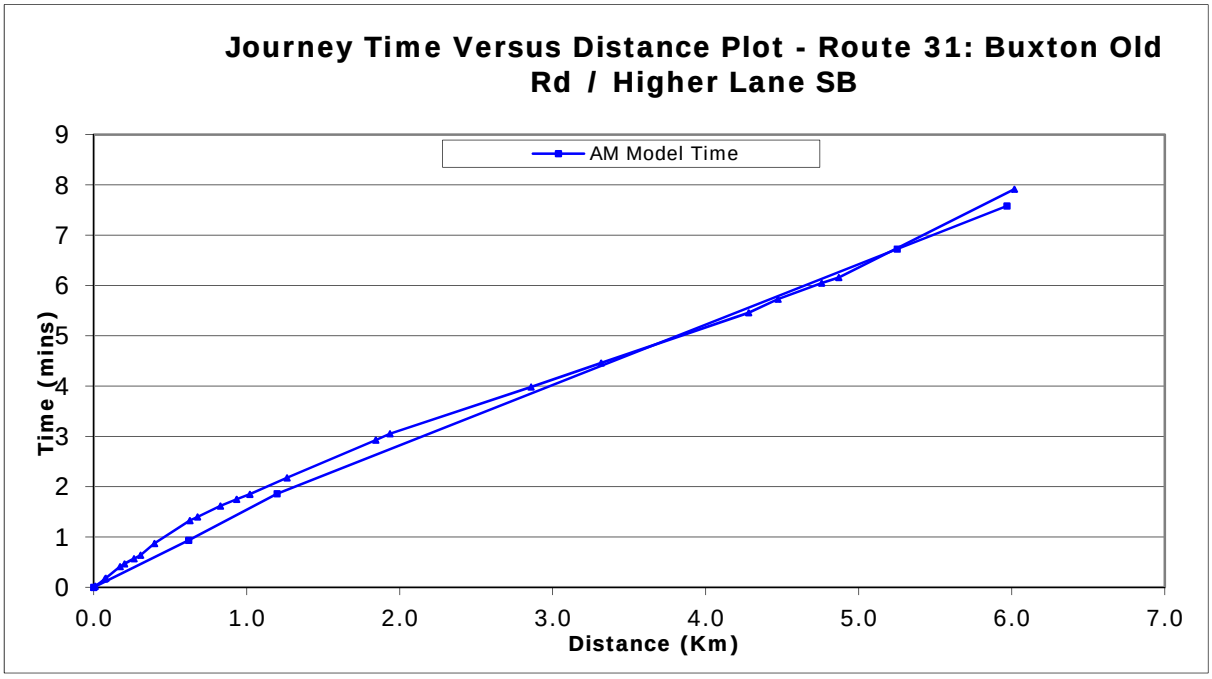
7.0

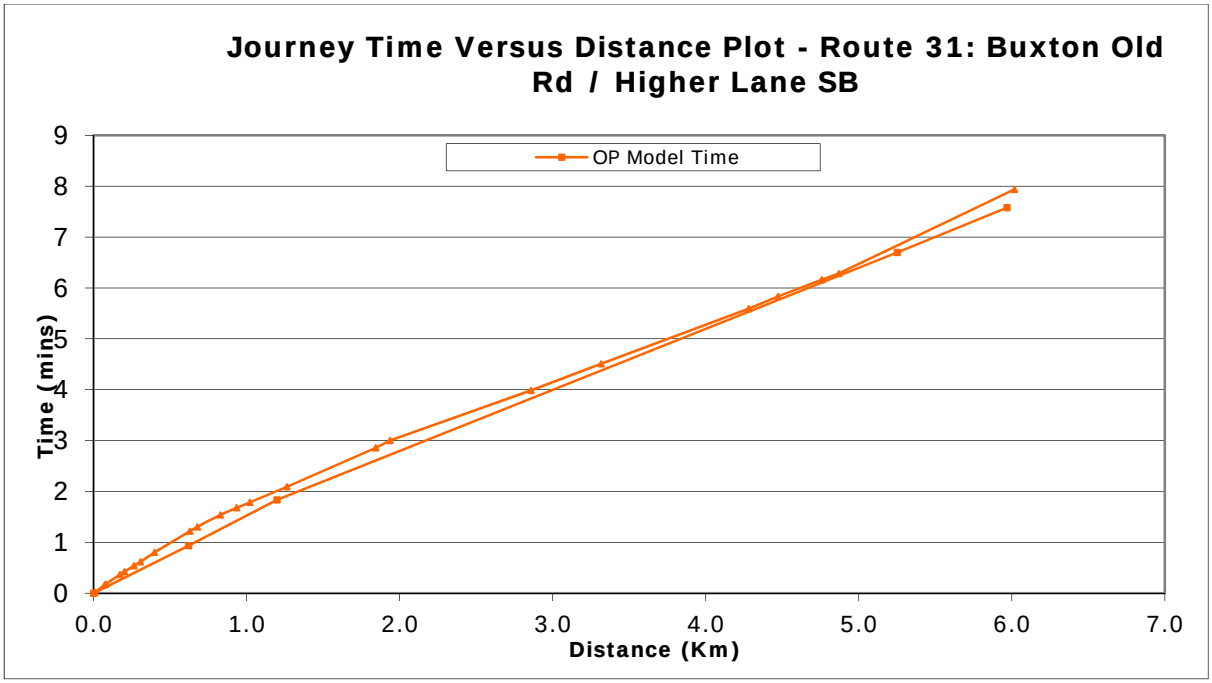

Journey Time Versus Distance Plot - Route 29: A5149/3
Cheadle Hulme to Hazel Grove
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 30: A5143/9
Hazel Grove to Cheadle Hulme
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 30: A5143/9
Hazel Grove to Cheadle Hulme
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 30: A5143/9
Hazel Grove to Cheadle Hulme
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 31: Buxton Old Rd / Higher Lane SB
AM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 31: Buxton Old Rd / Higher Lane SB
OP Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
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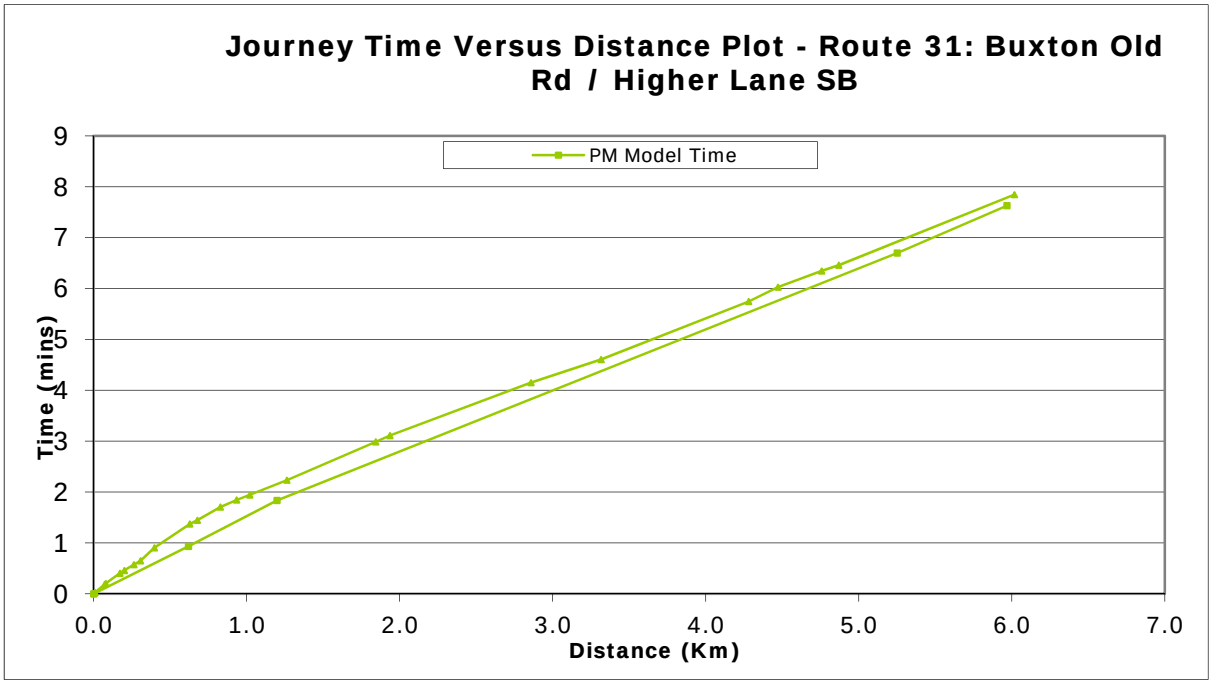
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 31: Buxton Old Rd / Higher Lane SB
PM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
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5.0
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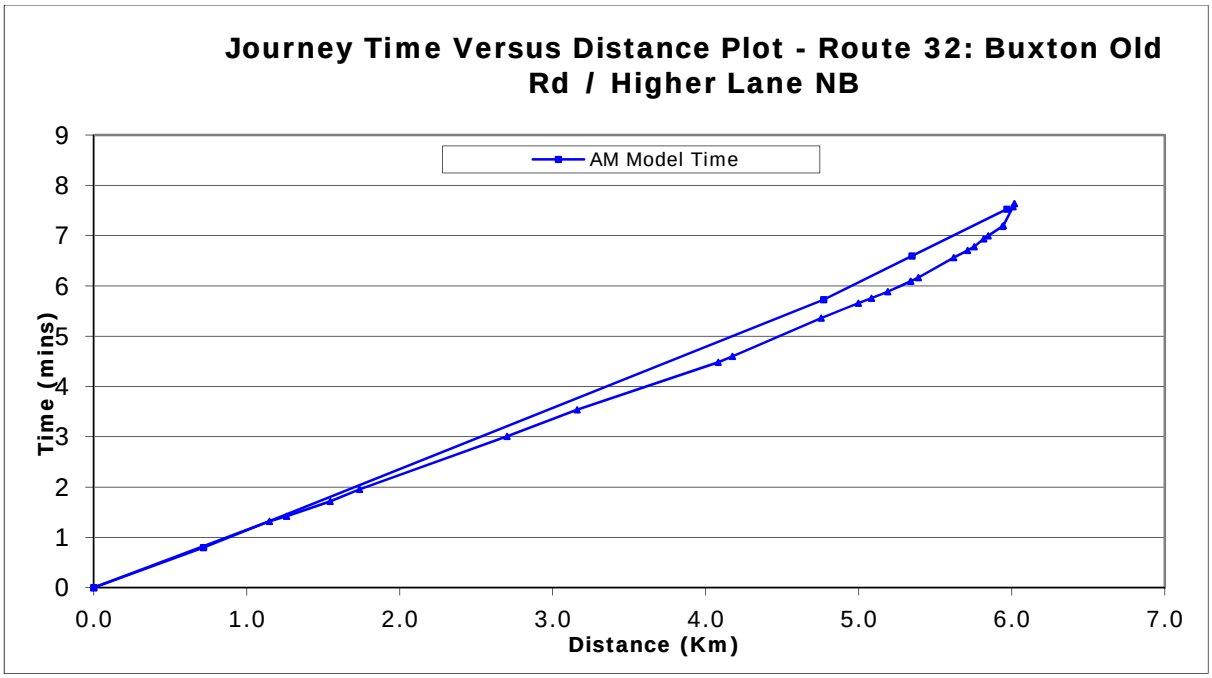
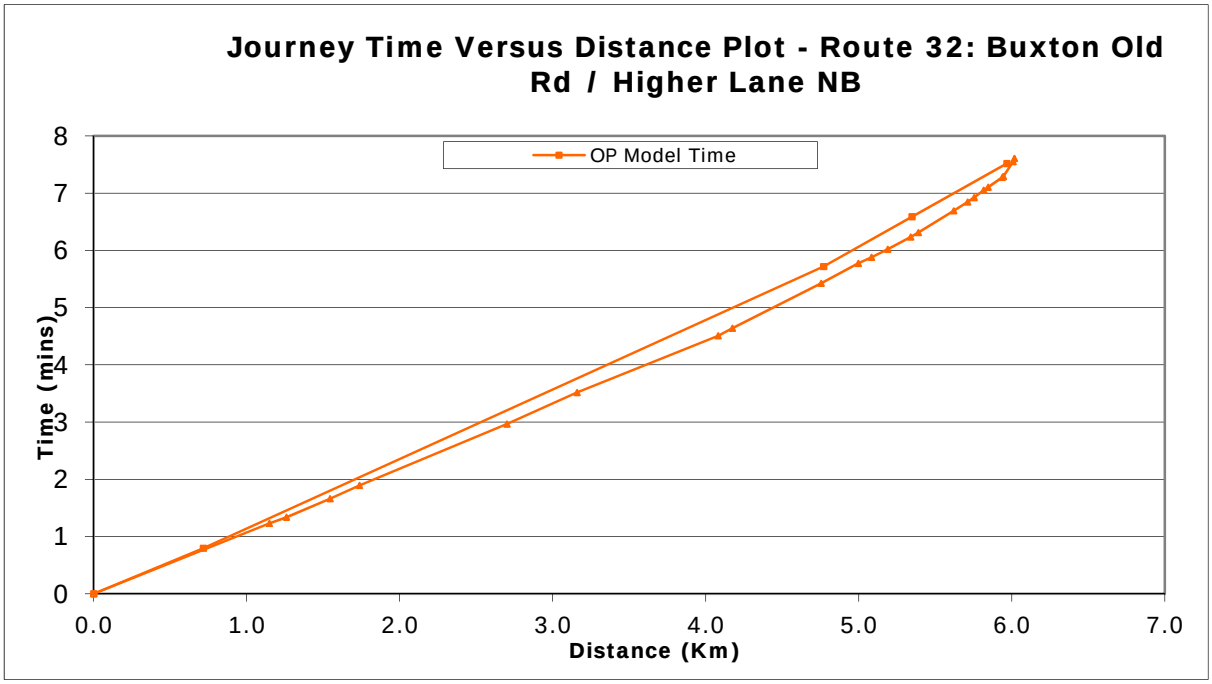
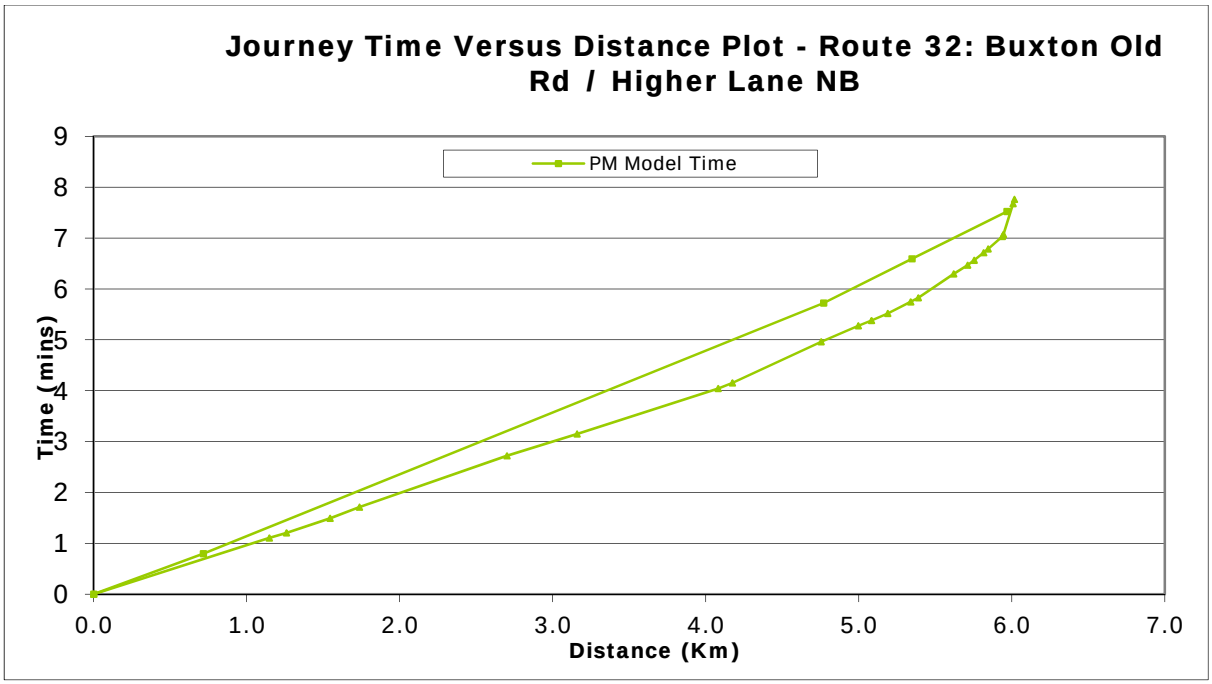
7.0


Journey Time Versus Distance Plot - Route 32: Buxton Old Rd / Higher Lane NB
AM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 32: Buxton Old Rd / Higher Lane NB
OP Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0


Journey Time Versus Distance Plot - Route 32: Buxton Old Rd / Higher Lane NB
PM Model Time
Time (mins)
Distance (Km)
0
1
2
3
4
5
6
7
8
9
0.0
1.0
2.0
3.0
4.0
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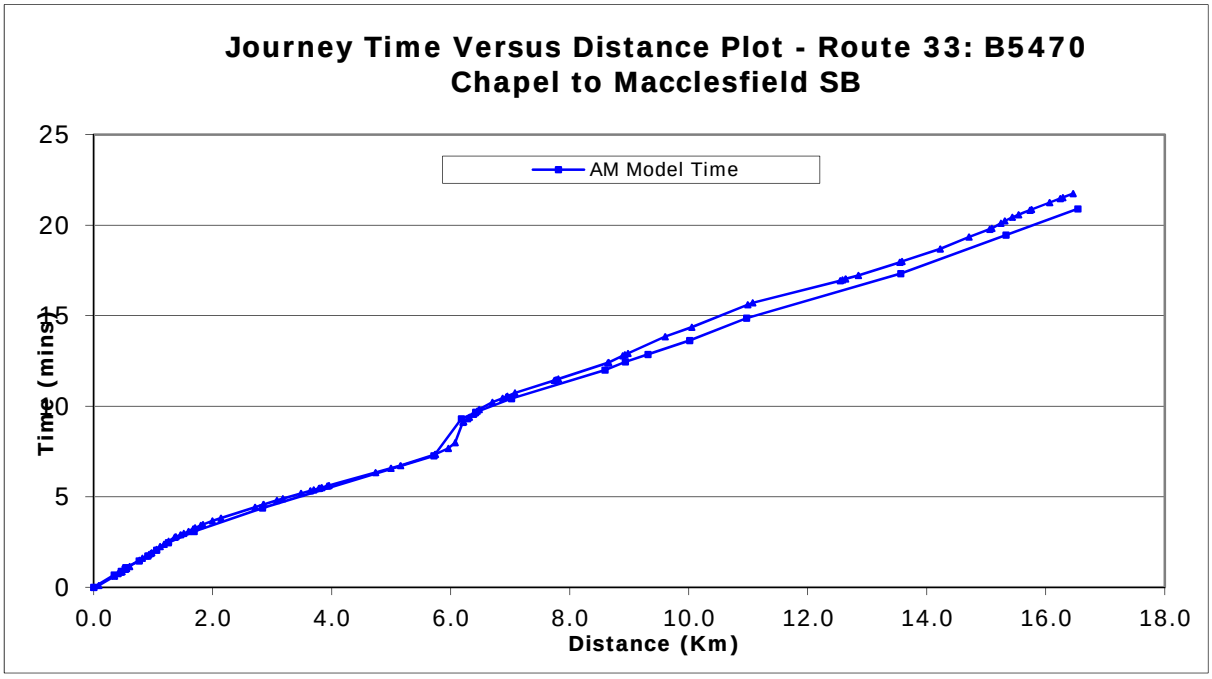
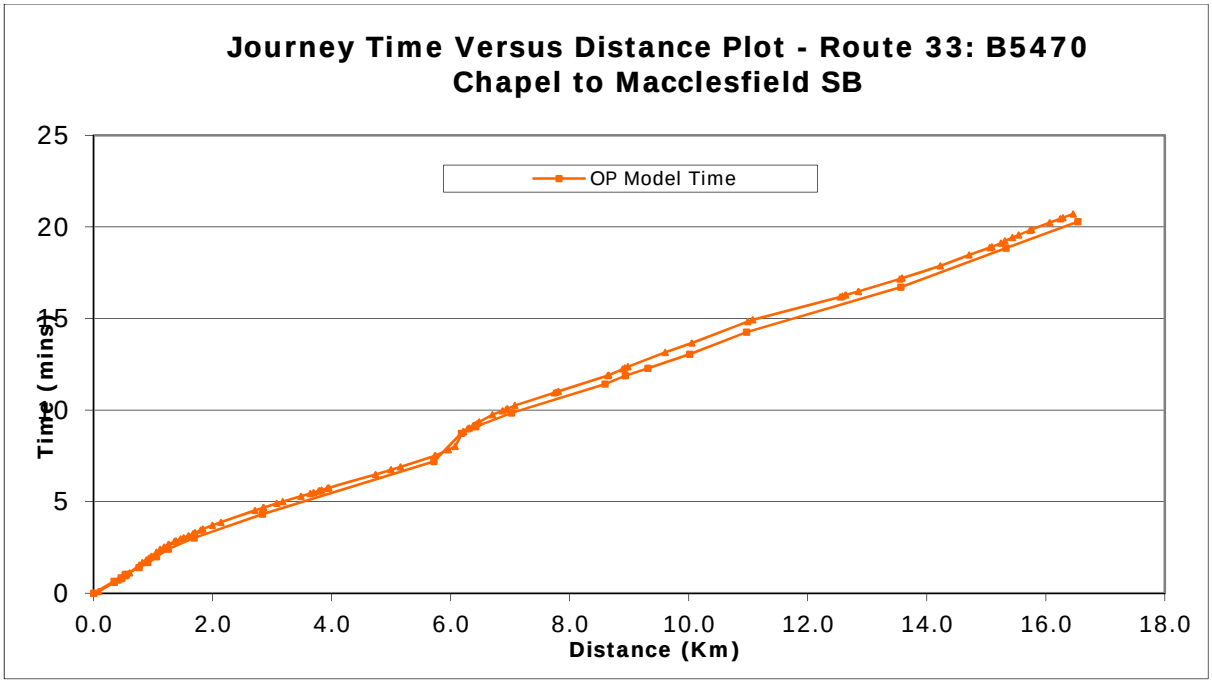
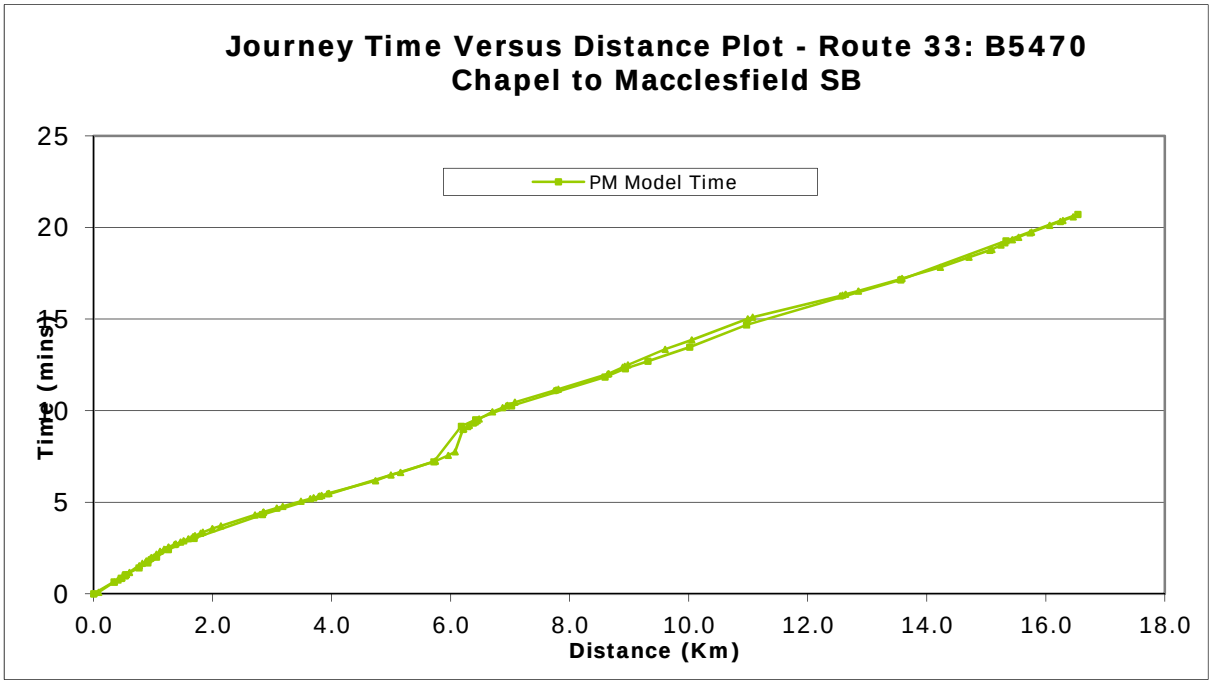
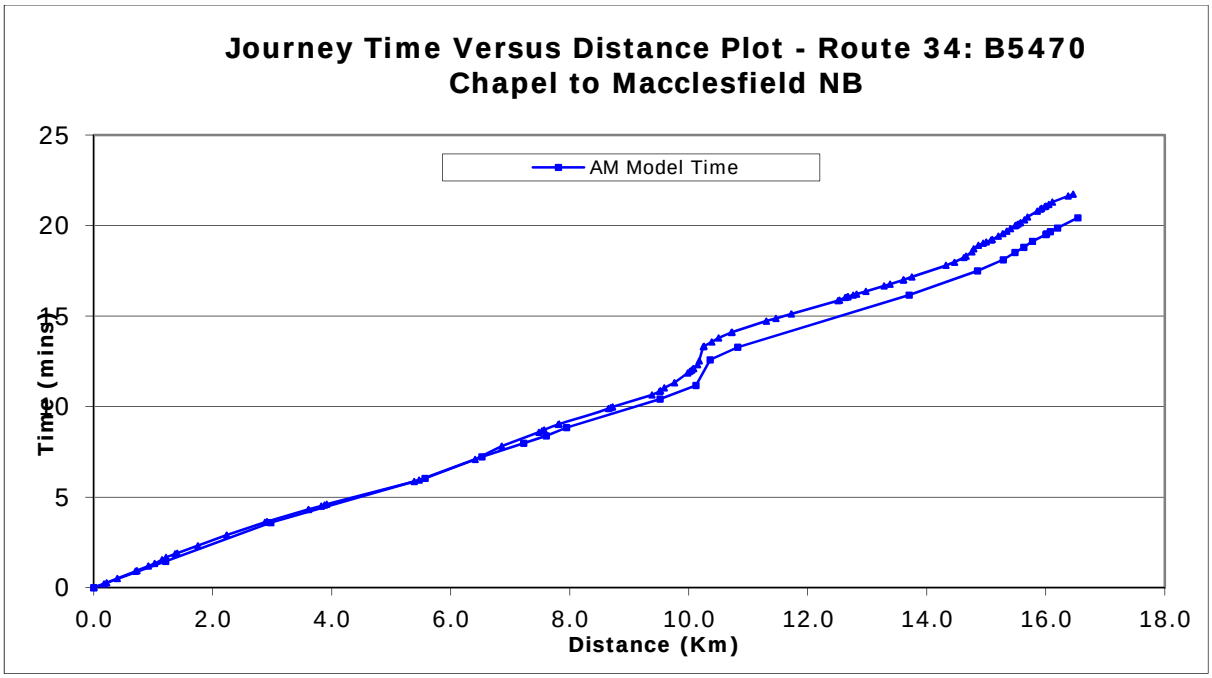
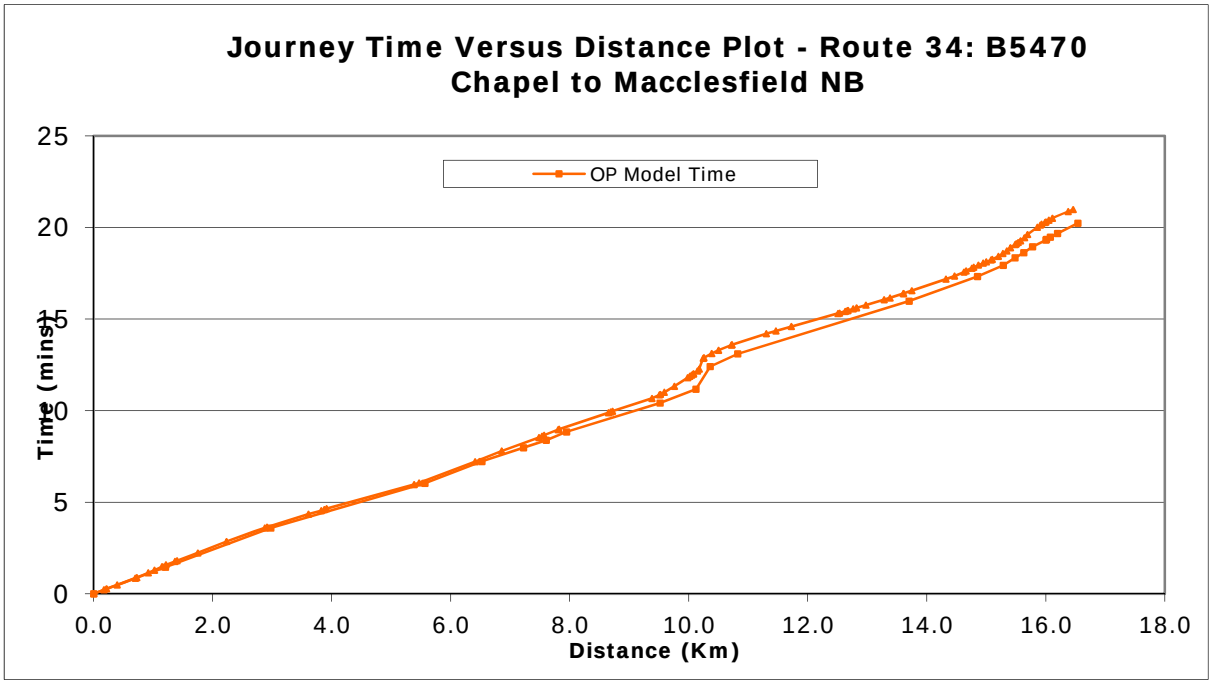
7.0

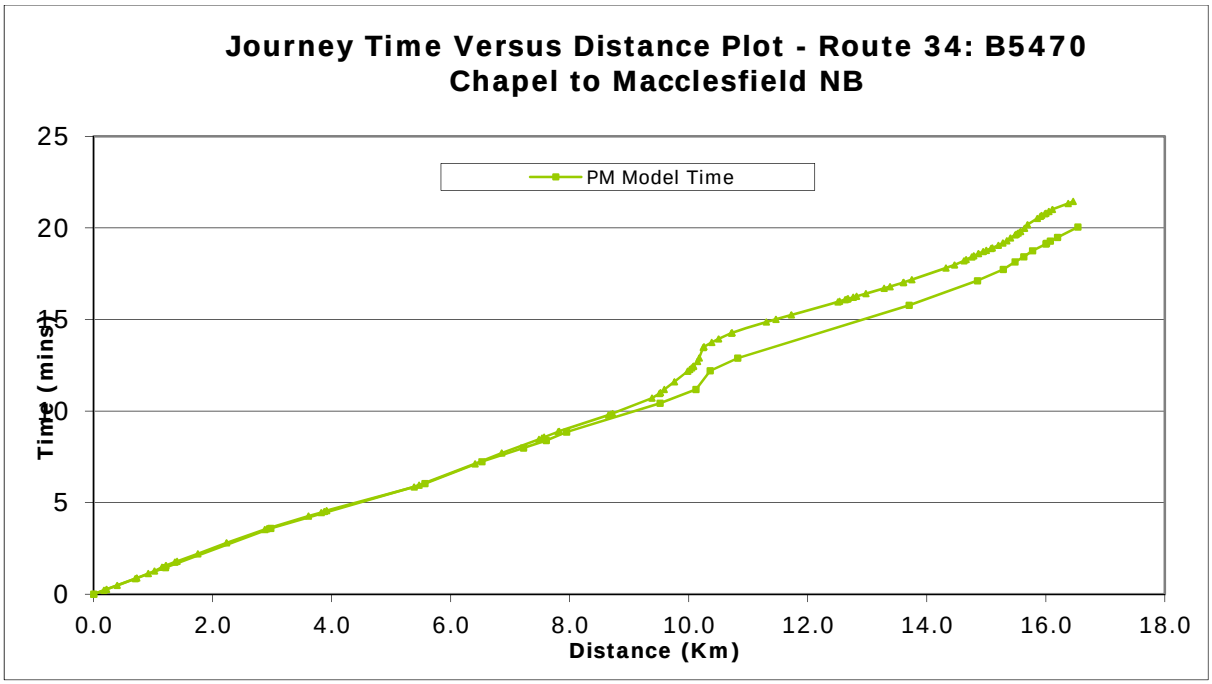

Journey Time Versus Distance Plot - Route 33: B5470
Chapel to Macclesfield SB
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

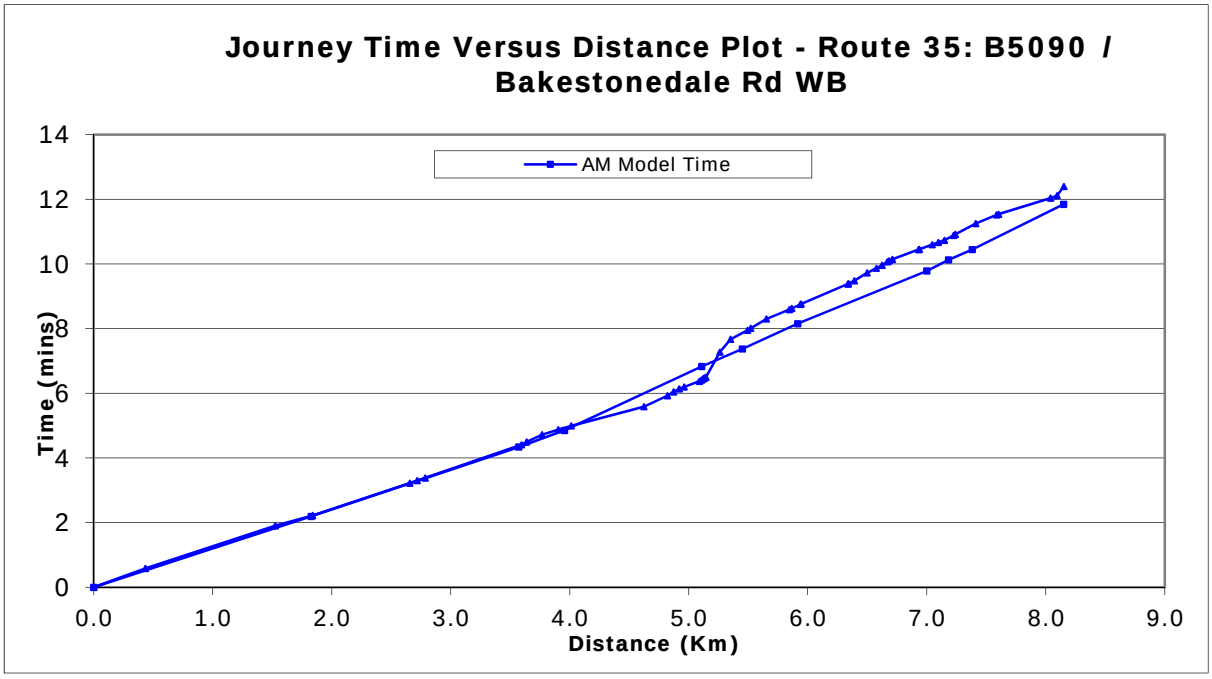

Journey Time Versus Distance Plot - Route 33: B5470
Chapel to Macclesfield SB
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

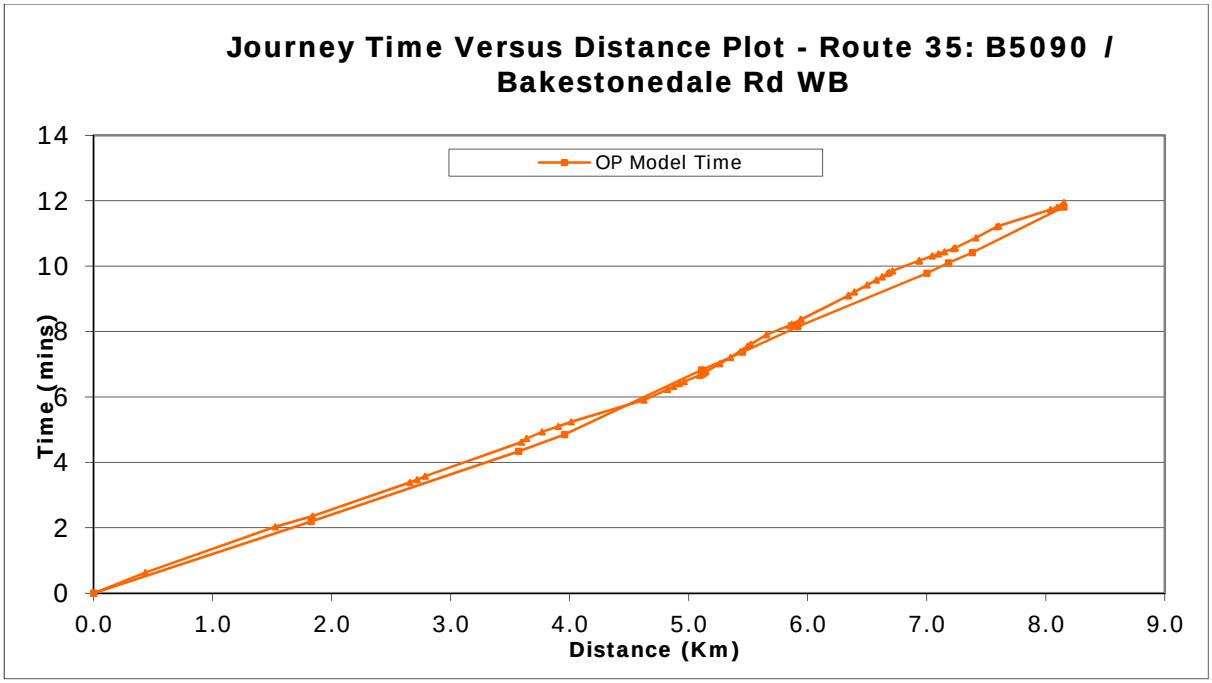

Journey Time Versus Distance Plot - Route 33: B5470
Chapel to Macclesfield SB
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

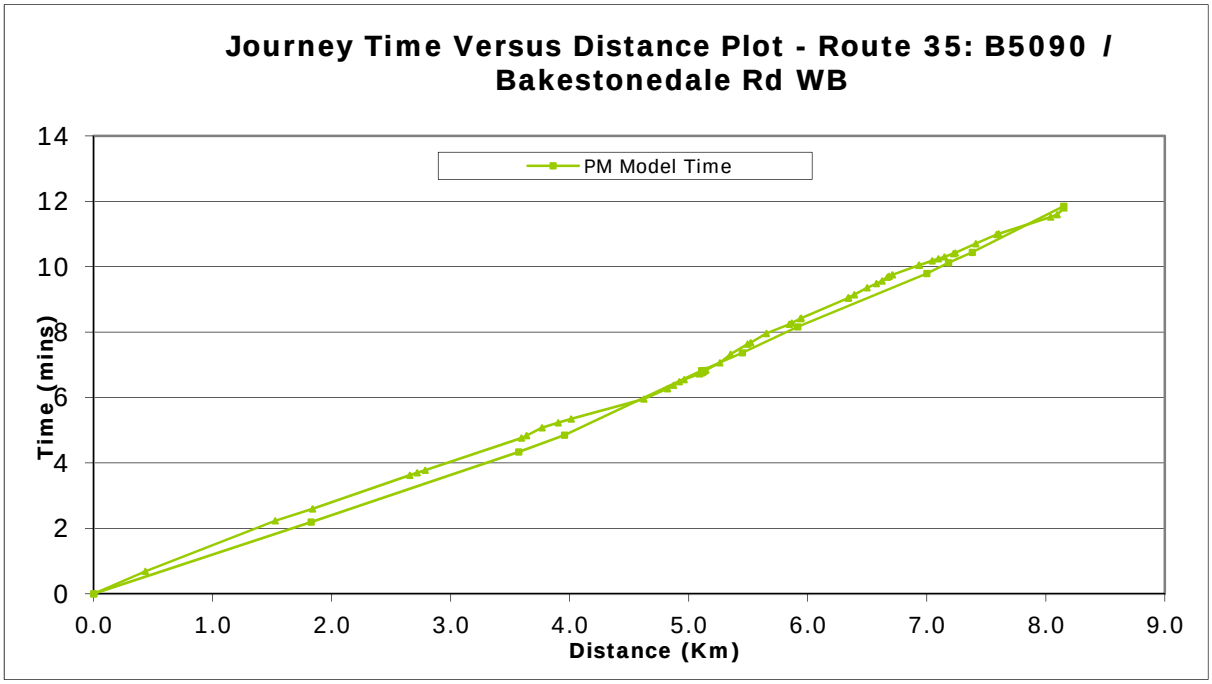

Journey Time Versus Distance Plot - Route 34: B5470
Chapel to Macclesfield NB
AM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

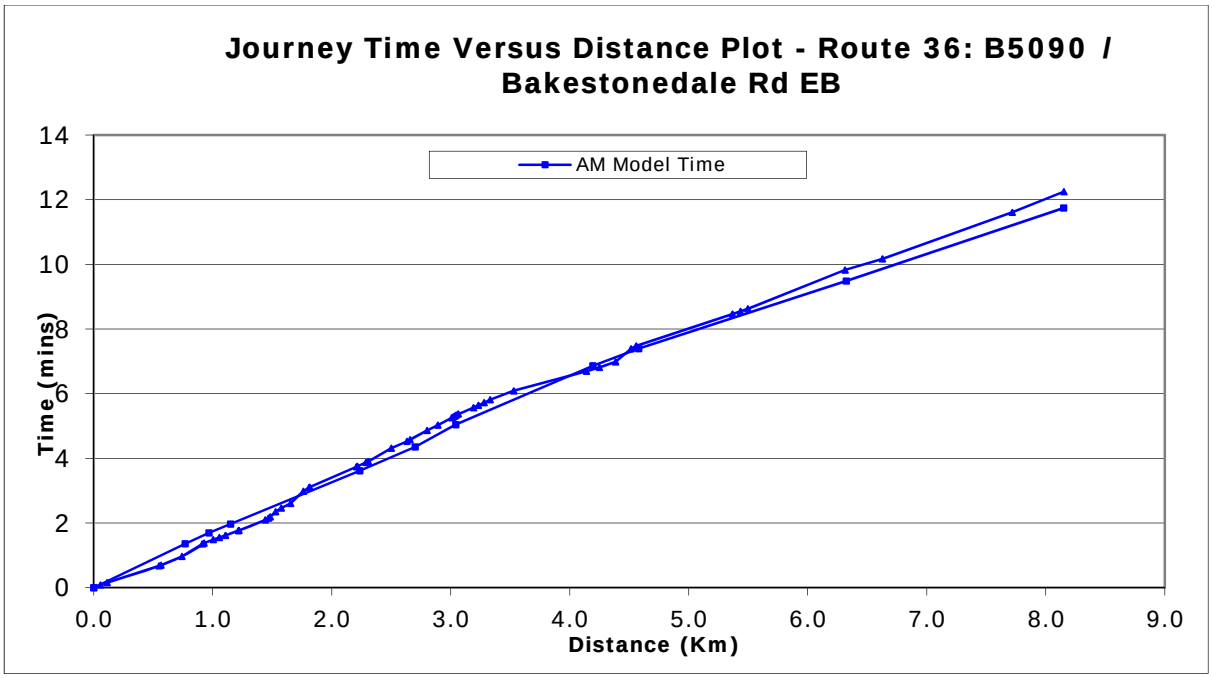

Journey Time Versus Distance Plot - Route 34: B5470
Chapel to Macclesfield NB
OP Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

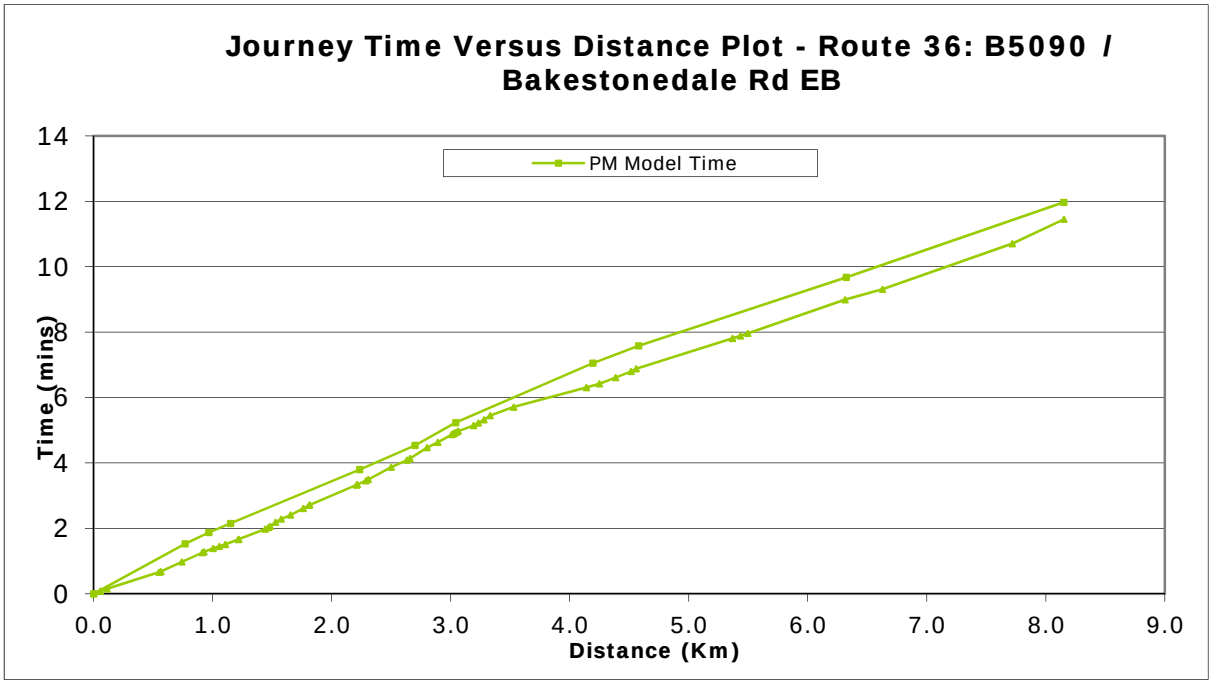

Journey Time Versus Distance Plot - Route 34: B5470
Chapel to Macclesfield NB
PM Model Time
Time (mins)
Distance (Km)
0
5
10
15
20
25
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0

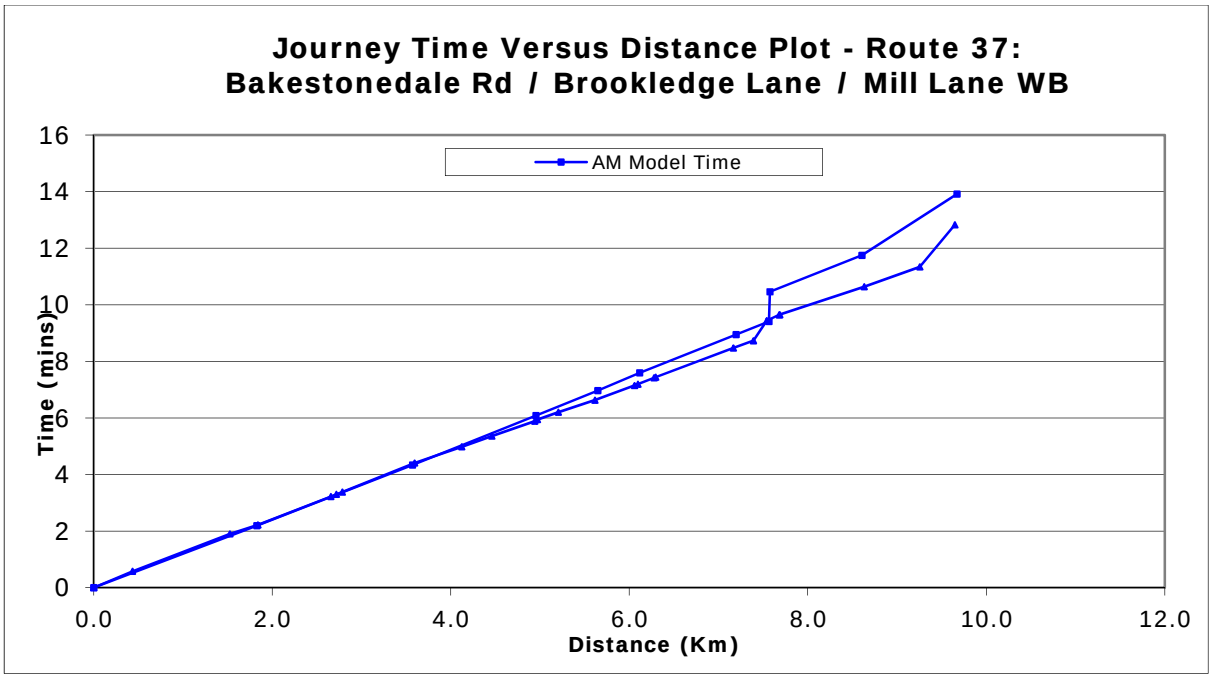

Journey Time Versus Distance Plot - Route 35: B5090 / Bakestonedale Rd WB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

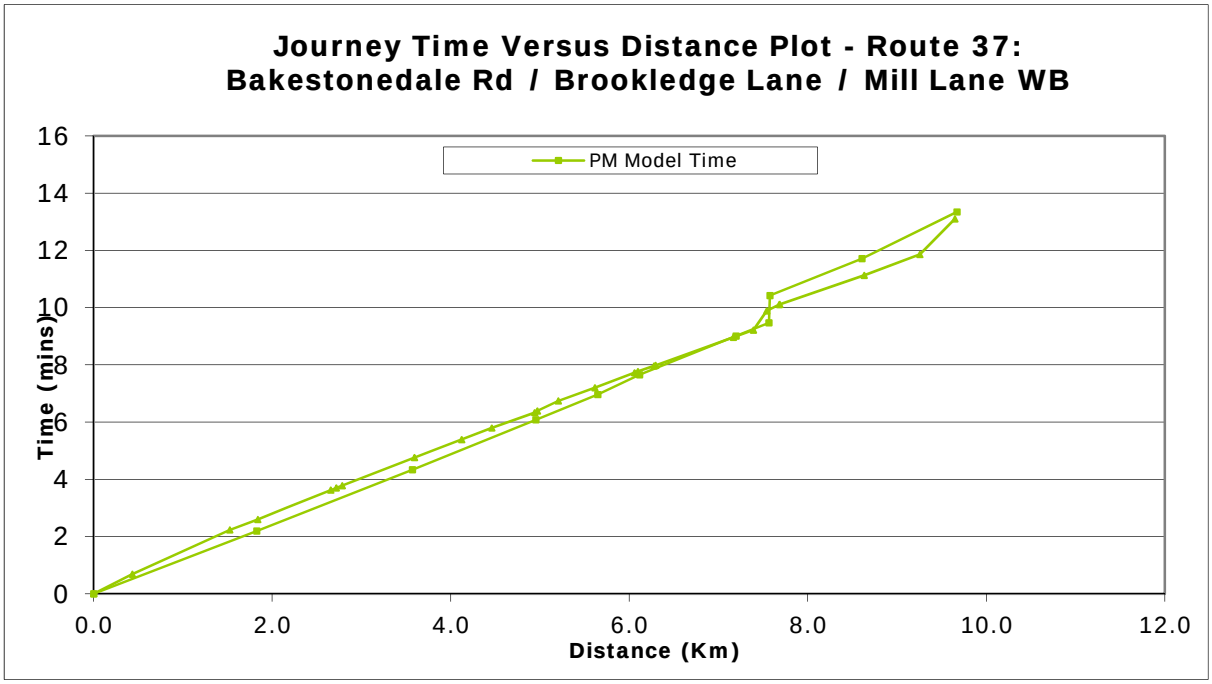

Journey Time Versus Distance Plot - Route 35: B5090 / Bakestonedale Rd WB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

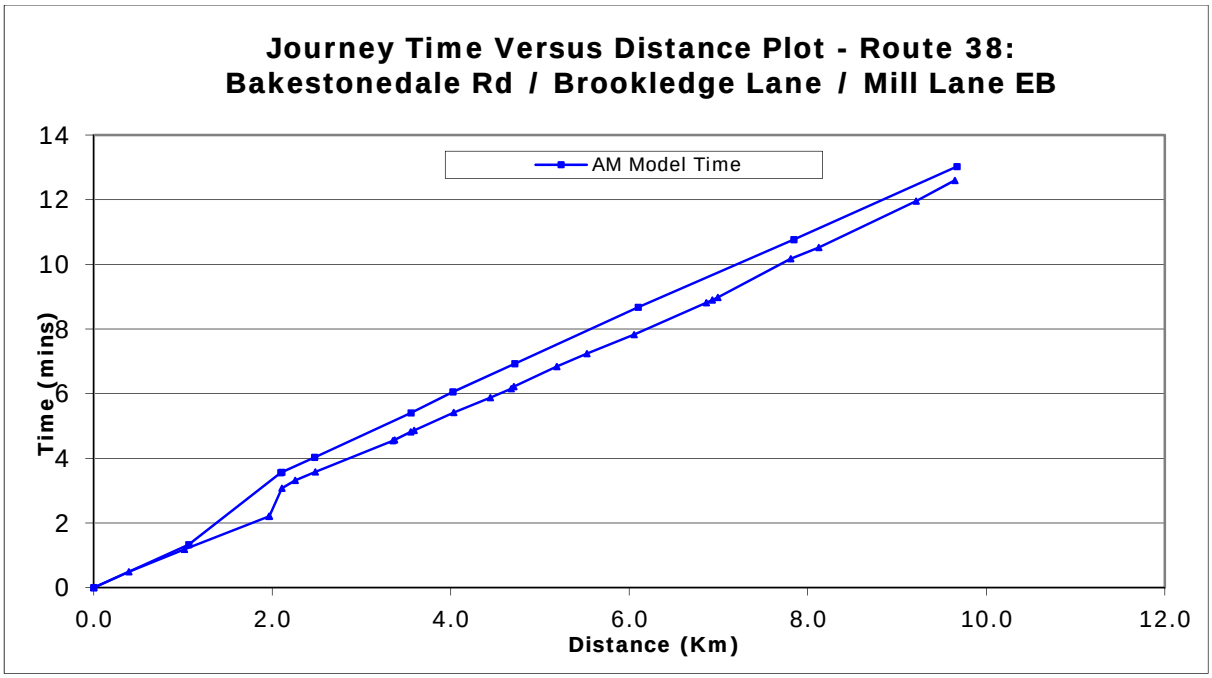

Journey Time Versus Distance Plot - Route 35: B5090 / Bakestonedale Rd WB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

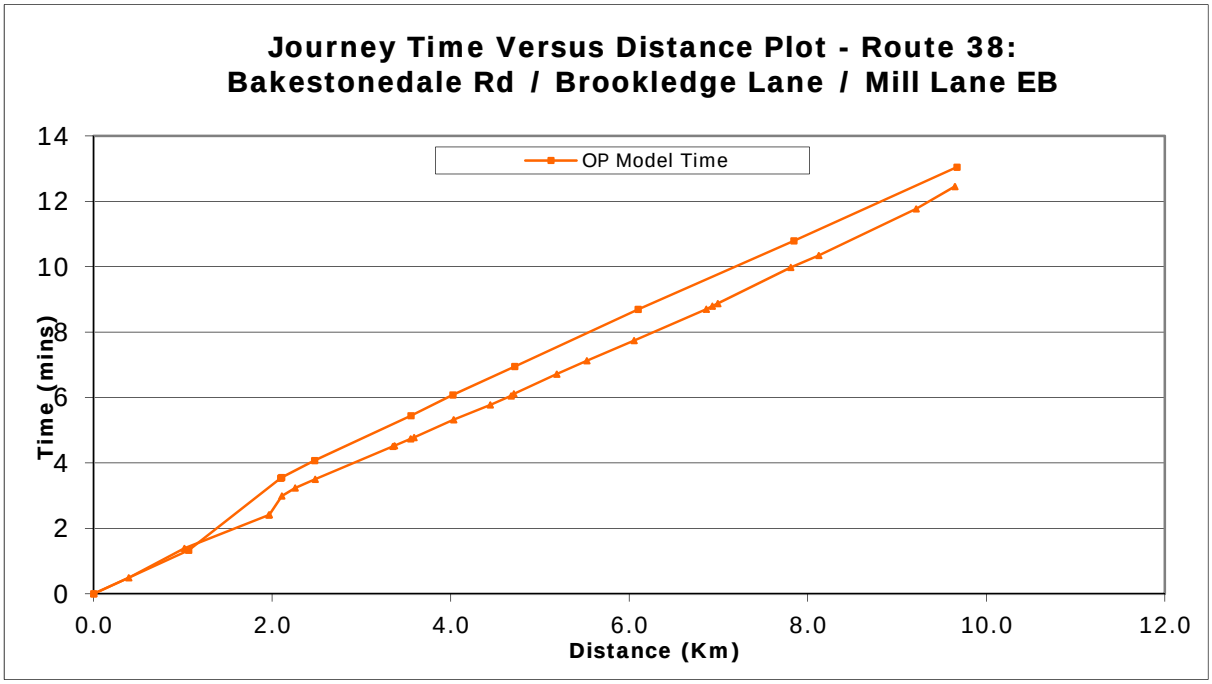

Journey Time Versus Distance Plot - Route 36: B5090 / Bakestonedale Rd EB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0


Journey Time Versus Distance Plot - Route 36: B5090 / Bakestonedale Rd EB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0


Journey Time Versus Distance Plot - Route 37: Bakestonedale Rd / Brookledge Lane / Mill Lane WB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 37:
Bakestonedale Rd / Brookledge Lane / Mill Lane WB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 38:
Bakestonedale Rd / Brookledge Lane / Mill Lane EB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 38:
Bakestonedale Rd / Brookledge Lane / Mill Lane EB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
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14
0.0
2.0
4.0
6.0
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10.0
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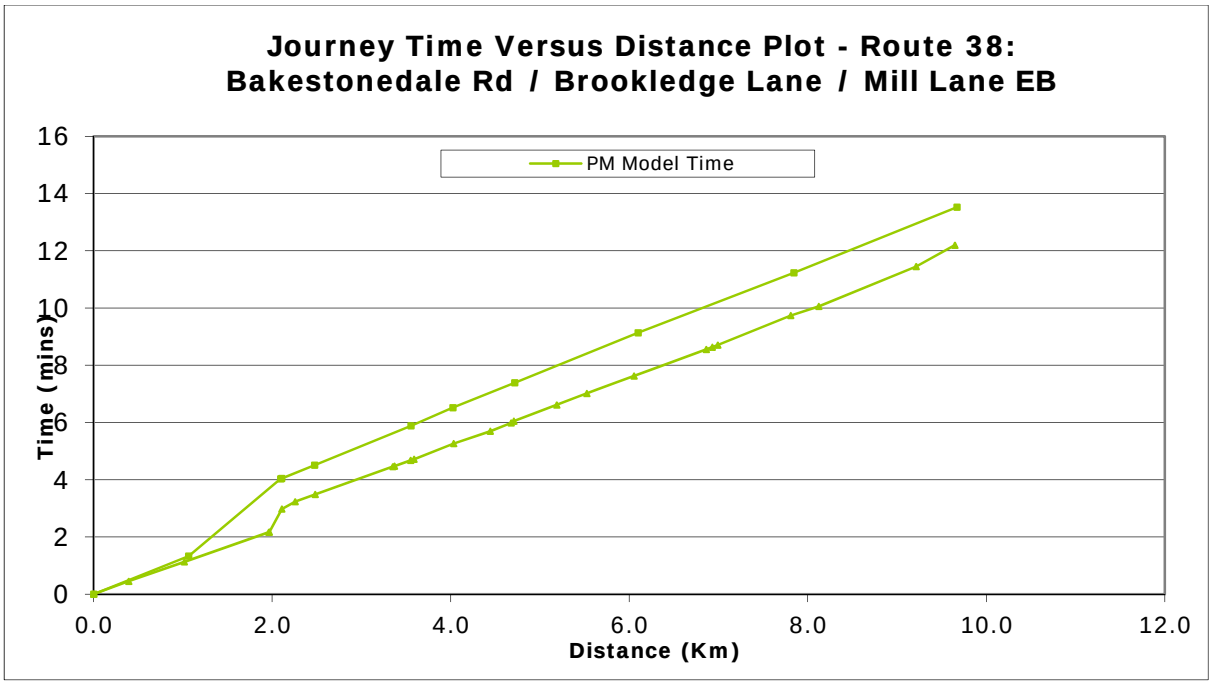
Journey Time Versus Distance Plot - Route 38:
Bakestonedale Rd / Brookledge Lane / Mill Lane EB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
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12
14
16
0.0
2.0
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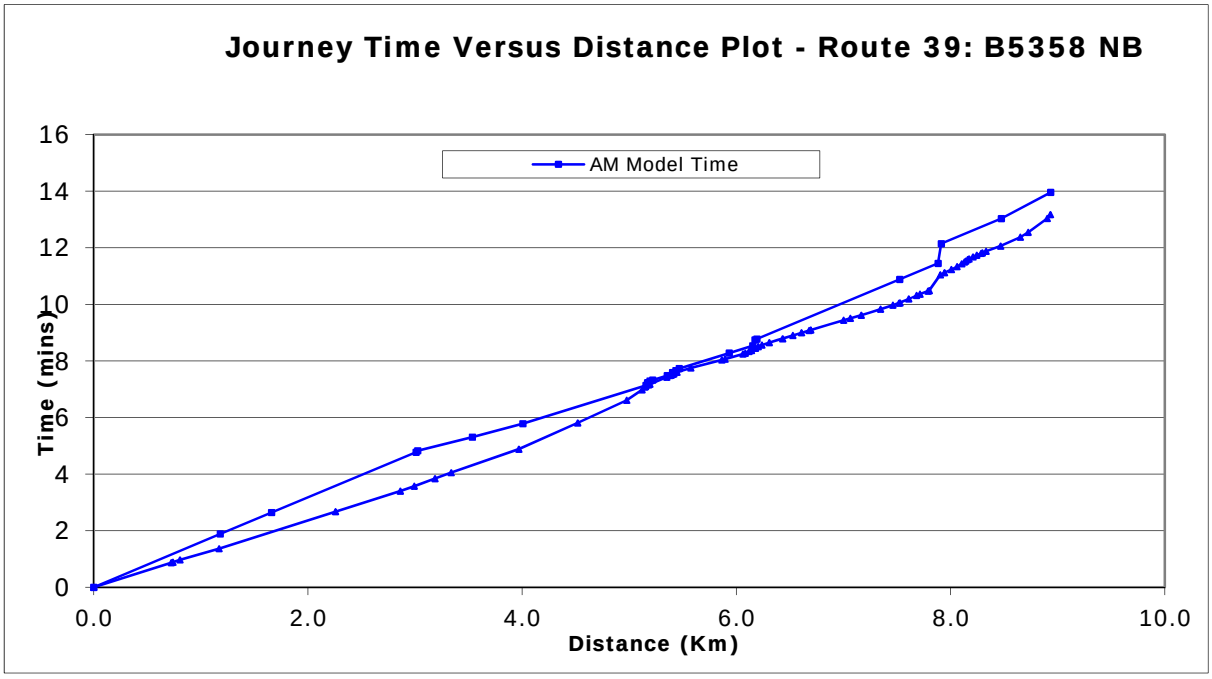
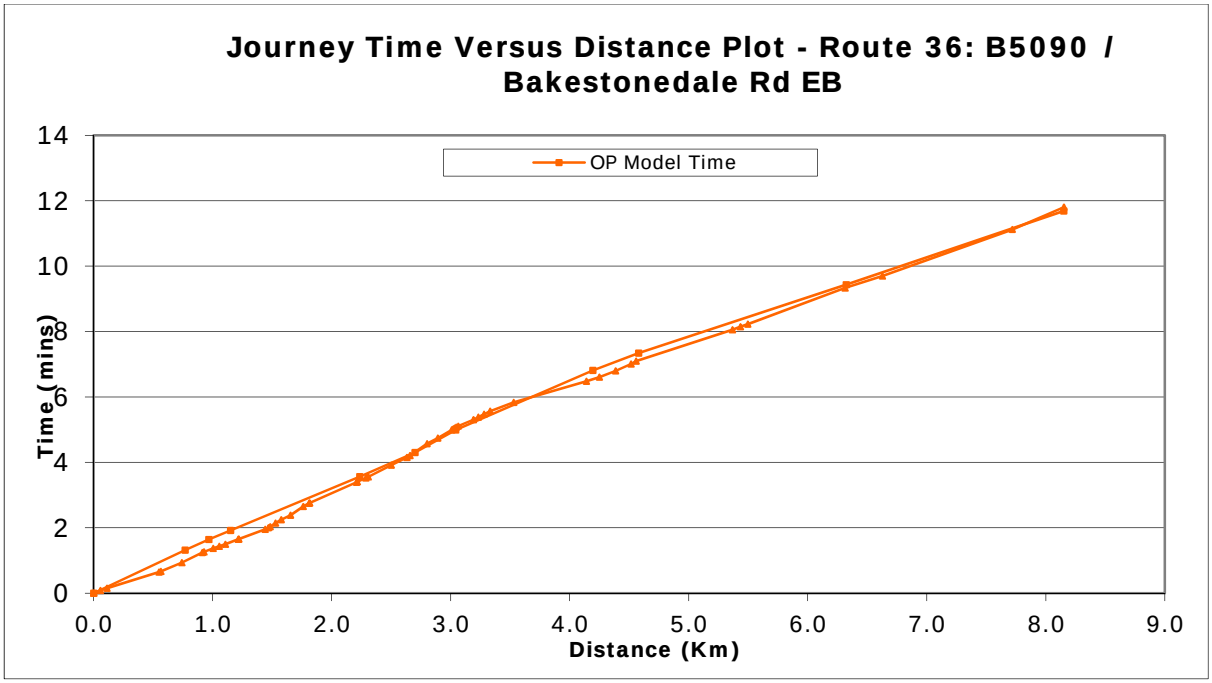
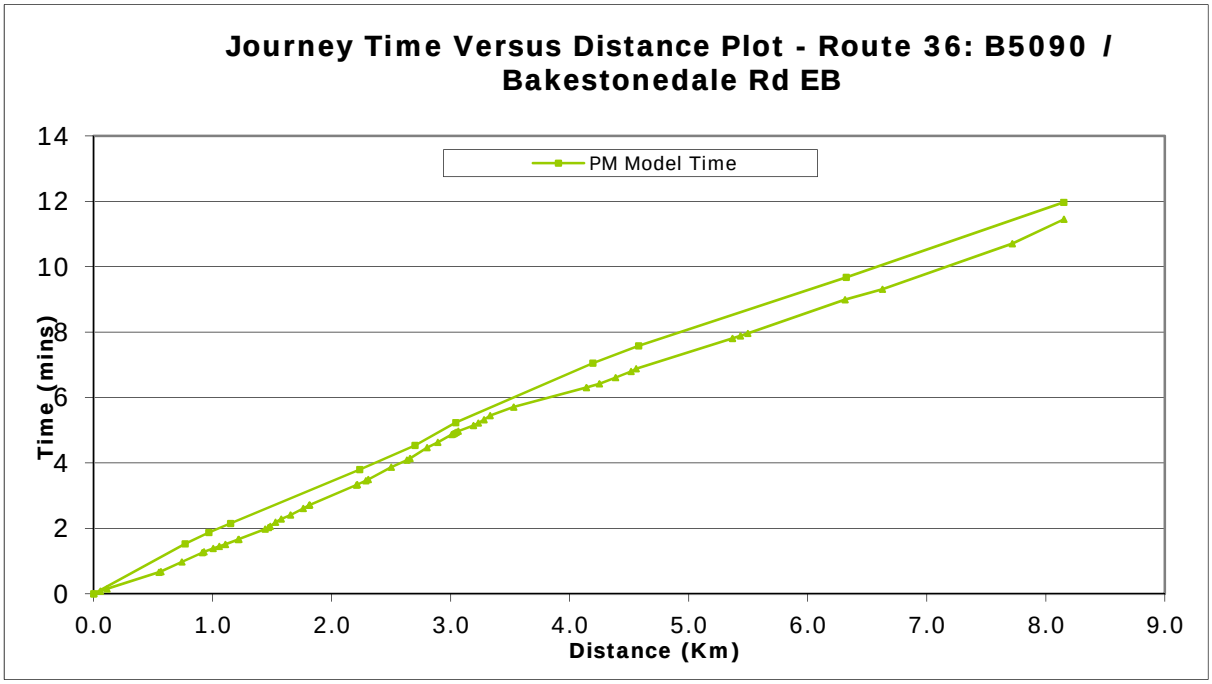
12.0


Journey Time Versus Distance Plot - Route 39: B5358 NB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0


Journey Time Versus Distance Plot - Route 36: B5090 / Bakestonedale Rd EB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0


Journey Time Versus Distance Plot - Route 36: B5090 / Bakestonedale Rd EB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
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12
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0.0
1.0
2.0
3.0
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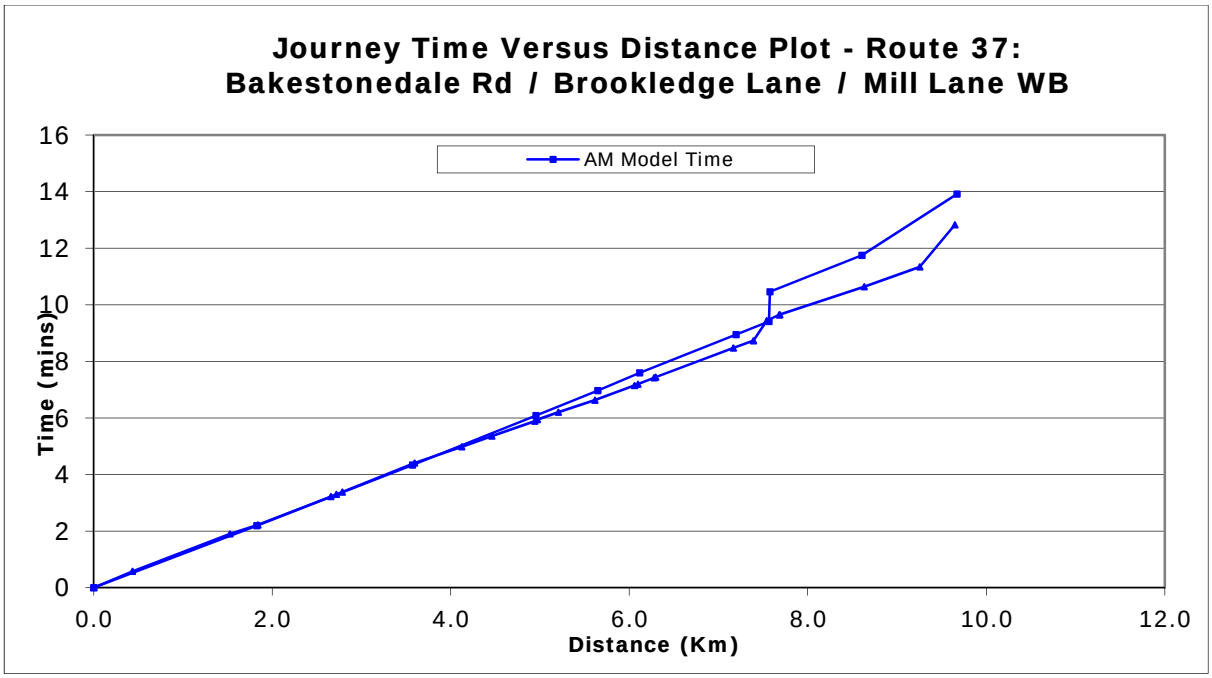
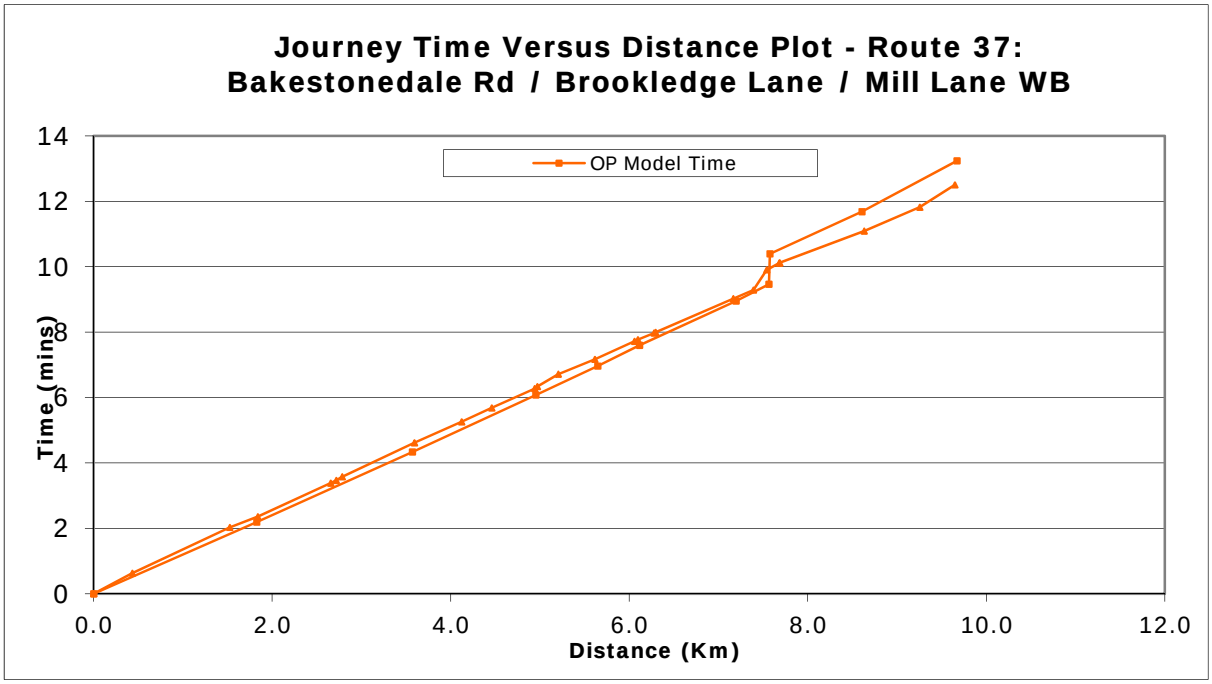
9.0


Journey Time Versus Distance Plot - Route 37: Bakestonedale Rd / Brookledge Lane / Mill Lane WB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 37:
Bakestonedale Rd / Brookledge Lane / Mill Lane WB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
2.0
4.0
6.0
8.0
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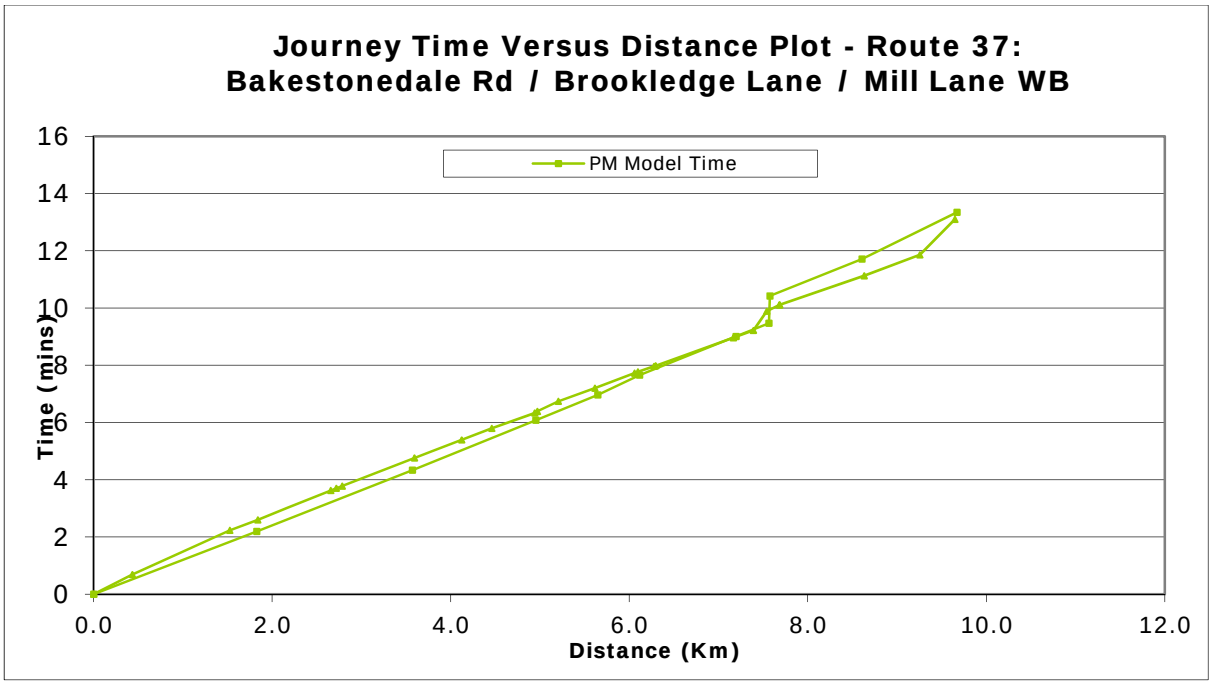
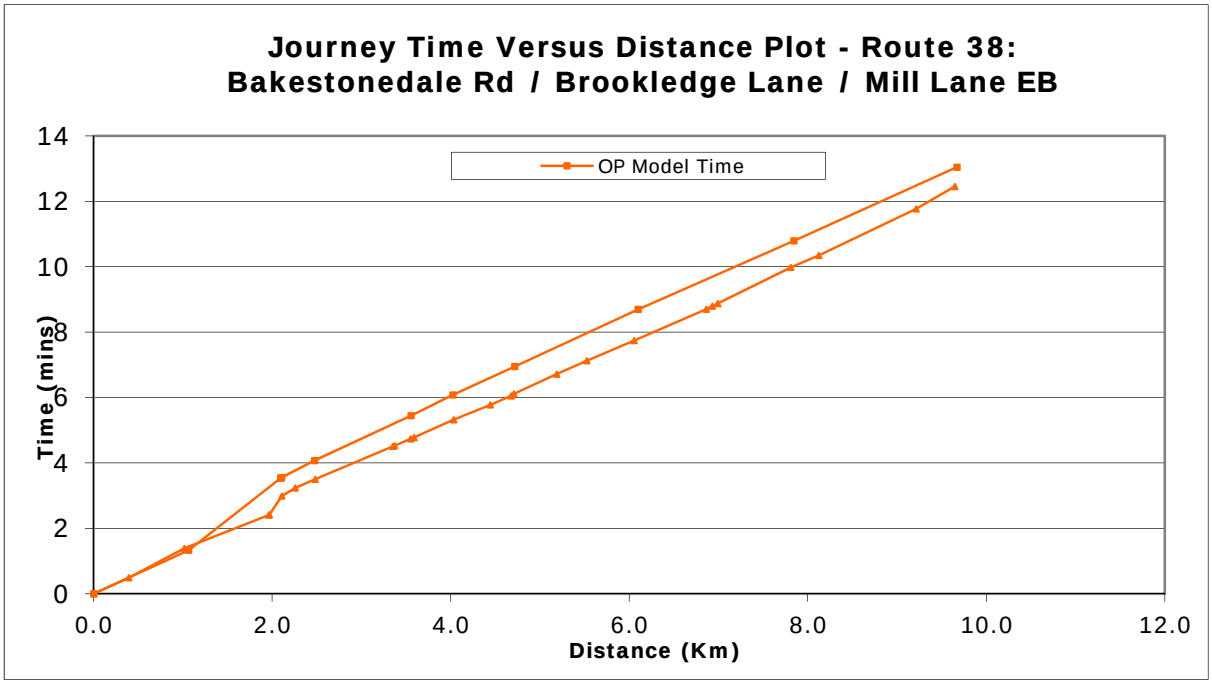
12.0


Journey Time Versus Distance Plot - Route 37:
Bakestonedale Rd / Brookledge Lane / Mill Lane WB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0
12.0


Journey Time Versus Distance Plot - Route 38:
Bakestonedale Rd / Brookledge Lane / Mill Lane EB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
2.0
4.0
6.0
8.0
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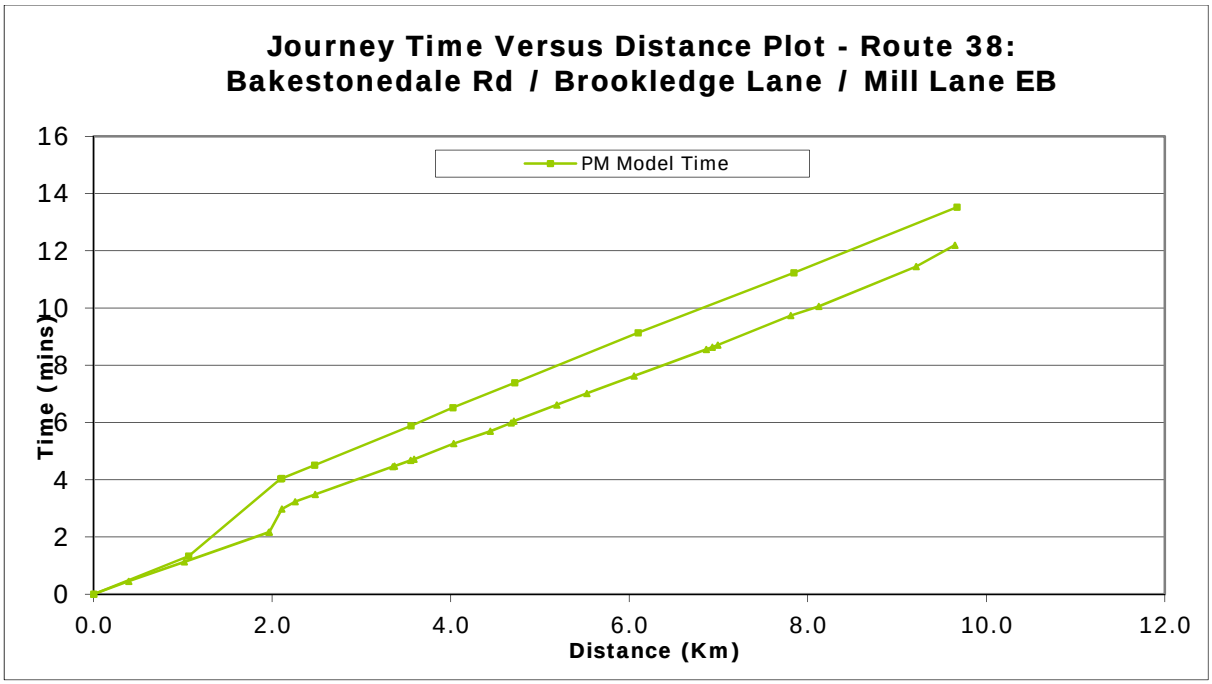
12.0


Journey Time Versus Distance Plot - Route 38:
Bakestonedale Rd / Brookledge Lane / Mill Lane EB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
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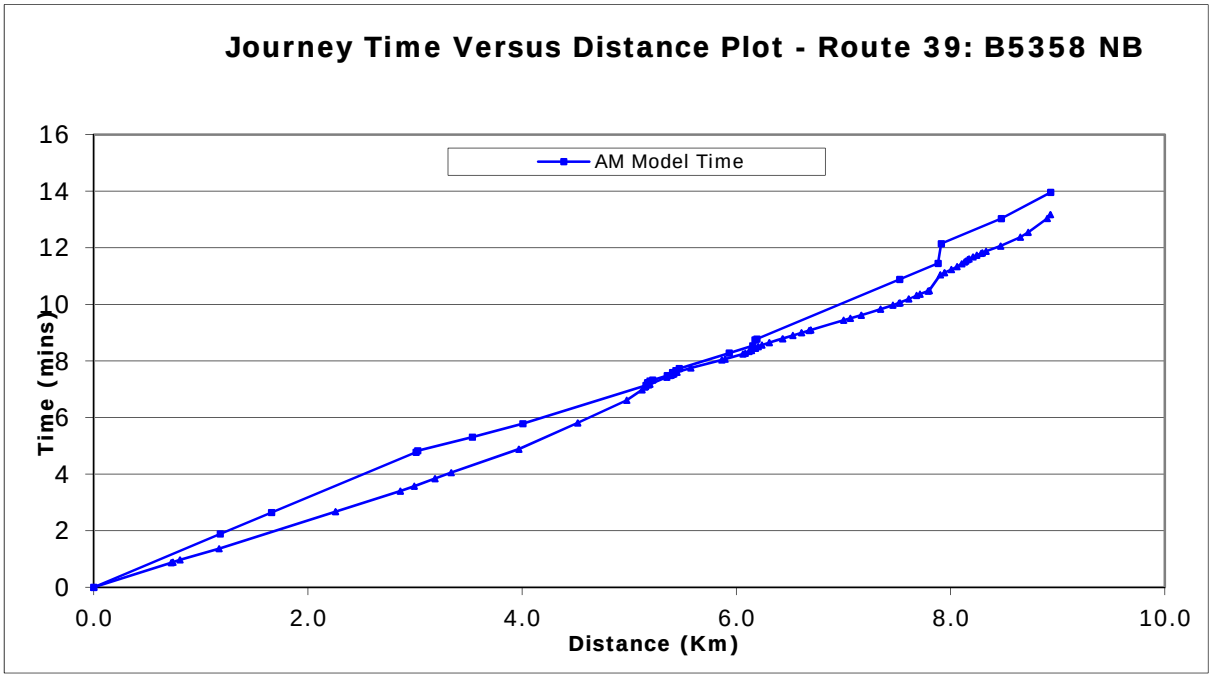
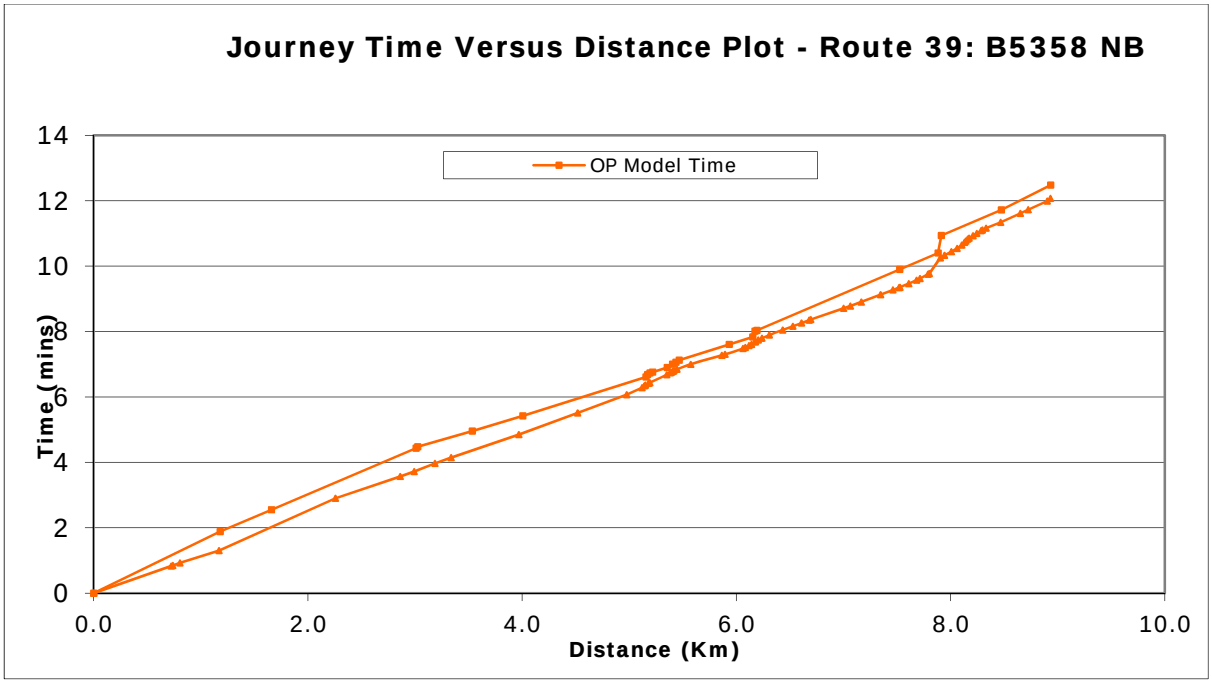
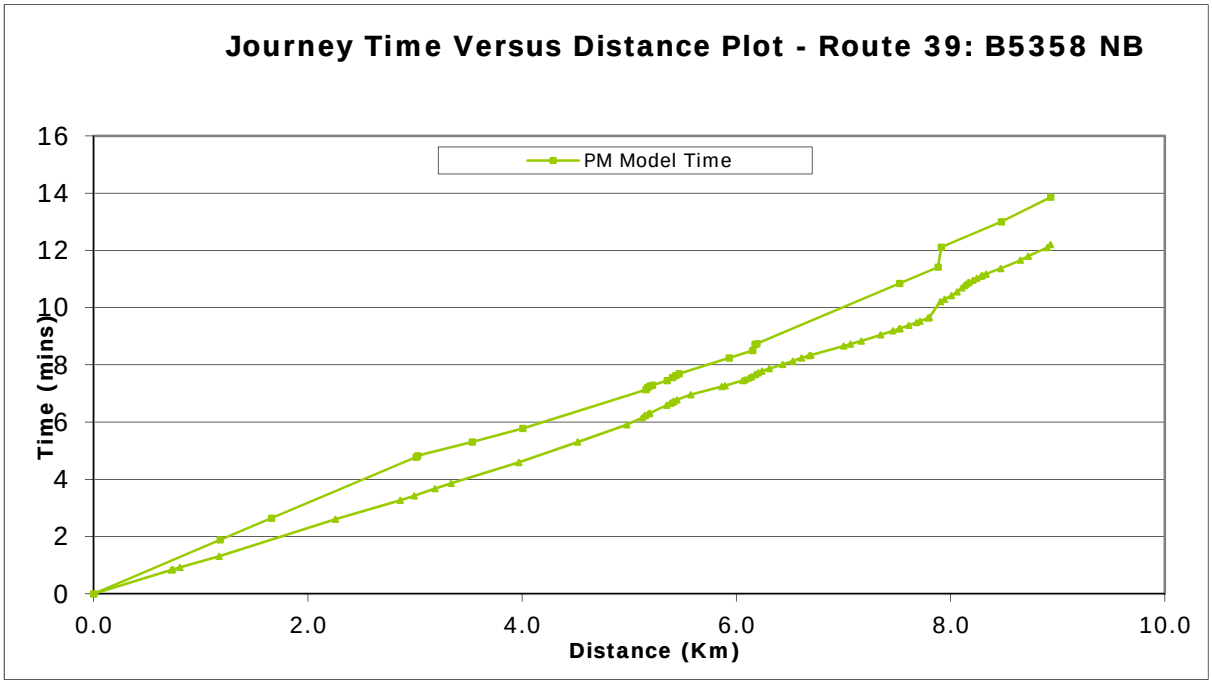
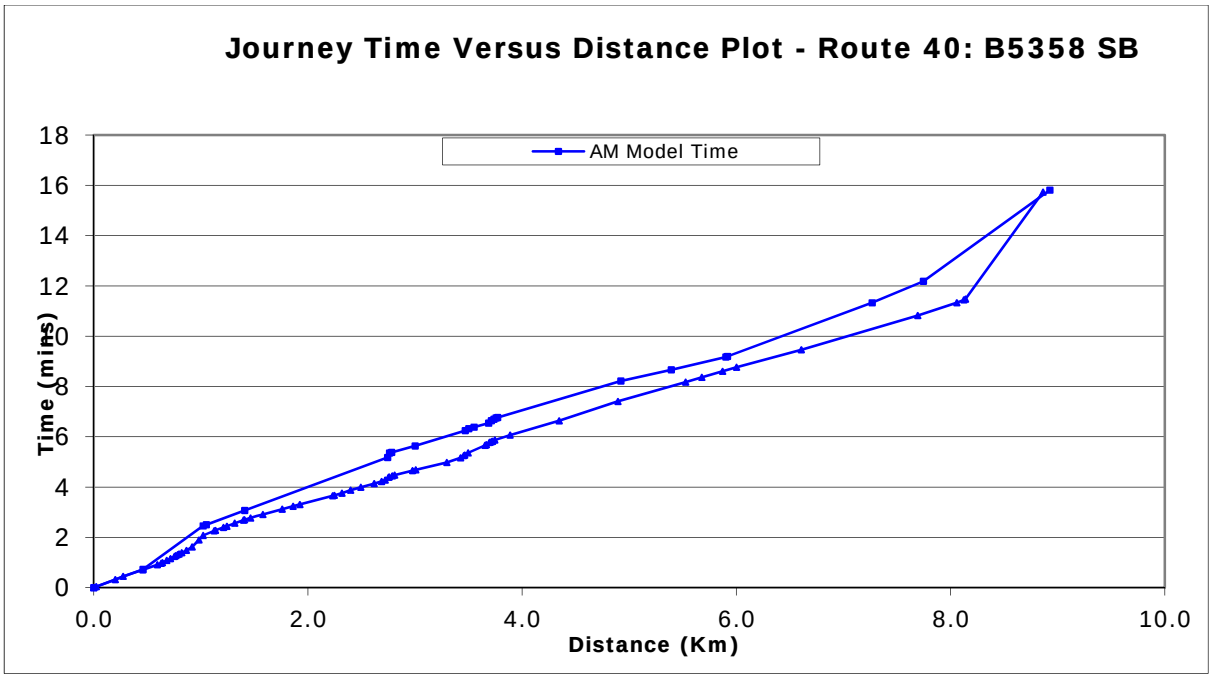
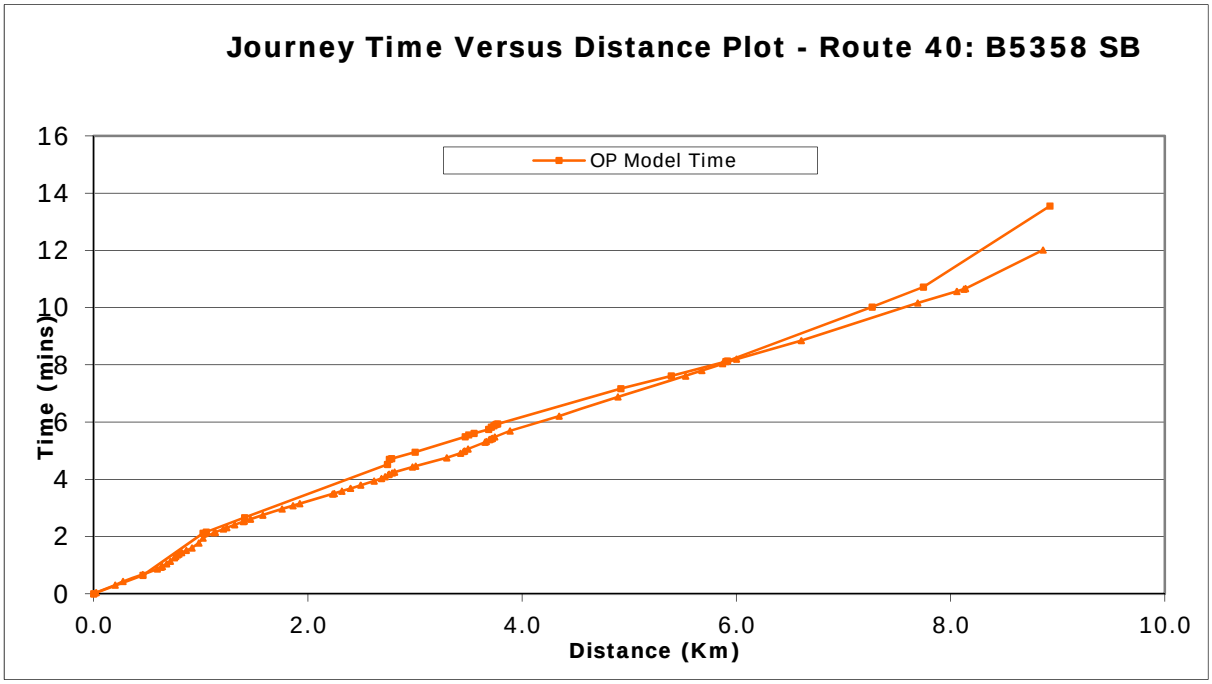
12.0

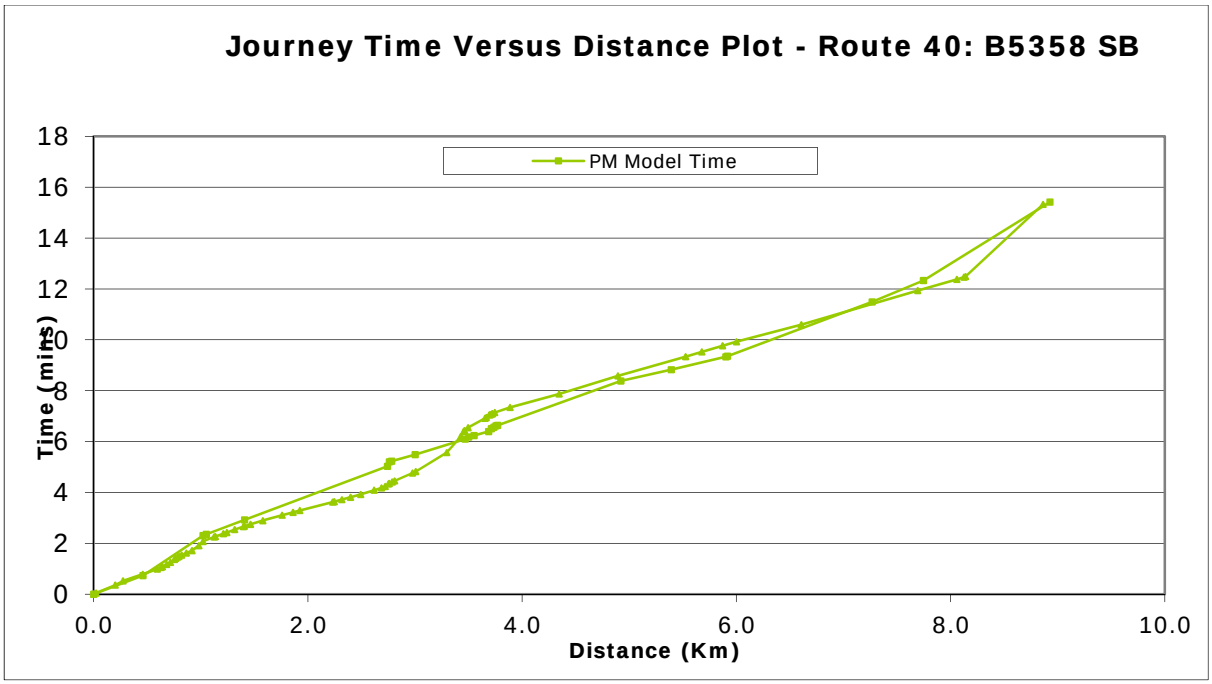

Journey Time Versus Distance Plot - Route 39: B5358 NB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0

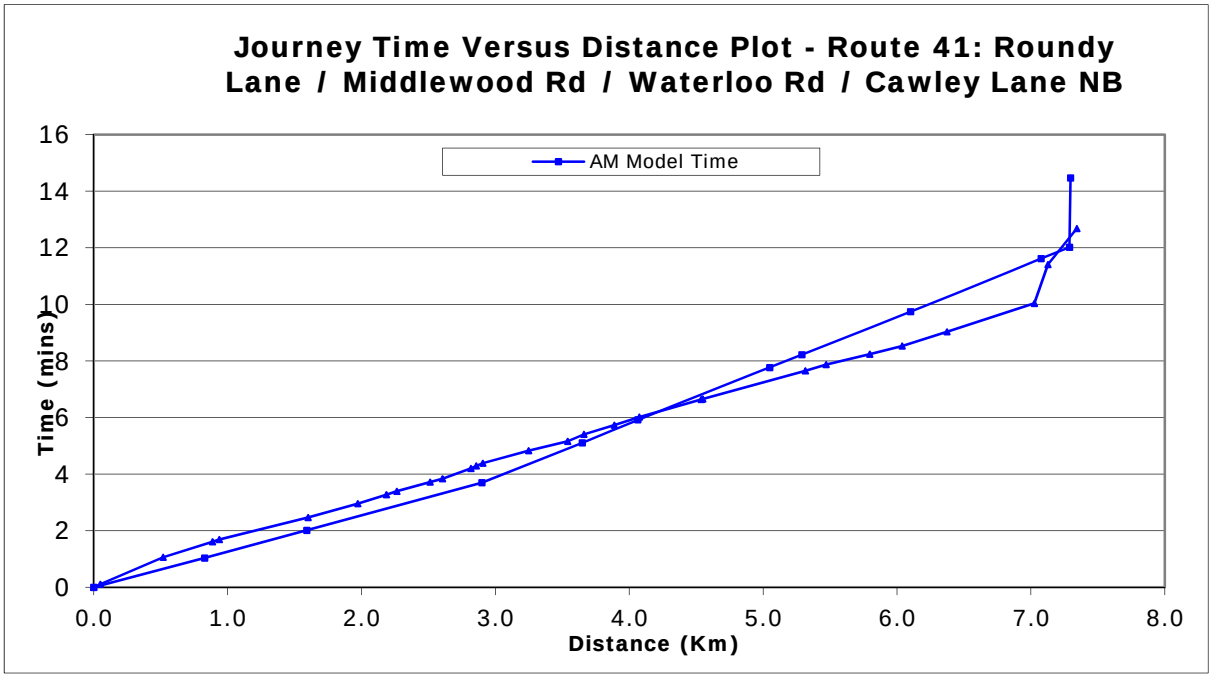

Journey Time Versus Distance Plot - Route 39: B5358 NB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
2.0
4.0
6.0
8.0
10.0

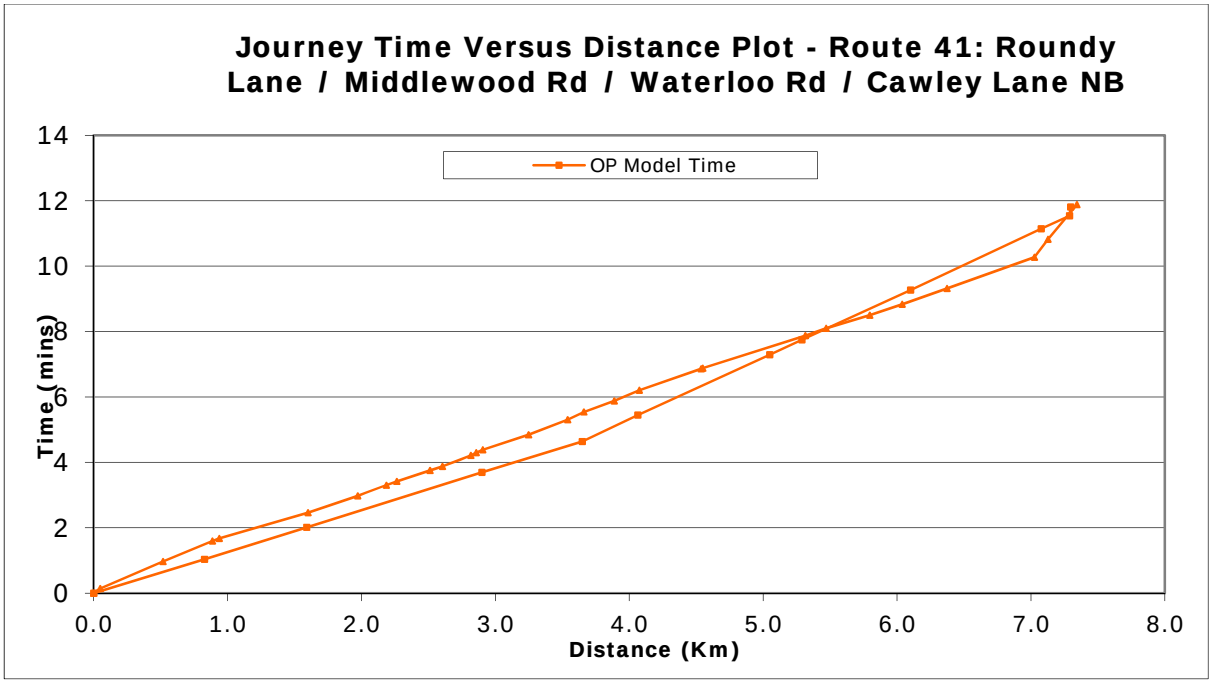

Journey Time Versus Distance Plot - Route 39: B5358 NB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0

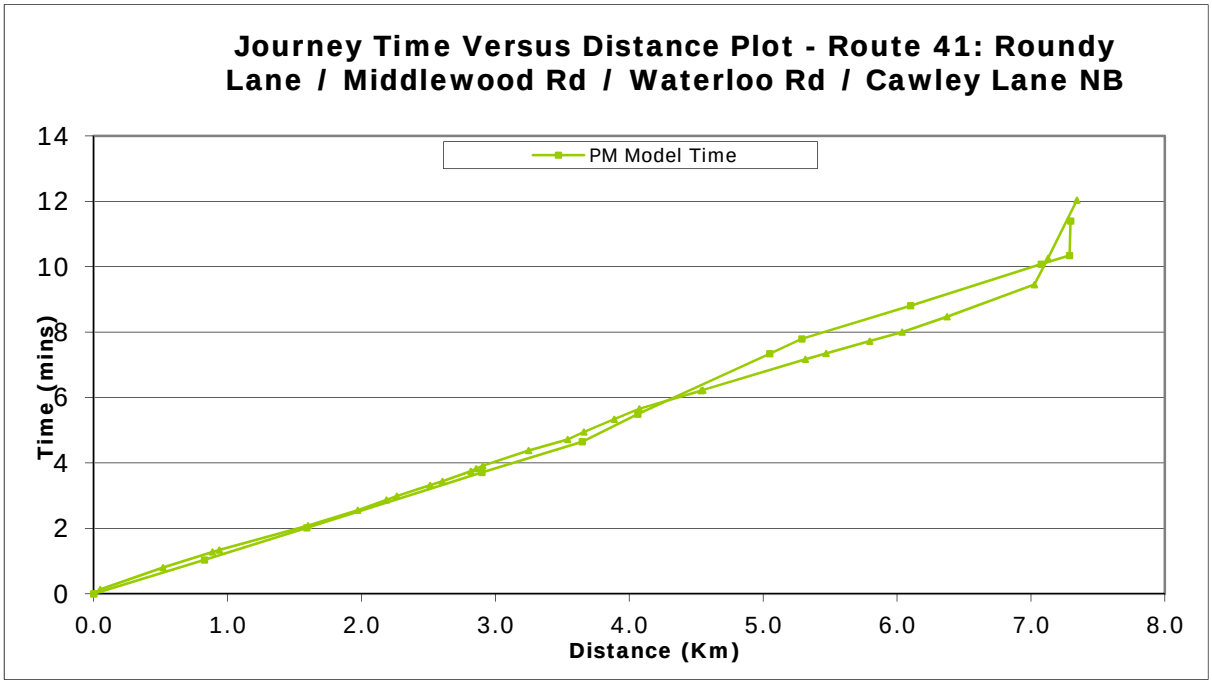

Journey Time Versus Distance Plot - Route 40: B5358 SB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0

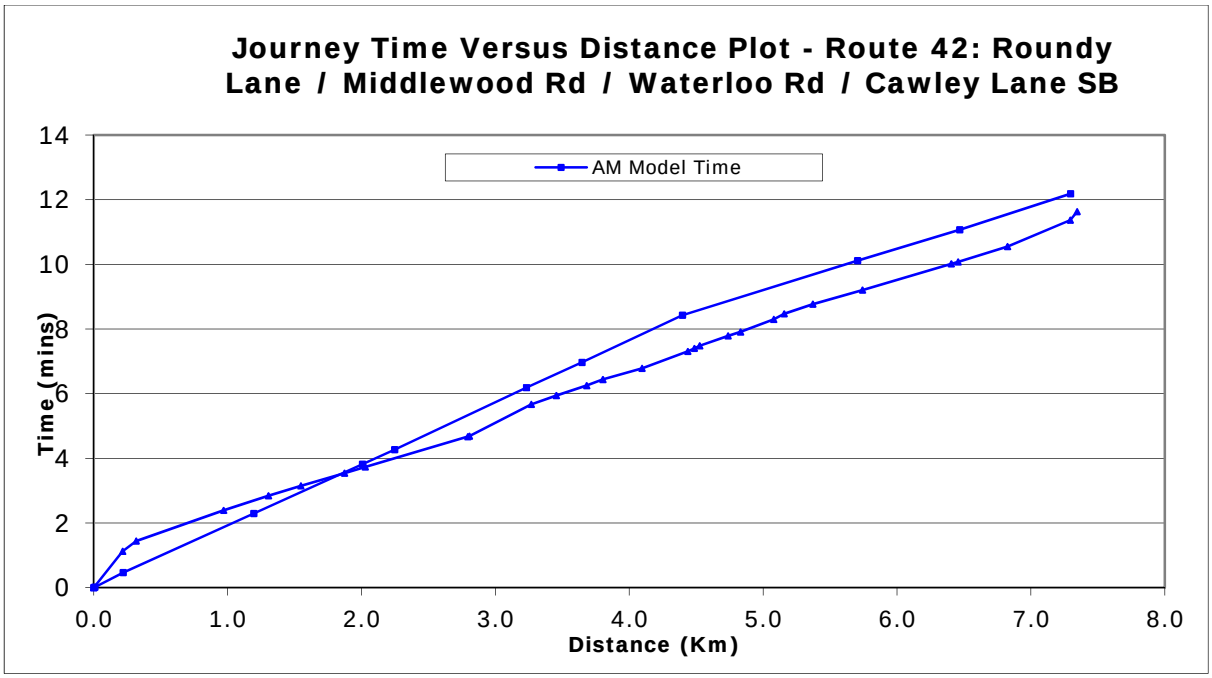

Journey Time Versus Distance Plot - Route 40: B5358 SB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
2.0
4.0
6.0
8.0
10.0

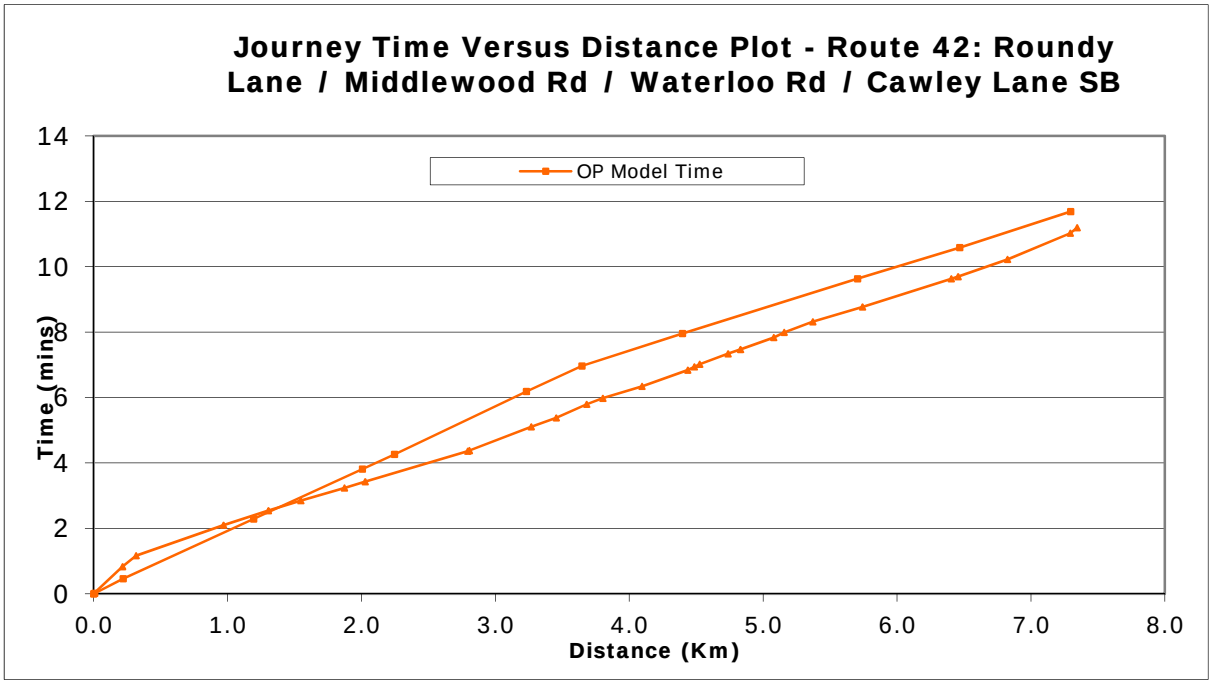

Journey Time Versus Distance Plot - Route 40: B5358 SB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
18
0.0
2.0
4.0
6.0
8.0
10.0

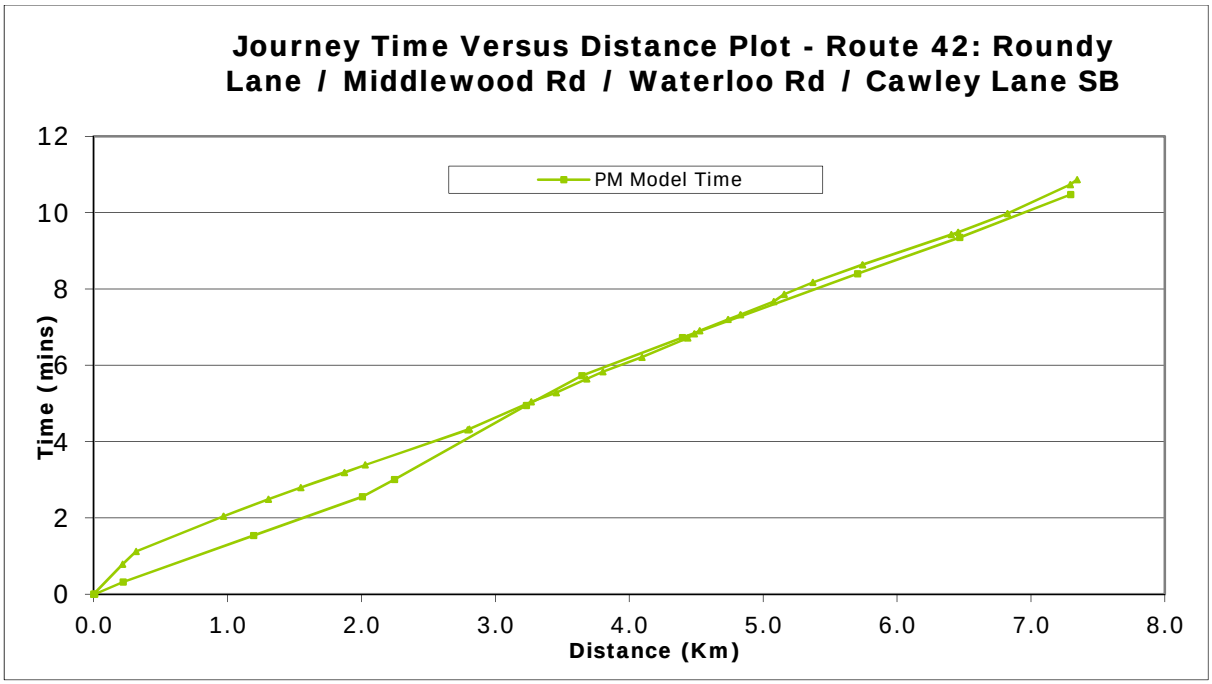

Journey Time Versus Distance Plot - Route 41: Roundy Lane / Middlewood Rd / Waterloo Rd / Cawley Lane NB
AM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
16
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0


Journey Time Versus Distance Plot - Route 41: Roundy Lane / Middlewood Rd / Waterloo Rd / Cawley Lane NB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0


Journey Time Versus Distance Plot - Route 41: Roundy Lane / Middlewood Rd / Waterloo Rd / Cawley Lane NB
PM Model Time
Time (mins)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Distance (Km)


Journey Time Versus Distance Plot - Route 42: Roundy Lane / Middlewood Rd / Waterloo Rd / Cawley Lane SB
AM Model Time
Time (mins)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
Distance (Km)


Journey Time Versus Distance Plot - Route 42: Roundy Lane / Middlewood Rd / Waterloo Rd / Cawley Lane SB
OP Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
14
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0


Journey Time Versus Distance Plot - Route 42: Roundy Lane / Middlewood Rd / Waterloo Rd / Cawley Lane SB
PM Model Time
Time (mins)
Distance (Km)
0
2
4
6
8
10
12
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0