Transport Model for Scotland

Public Transport Model – 2005 rebase - Development and Validation – Draft Report

Prepared for
Transport Scotland

May 2007

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Document Control

Project Title:	**TMfS**
MVA Project Number:	C32142
Document Type:	Report
WP Reference:	ab
Directory & File Name:	H:\Contracts\Live\C3214200_Transport Model for Scotland\Reports\TMfS05 Cal Val\PT\TMfS05 PTAM Cal Val Final Report

Document Approval

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Issue	Date	Distribution	Comments
1	25/07/06	Annabel Eccles	Initial Draft for Comment
2	08/08/06	Kevin Lumsden	For Review
3	27/09/06	Transport Scotland	Draft for Comment
4	15/05/07	Transport Scotland STPR Team TTAA TMfS User Group	Final Report

1   Introduction

1.1   Background

1.1.1   In 2001, MVA was commissioned by the Scottish Executive (now Transport Scotland) to undertake the Transport Model for Scotland (TMfS) project. The purpose was to build on existing transport models (eg CSTM3 and CSTM3A) and develop, support and maintain a methodologically enhanced and geographically expanded multi-modal forecasting tool.

1.1.2   The development of TMfS was completed in August 2004. The model has a Base Year of 2002. Since completion, the model has since been used for a range of infrastructure and policy assessments by MVA, other consultants, Local Authorities, the Scottish Executive and Transport Scotland.

1.2   2005 rebase

1.2.1   In December 2005, MVA was instructed by Transport Scotland to undertake a rebase of TMfS to a 2005 Base Year. This work involves the update and enhancement of the model to incorporate newly available data and other procedural enhancements.

1.2.2   This report describes the rebase of the TMfS Public Transport Model to a 2005 Base Year. Separate reports detail the other aspects of the TMfS 2005 rebase such as the Highways Model, Demand Model and Park and Ride Model as follows:

- TMfS05 HAM Cal Val Final Report, MVA May 2007; and

- TMfS05 Demand Model Development Report, MVA May 2007.

1.3   Development of Public Transport Model

1.3.1   The development of the 2002 Base Year Public Transport Model for TMfS is described in the report: TMfS PTAM Cal_Val_V8, MVA November 2004.

1.3.2   This report provides a description of the 2005 base model and includes information on the following:

- model dimensions and journey purposes;

- development of the modelled public transport network;

- development of demand matrices

- assignment procedures; and

- model validation.

1.4   Structure of this Report

1.4.1   Following this introductory Chapter, this Report includes the following chapters:

- **Chapter 2** describes the update of the PT network and services;

- **Chapter 3** describes the update of the demand matrices;

- **Chapter 4** describes the review of the assignment model parameters;

- **Chapter 5** details the validation of the 2005 rebase model; and

- **Chapter 6** provides conclusions and recommendations.

2 Public Transport Network

2.1 Public Transport Model Update

2.1.1 As part of the 2005 rebase, the PT network has been updated to include new infrastructure. In addition, selected public transport lines have been reviewed and updated to reflect changes in the timetabling and routeing.

2.2 Network Update

2.2.1 As per the 2002 Base Year version of TMfS, the Public Transport Model network is based on the highways assignment model network, which has also been rebased to 2005. The highways model development is described in TMfS05 HAM Cal Val Final Report, MVA May 2007.

2.2.2 As per the 2002 Base Year version of TMfS, rail/underground links and associated walk links have been added to the highways network in order to have a full representation of the public transport system. As part of the 2005 rebase, the rail network has been updated to include the following changes:

- a new station at Edinburgh Park;

- a new station at Gartcosh;

- addition of the Larkhall line including new stations at Chatelherault, Merryton and Larkhall; and

- a new station at Kelvindale.

2.3 Public Transport Lines Data

2.3.1 Timetables for the following public transport services have been reviewed and the coded PT lines files updated where appropriate:

- all First ScotRail services;

- all GNER and Virgin rail services that operate in Scotland;

- all Citylink, Megabus and Motorvator inter-urban bus services;

- Stagecoach Bluebird and Stagecoach Perth bus services; and

- Lothian Buses Park and Ride bus services.

3   Demand Matrix Update

3.1   Introduction

3.1.1   The rail element of the 2002 TMfS PT matrices has been updated to incorporate LENNON (Latest Earnings Networked Nationally Overnight) ticketing data. This data provides a more complete picture of rail demand in Scotland in 2005, which is superior to the existing rail demand data in TMfS.

3.1.2   The remainder of the 2002 TMfS PT matrix, ie travel demand by all other modes, has been retained in the absence of other new data.

3.2   Overview

3.2.1   The update of the demand matrices is described in detail below. The process can be summarised as follows:

- split 2002 matrices to isolate rail demand;

- process LENNON data to obtain station to station matrix for each time period;

- identification and removal of park and ride (station to station) trips;

- convert station to station matrices to true origin-destination TMfS zone matrices; and

- replace rail element of 2002 matrices with prepared LENNON rail demand matrices to form complete 2005 rebase PT matrices.

3.3   Matrix Split

3.3.1   Within TMfS, Public Transport matrices contain all public transport related movements in person trips (ie for all modes). In order to update the rail element of the 2002 TMfS PT demand matrices, it was necessary to first split the matrices by mode in order to isolate the rail demand. This has been undertaken using in-vehicle time skims extracted from the PT assignment.

3.3.2   The PT skims provide information for the 'best path' for each origin-destination pair, which can be split by mode. It should be noted that the skims represent a single (best) path and that it is not possible to extract skim data for alternative paths. A 'best path' may be made up by a series of journey legs by different modes, eg train and bus.

3.3.3   In order to separate the individual public transport modes, it was necessary to skim by individual mode. This provides a summation of time spent on each mode for each individual origin-destination (O-D) pair. The skimmed in-vehicle times by mode have then been used to identify the dominant mode for each O-D pair, where the dominant mode is defined as the trip segment with the largest time. The TMfS:02 PT demand matrix has been assigned using the dominant mode for each O-D pair.

3.3.4   The resulting matrices, split by mode, closely mirror the passenger loadings calculated by the TMfS:02 PT assignment model.

3.4   LENNON Data Processing

3.4.1   LENNON is the Association of Train Operating Companies' system for compiling ticket data and allocating revenues. For the purposes of the TMfS 2005 rebase,

data has been obtained for all rail trips originating or terminating at stations in Scotland from the Scottish Executive.

3.4.2   The LENNON data is based on all tickets sold, including ticket office, ticket machine, telephone, and internet sales over the year April 2004 to March 2005. Some tickets issued will result in more than one journey (eg return tickets or season tickets), and factors are applied within LENNON to convert the tickets issued to total journeys.

3.4.3   The LENNON data is also disaggregated by ticket type under the following categories:

- First full;

- First reduced;

- First advanced purchase;

- First season ticket;

- Standard full;

- Standard reduced;

- Standard advance purchase;

- Standard season ticket;

- Other; and

- No group.

3.4.4   For each category, the number of tickets issued and resultant journeys are defined.

3.4.5   The LENNON data does not represent true origin-destination data (for example from home to place of work). The data allocates journeys to the station of issue. For example a return ticket from Croy to Glasgow Queen Street would be counted as two journeys from Croy to Glasgow Queen Street rather than one in each direction.

3.4.6   A method has been devised to convert the LENNON ticket issue data to origin-destination data that provides a demand matrix of travel between rail stations. This process is described below.

Station Allocation

3.4.7   The LENNON data includes a large number of rail stations that lie outwith the TMfS modelled area, largely in northern Scotland but also in England and Wales. In addition, the data includes origins and destinations that are not station specific including station groupings (eg Glasgow BR), travelcards (eg SPT Zonecard) as well as special ticket types, including various tourist attractions and flexible tickets.

3.4.8   In order to produce a matrix of rail journeys within TMfS, it was necessary to allocate the LENNON ODs to an appropriate TMfS station. This was undertaken through the following procedures.

- a station allocation table was defined to allocate LENNON ODs to equivalent TMfS stations wherever possible. For stations outwith the modelled network

appropriate stations at the edges of the network were allocated, eg Carlisle, Berwick upon Tweed, Dunkeld; and

- where multiple TMfS stations (eg Glasgow BR) were possible a 'dummy station' was allocated in order that the processing of the LENNON data to modelled time periods could be completed. SPT Zonecards were also treated in this manner. Following the processing of the LENNON data the 'dummy stations' were manually assigned to the appropriate stations by examination of the rail network and local knowledge. Where multiple stations were possible, the split was based on the LENNON data for the valid station pairs.

Conversion to Annual Station to Station Matrix

3.4.9   Following the allocation of TMfS rail stations, it was then necessary to process the LENNON data into an annual station to station matrix. As highlighted previously, the LENNON data is not a true representation of origin and destination movements as journeys are allocated to the station of issue.

3.4.10   In creating a matrix that reflects the origin-destination stations of trips it was necessary to make a number of assumptions:

- the data is for a whole year, so the number of journeys between an Origin-Destination pair will be the same in each direction (ie the matrix will be symmetrical);

- where trips are observed in one direction only, then the number of journeys in each direction will be equal to half the observed trips; and

- where trips are observed in both directions (eg Glasgow-Edinburgh), the number of actual journeys in each direction will be the average of the two.

3.4.11   In practice this involves a number of stages that are carried out in a Microsoft Access Database (MS Access) as follows:

- transposing the matrix (swapping origin and destination);

- appending the original matrix to the transposed matrix; and

- averaging the journeys observed in both directions resulting in station-station matrix.

Modelled Time Period Demands

3.4.12   The LENNON data represents the total rail demand for a single year and, therefore, it was necessary to convert the data to AM, Interpeak and PM peak hour periods.

3.4.13   The first step undertaken was to convert the annual data to an average weekday. This was achieved by applying a standard factor, which assumes there are the equivalent of 310 average weekdays in a year. This allows for lower rail patronage at the weekend.

3.4.14   In order to convert the daily data to individual modelled time periods the ORCATS (Operational Research Allocation of Tickets to Services) demand profiles were applied. These profiles provide an estimation of rail demand throughout the day in 15 minute intervals based on the following variables:

- ticket type;
- journey distance; and
- journey type.

3.4.15   Three journey types were applicable for the rail data examined for TMfS:

- 'To Blue' - trips destined for major commuter stations;
- 'Ex Blue' - trips originating from major commuter zones; and
- 'Default' – all other journeys.

3.4.16   The major commuter stations were defined as Aberdeen, Dundee, Edinburgh Haymarket, Edinburgh Waverley, Glasgow Central and Glasgow Queen Street.

3.4.17   Using the above variables, the ORCATS profiles were applied to derive LENNON flow data for each time period in the form of a station to station matrix. The 'dummy stations' within this matrix were then manually assigned to the appropriate TMfS rail stations. This was undertaken using local knowledge of the rail network and rail boardings data from TMfS 2002.

3.5   Park and Ride

Park and Ride Assignment Model

3.5.1   The 2002 version of TMfS includes a supplementary Park and Ride Assignment Model (PARAM), which is implemented separately following a complete TMfS model run. The PARAM procedure requires the highway and PT demand and generalised cost matrices, city centre parking charges and a list of defined park and ride sites in order to predict the demand for park and ride. This change in demand is then applied to the highway and PT matrices, which are manipulated to allow for transfer to park and ride.

3.5.2   The PARAM process is best illustrated in a worked example as follows:

- TMfS currently includes a demand for highway trips between East Lothian and Edinburgh. If the PARAM includes the Newcraighall park and ride site as an attractive proposition then a proportion of these trips would be reassigned to park and ride.

- The output AM highway matrix would be adjusted to show trips that previously terminated in Edinburgh now terminating at Newcraighall.

- The output AM PT matrix would be adjusted to include additional trips between Newcraighall and Edinburgh.

3.5.3   The PARAM procedure is undertaken for all three time periods and also re-assigns trips from the PT demand matrices to park and ride.

3.5.4   The PARAM currently contains several rail stations and the 2005 rebase has included a significant number of additional stations. Therefore, the PARAM will almost certainly add rail trips to the final PT demand matrices. This could, in

effect, lead to the double counting of rail demand if the observed LENNON data is used to create the rail demand matrix.

3.5.5   In order to avoid double counting rail trips in TMfS post-PARAM, it is necessary to identify those trips on the rail network which are park and ride and remove them from the rail demand matrix. The trips will be reinstated when the PARAM model is run.

3.5.6   There are a number of important points to note with this approach:

- in order to obtain a complete PT demand matrix (and, hence, assignment) it is necessary to run the PARAM;

- the calibration and validation of the TMfS PT Assignment model should be carried out post-PARAM, hence the park and ride model becomes an integral part of TMfS; and

- the volume of rail trips created by the PARAM should closely mirror those removed from the observed matrix.

3.5.7   As the above points have satisfactorily been addressed in the 2005 rebase, the park and ride trips have been removed from the observed LENNON station to station matrix as described below.

Removal of Park and Ride Trips

3.5.8   The volume of park and ride trips in each time period for each station has been quantified based on the output from PARAM, which has been verified against the equivalent LENNON observed data.

3.5.9   In order to remove the park and ride rail trips from the observed LENNON matrix, it was necessary to identify the station to station park and ride movements. This has been undertaken by extracting the trip distributions from the PARAM. The matrices output from PARAM using TMfS:02 have been compared with the input matrices in order to identify the effects of the PARAM on the PT demand matrices. This provides information on the origin and destination of the park and ride trips at the TMfS zone level. In order to translate this to a station to station matrix, a station-zone allocation table was defined.

3.5.10 For the majority of trips a simple allocation was possible. However, in a number of instances an element of judgement was required. For example, trips destined for central Glasgow required to be allocated to either Glasgow Central or Glasgow Queen Street depending on the origin station. Similarly, trips destined for central Edinburgh had to be split between Edinburgh Waverley and Haymarket and this split was based on the TMfS boarding/alighting data.

3.5.11 Following the quantification and distribution of the park and ride rail trips, these were subtracted from the observed LENNON rail demand matrix to create a matrix suitable for inclusion in the 2005 rebase demand matrices. This park and ride demand was re-instated through the implementation of the PARAM.

3.6   Development of True Origin-Destination Rail Matrices

Manipulation of LENNON data

3.6.1   The LENNON data only provides information on the volume of trips on the rail network and, therefore, does not represent true origin-destination data. For example, the LENNON data will provide information on the volume of trips between

Glasgow Queen Street and Croy stations but does not detail where those trips ultimately originated from and are destined to. Therefore, the LENNON station to station matrix needs to be converted to the TMfS zone matrix. It should be noted that this process has been undertaken following the removal of the park and ride trips as noted above.

3.6.2   The conversion of the station to station matrix to the TMfS zone system has been undertaken using an allocation table. This has been developed through a process of manual inspection of the TMfS network to identify the nearest zone to each station node. TMfS highway distance skims were then used to determine a list of the zones that fell within a reasonable walking distance radius of each identified station zone.

3.6.3   Using the defined allocation table, station to station trips were distributed to TMfS zones at the origin and destination. The proportion of trips allocated to each zone was calculated based on the following characteristics.

- planning data for each zone from TMfS – depending on the nature of the origin/destination station, either population or employment data was used to proportionally distribute trips between zones;

- distance between rail station and TMfS zone – a TMfS highway distance skim provided information on the distance between the station and each zone, a process based on a traditional gravity model assigns trips to zones with a higher proportion of trips being assigned to closer zones; and

- settlement type of each station – four settlement types were defined for which the trip distribution would be different: Major Urban (eg Edinburgh Waverley), Urban (eg Ayr), Urban Local (eg Glasgow Charing Cross) and Rural (eg Montrose). The assigned settlement type influences the selection of planning data and distance weightings.

3.7   Creation of 2005 TMfS Public Transport Matrices

3.7.1   The LENNON based true origin-destination rail matrix was used to replace the extracted TMfS:02 rail matrices and, thus, create the complete 2005 pre-park and ride TMfS PT matrices.

3.7.2   Table 3.1 compares the 2002 TMfS total trips to the 2005 rebase TMfS Matrix total trips.

Table 3.1   Comparison of TMfS and 2005 rebase Matrices Trip Totals

Time Period	TMfS 2002	TMfS 2005 rebase	Absolute Difference	% Difference
AM Peak hour	98998	99300	+302	0%
Inter Peak hour	65744	61267	-4,477	-7%
PM Peak hour	101181	95246	-5,935	-6%

3.7.3   Table 3.1 indicates that in the AM peak the total PT travel demand is relatively unchanged, compared to 2002, as a result of the 2005 rebase matrix update. For the interpeak and PM peak, however, there is a noticeable reduction in travel demand as a result of the 2005 rebase. This is because the LENNON data indicates a lower rail demand than that extracted from the 2002 TMfS demand matrices.

4 Assignment Model

4.1 Introduction

4.1.1 This Chapter describes the review and update of the public transport assignment model. The 2005 rebase TMfS PT model procedures and parameters are largely the same as the original version of TMfS. Specifically, the following aspects of the assignment model have been reviewed and updated:

- introduction of crowding;

- introduction of 'wait curves';

- review of assignment model parameters; and

- update of fares model.

4.2 Assignment Model Inputs

4.2.1 The inputs to the Public Transport Assignment Model for each time period are:

- public transport highway and rail network (described in Chapter 2);

- public transport lines file (described in Chapter 2); and

- hourly assignment matrices (described in Chapter 3).

4.3 Path Building and Loading

4.3.1 The path building and loading procedures are the same as those applied in the original version of the model. In summary, the CUBE public transport assignment model software has been utilised with the following modelling stages:

- Walk Choice Model;

- Service Model;

- Alternative Alighting Model; and

- Sub-Mode Choice Model.

4.3.2 Further details relating to the assignment model can be found in the original MVA Development and Validation report: TMfS PTAM Cal_Val_V8, MVA November 2004.

4.4 Crowding

4.4.1 Prior to the 2005 rebase, TMfS did not include crowding effects on bus or rail.

4.4.2 This was for two main reasons;

- There is an assumption that generally, public transport operators would increase supply to match demand wherever possible, and thus keep the average load factors broadly constant. In the case of bus, particularly inter-urban, this is considered a reasonable assumption to make for modelling purposes.

- The implementation of public transport crowding is likely to add significantly to model run times, since the public transport assignment process would then become iterative as an equilibrium position would be sought.

4.4.3   It is common to implement public transport crowding in major public transport models in urban areas, for example London Transportation Studies (LTS), PLANET, RAILPLAN and the Dublin Transportation Office Model. In these models, the crowding is implemented by use of multiplicative crowding factors which are applied to the in-vehicle time component of generalised cost. These factors are known as crowding curves, which are the public transport parallel to highways based speed flow curves in terms of their impact on generalised cost.

4.4.4   Implementation of crowding for rail is likely to improve the quality of the modelled forecasts for public transport passenger flows, particularly in corridors of significant rail competition, as well as for road traffic.

4.4.5   The principal issues involved in the implementation of crowding are;

- how to achieve this with minimum impact on overall model run times;

- what form of crowding curve to adopt; and

- whether it is necessary to apply the crowding for inter-peak as well as peak period.

4.4.6   These issues have been examined in a testing process which has identified an optimum method to include crowding whilst minimising the adverse effects on model run time.

4.4.7   Public transport crowding has been included in the TMfS PT assignment procedures for the morning and evening peak. Crowding is not considered to be a significant issue outwith the peak periods and, therefore, has not been included in the inter-peak period. This also assists in minimising the impact on run times.

4.4.8   PT crowding is an iterative process where the model calculates an initial set of crowding factors and passenger loadings. These are then fed back into the model and a revised set of crowding factors and passenger loadings are calculated. Convergence of the model is reached when the factors and loadings stop changing considerably between iterations. The number of iterations is specified by the user and the objective is to minimise the number of iterations required, while achieving stable network conditions. A review of the model convergence has shown that five iterations are appropriate for the TMfS assignment using the load and crowd factor averaging procedures.

4.4.9   The PT crowding assignment requires the specification of the following data:

- PT crowding curves;

- PT line capacities; and

- passenger and vehicle arrival profiles.

4.4.10   Crowding curves are implemented as multiplicative curves in the CUBE public transport assignment procedures. For each level of utilisation the free link journey time is multiplied by the appropriate adjustment factor to represent the perceived journey time whilst spent in crowded conditions.

4.4.11   The measure of utilisation in CUBE is approximately the same as the percentage of standing passengers as a proportion of the capacity for standing passengers. Utilisation is therefore zero until all seats are occupied and standing is necessary. Utilisation is 100% when the vehicle is at crush capacity, ie all standing room is taken.

4.4.12   The UK Rail standard curves included in the Passenger Demand Forecasting Handbook (PDFH) are multiplicative and are applicable to rail only. The PDFH Non-

London Commuting Rail Crowding curve has been allocated to all rail lines in TMfS in the morning and evening peak. The data points for this curve are shown in Table 4.1.

Table 4.1   PDFH Non-London Commuting Rail Crowding

Utilisation	Crowding Factor
0%	1.100
20%	1.188
40%	1.276
60%	1.364
80%	1.452
100%	1.540

4.4.13   No crowding calculations were performed for the bus lines as it is assumed that operators would increase supply to match demand wherever possible, and thus keep the average load factors broadly constant.

4.4.14   Capacities have been coded for all rail lines in the morning and evening peak periods based on rolling stock usage in 2005. The crush capacity was assumed to be 40% above the seated capacity. A review of the assigned ratios of loading to capacity for coded rail services is included in Chapter 5.

4.4.15   In the absence of any data, the passenger and vehicle arrival profiles have been assumed to be level throughout the modelled time periods. This is a potential weakness in the crowding procedures applied in that there is no allowance for varying demand on individual services within the peak hour modelled. This may result in an underestimation of crowding on certain services where the number of passengers is above the hourly average.

4.5   Wait Curves

4.5.1   Prior to the 2005 rebase, TMfS followed the practice of CSTM3 in public transport assignment and did not include wait curves. Instead, the default wait time of half the headway multiplied by the wait time factor was calculated. The range of calculated wait times is restricted within a minimum and maximum of 0 to 15 minutes respectively in TMfS.

4.5.2   This default calculation does not necessarily provide a realistic representation of average wait times for long distance services with larger headways. Therefore, wait curves have been implemented for inter-urban bus and all rail lines in the 2005 rebase of TMfS. Two wait curves (derived from PDFH) have been applied to morning and evening peak periods and the inter-peak period, respectively. It should be noted that wait curves calculate the wait time in real time and, therefore, no wait time factor is applied.

4.5.3   For urban bus and underground the default wait time calculation has been applied with a wait time factor of 1.8, as per the previous version of TMfS.

4.5.4   Table 4.2 compares the wait curves with the default wait times, including any wait time factors.

Table 4.2   Wait Times

Headway (minutes)	Wait Time (minutes)			
	AM / PM Wait Curve (no factor)	Interpeak Wait Curve (no factor)	Default Wait Time (unfactored)	Default Wait Time (factored)
5	4	4	2.5	4.5
10	8	7	5	9
15	12	10	7.5	13.5
20	15	12	10	18
30	22	17	15	27
40	28	20.5	20	36
60	36	27	30	54
90	49	33	45	81
120	63	39	60	108
180	87	51	90	162

4.5.5   It should be noted that the minimum wait time has been set at 0 minutes and the maximum wait time has been set at 60 minutes for all modes.

4.6   Assignment Model Parameters

4.6.1   The assignment model parameters have been reviewed as part of the 2005 rebase. This has been necessary as the introduction of rail crowding and wait curves has affected the level of generalised cost.

4.6.2   A range of parameters are available to control the path building process, including:

- mode specific in-vehicle time weighting factors;
- mode specific waiting time weighting factors;
- walk time weighting factors;
- mode specific boarding penalties;
- mode to mode transfer penalties (Sub-Mode Choice Model only); and
- mode specific minimum and maximum wait times.

4.6.3   The assignment model parameters, common to peak and inter-peak assignments, are shown in Table 4.3.

Table 4.3   Public Transport Assignment Model Parameters

Model Parameter	Value/Factor
Parameter:	
In vehicle times – bus	1.5
- rail/underground	1.0
Walk Time Factor	1.6
Wait Time Factor (Urban Bus/Underground/Ferry)	1.8
Minimum Wait Time	0
Maximum Wait Time	60
Transfer Penalty	
- rail to rail or underground	5 mins
- underground to rail or underground	5 mins
- bus to bus	10 mins
- bus to rail/underground and vice versa	10 mins
Value of time:	
- in work	2016.169 p/hr
- non work	489.781 p/hr

4.6.4   It should be noted that the in-vehicle times factor for urban and inter-urban bus has been increased from a value of 1.2 in TMfS 2002 to 1.5 in the 2005 rebase. This was necessary to calibrate the model because of the increase in rail generalised cost as a result of the inclusion of rail crowding. In addition, the 2005 rebase includes a greater increase in rail fares than bus, particularly in the morning and evening peak (see Section 4.7 below). The increase in rail generalised cost compared to bus resulted in unrealistic mode split within the model. Therefore, the bus in-vehicle times factor was increased to achieve the appropriate ratio of generalised cost between bus and rail and, hence, mode split.

4.6.5   All parameters were based on standard ranges used in other studies. The values in Table 4.3 are the values used in the final calibration.

4.6.6   Values of time were derived using the Transport Economic Note (TEN) methodology, with Values of Time taken from WebTAG 3.5.6 (June 2004). Using the average earnings data, a factor was derived and applied to the 2005 Value of time to produce the value used in TMfS. In-work and non-work values of time were also used for the TMfS Demand Model.

4.6.7   The in-work value of time is, however, largely irrelevant to public transport assignment models, as comparatively few public transport trips are made in the course of employment. Therefore, the non-work value of time was used to represent all trips in the public transport assignment models.

4.7   Fares Model

4.7.1   As part of the 2005 rebase, the Fares Model has been updated to reflect changes in fares since 2002.

4.7.2   The Fares Model for TMfS is based on a boarding charge for each mode of PT and a set of Fare Tables for different types of PT operators.

4.7.3   The Fare Tables consist of a set of distances and fares that define points on a curve. For distances between two fixed points in the table, the Fares Model will linearly interpolate to find the fare.

4.7.4   For Glasgow Underground, the Renfrew Foot Ferry and Lothian Buses Park and Ride, all fares in the table are set to a single 'flat' fare. This is because there is only one fare regardless of the length of the journey.

4.7.5   The following changes have been made to the TMfS fares table as part of the 2005 rebase:

- Lothian buses, Glasgow Underground and the Renfrew Foot Ferry have all been updated to reflect 2005 fares;

- all other urban bus fares have been increased to 2005 prices using the Retail Price Index;

- inclusion of Lothian Buses Ingilston Park and Ride standard fare;

- inter-urban bus and rail fares have been recalculated to reflect 2005 fares;

- a separate fares table has been defined for each time period in order to represent peak rail fares; and

- a separate rail fares table has defined for the Strathclyde area where examination of the fares structure indicated a significant difference to the rest of Scotland.

4.7.6   Table 4.4 shows the fares as they are coded in the model.

Table 4.4   Modelled PT Fares (Based on 2005 prices)

Distance (km)	Morning Peak Fare (pence)	Interpeak Fare (pence)	Evening Peak Fare (pence)
1 Lothian Buses			
0.00	80	80	80
1.60	80	80	80
6.40	80	80	80
7.20	100	100	100
1000.00	100	100	100
2 Inter-Urban Bus			
0.00	160	160	160
500.00	3196	3196	3196
1000.00	6393	6393	6393
3 ScotRail			
0.00	60	60	60
10.40	201	158	201
46.80	695	503	695
91.60	1302	927	1302
183.20	2544	1794	2544
366.40	5028	3529	5028
4 Glasgow Underground			
0.00	100	100	100
1000.00	100	100	100
5 Other Rail			
0.00	95	95	95
1.91	110	110	110
60.75	560	560	560
80.51	800	800	800
99.52	1270	1270	1270
152.36	2650	2650	2650
293.97	4950	4950	4950
6 Renfrew Foot Ferry			
0.00	100	100	100
1000.00	100	100	100
7 Other Urban Bus			
0.00	72	72	72
10.00	124	124	124
20.00	213	213	213
30.00	236	236	236
40.00	259	259	259
50.00	279	279	279
1000.00	279	279	279
8 Lothian Buses - Ingilston Park and Ride			
0.00	100	100	100
1000.00	100	100	100
9 Strathclyde Trains			
0.00	60	60	60
10.40	152	123	123
46.80	476	345	345
91.60	874	618	618
183.20	1687	1177	1177
366.40	3314	2294	2294

4.7.7   The above fares include the mode specific boarding fares (as required by the model), which are as follows. This parameter is called FBOARD and is unchanged from the original version of TMfS as indicated in Table 4.5.

Table 4.5   Boarding Fares

Mode	Description	FBOARD (pence)
1	Urban Bus	50
2	Inter-Urban Bus	160
3	Rail	60
4	Underground	90
5	Ferry	90

4.7.8   When coding fares the model boarding fares are coded separately and removed (subtracted) from the fares tables. This enables use of refunded fares on boarding for transfer journeys using the REDF parameter should this be required. The refunded boarding fares cannot exceed the minimum of the model boarding fares for the modes being transferred to and from.

5 Model Validation

5.1 Introduction

5.1.1 This Chapter describes the validation process undertaken for the assignment of the 2005 rebase networks and matrices through detailed analysis of the following:

- LENNON station to station electronic rail ticket data (see Chapter 3);

- historical bus and rail passenger survey data; and

- comparison of timetabled and modelled bus journey times.

5.1.2 The validation of the 2005 rebase PT assignment model has compared the modelled flows with equivalent observed data. This has focused on screenlines for which the modelled flow would typically be expected to be within 15% of observed, as indicated in Appendix E of the *Major Scheme Appraisal in Local Transport Plans* document.

5.1.3 The analysis of the modelled flows also makes use of a summary statistic known as GEH, which is defined as:

$$GEH = ((observed-modelled)^2/(0.5*(observed+modelled)))^{0.5}$$

5.1.4 The GEH value is designed to be more tolerant of large percentage differences at lower flows. For example, one would not normally be concerned about a modelled flow which differed from a count by 40% if the count was only 100, but one would be if the count were 1000. The reason for introducing such a statistic is the inability of either the absolute difference or the relative difference to reflect differences over the wide range of flows contained in the model.

5.1.5 The GEH statistic is typically used for the validation of highways assignment models. It is, however, also a useful indicator for PT assignment model though a greater level of tolerance would be expected due to the higher level of variation of public transport data. For a model of this complexity and size a GEH of 5 or less is considered to be excellent. Values between 5 and 10 are considered within an acceptable range. Beyond this the level of validation would be less acceptable.

5.2 Validation to LENNON Data

5.2.1 The LENNON station to station data has been assigned to the modelled network to allow comparison with the modelled assignments for each time period. This has been achieved using the CUBE programme MVESTL, which assigns observed data to PT lines data and, hence, the modelled network. This requires the specification of a rail line for each station to station movement. Where a movement uses multiple lines (ie requires a change of train) it is necessary to split the trip and specify each leg of the journey.

Passenger Loading Comparisons

5.2.2 Tables 5.1 and 5.4 indicate the comparison of the LENNON passenger loadings with the modelled assignments for select screenlines and cordons across the rail network. Appendix A contains the individual count comparisons at the screenlines and cordons as well as at a selection of strategic locations.

Table 5.1   Summary of Central Scotland East West Rail Screenline

Cordon		LENNON	Assigned	Diff	% Diff	GEH
INBOUND	AM	1366	1550	184	13%	5
	IP	491	569	78	16%	3
	PM	1274	1337	63	5%	2
OUTBOUND	AM	1284	1324	40	3%	1
	IP	493	577	84	17%	4
	PM	1331	1253	-78	-6%	2

Table 5.2   Summary of Forth Estuary Rail Screenline

Cordon		LENNON	Assigned	Diff	% Diff	GEH
INBOUND	AM	794	906	112	14%	4
	IP	374	459	85	23%	4
	PM	1431	1488	57	4%	1
OUTBOUND	AM	1451	1474	23	2%	1
	IP	372	433	61	16%	3
	PM	594	592	-2	0%	0

Table 5.3   Summary of Edinburgh Rail Cordon

Cordon		LENNON	Assigned	Diff	% Diff	GEH
INBOUND	AM	4277	4294	17	0%	0
	IP	1134	1251	117	10%	3
	PM	2013	2246	233	12%	5
OUTBOUND	AM	2544	2780	236	9%	5
	IP	1128	1274	146	13%	4
	PM	3956	3916	-40	-1%	1

Table 5.4   Summary of Glasgow Rail Cordon

Cordon		LENNON	Assigned	Diff	% Diff	GEH
INBOUND	AM	9290	8187	-1103	-12%	12
	IP	1878	1891	13	1%	0
	PM	3356	3047	-309	-9%	5
OUTBOUND	AM	4730	4600	-130	-3%	2
	IP	1706	1852	146	9%	3
	PM	7343	7297	-46	-1%	1

5.2.3   Examination of the above tables and Appendix A indicates that the validation to the LENNON data is generally very good and there is strong correlation between the assigned model flows and the LENNON passenger flows.

5.2.4   The exception to this is the validation of trips going into Glasgow in the morning peak, where the assigned model passenger flows are lower than the equivalent LENNON counts. This is because of the strong competition between bus and rail services in the Glasgow conurbation area.

5.2.5   Overall, however, it is considered that the strategic rail movements are very well represented in the 2005 TMfS Rebase and are a major improvement on the previous validation of the 2002 Base Year model.

Passenger Boarding/Alighting Comparisons

5.2.6   The LENNON data also provides information on the volume of passengers boarding and alighting at each station for each time period. This has been compared with the equivalent modelled data and the comparisons can be found in Appendix B.

5.2.7   Table 5.5 provides a summary of the GEH statistics for all the stations in TMfS. This indicates that the vast majority of the boarding and alighting comparisons have a GEH of less than 5 and nearly all have a GEH of less than 10. Therefore, the validation is considered to be good.

Table 5.5   Boarding/Alighting Summary

GEH	AM		IP		PM	
	Boarding	**Alighting**	**Boarding**	**Alighting**	**Boarding**	**Alighting**
less than 5	71%	78%	93%	93%	83%	75%
less than 7	82%	89%	97%	97%	93%	86%
less than 10	93%	96%	98%	98%	95%	95%

5.2.8   Further examination of the individual station boarding and alighting comparisons in Appendix B indicates that generally the validation is good.

5.2.9   It should be noted that the stations in central Glasgow and Edinburgh have been grouped in order to show the total comparison for each city. This is because the LENNON data does not always give a good representation of where people board and alight in the city centre. For example, in some cases where people buy a ticket to a main station (eg Glasgow Central), they may alight at a different station. This is particularly the case on low level trains in Glasgow. It is considered the assignment of such trips within TMfS offers a good representation of boarding and alighting in the city centre.

Edinburgh to Glasgow Flows

5.2.10   The flow on the railway line between Glasgow and Edinburgh obviously varies along the route as passenger board and alight at each station. However, the number of assigned rail trips travelling between Edinburgh and Glasgow in either direction was calculated, using the 'Select Link' feature of the CUBE PT assignment software. This allowed the matrix of trips that use both the rail lines to the north of Glasgow Queen Street station **and** to the west of Edinburgh Haymarket in their journey to be extracted.

5.2.11   Table 5.6 shows that there is very good validation of rail trips between Edinburgh and Glasgow in both directions in all time periods.

Table 5.6   Validation of Glasgow to Edinburgh Rail Trips

	Edinburgh to Glasgow			Glasgow to Edinburgh		
	LENNON	Assigned	GEH	LENNON	Assigned	GEH
AM Peak Hour	768	779	0	768	863	3
Inter Peak Hour	208	257	3	208	260	3
PM Peak Hour	724	603	5	724	699	1

5.3   Validation to Historic Survey Data

5.3.1   In addition to the LENNON data, comparisons have also been made with the historical count data, which was used for validation purposes when developing the original version of TMfS. This includes the following data sources:

- Glasgow Bus Occupancy Data; and

- Edinburgh Bus Occupancy Data.

5.3.2   Appendix C presents the comparison of the above data to the 2005 rebase assigned passenger flows. These comparisons show broadly the same level of validation as the original version of TMfS with some individual variation.

5.4   Rail Capacities

5.4.1   As indicated in Chapter 4, the PT assignment model now includes crowding on rail lines in the morning and evening peak periods. For information purposes Appendix D indicates the ratio of passenger flow to seated capacity on the modelled rail lines.

5.4.2   Examination of Appendix D indicates that the morning peak is slightly more crowded than the evening peak. Only a small number of services, however, are above the seated capacity in either time period. The most crowded services in the modelled network are:

- between Glasgow and Edinburgh;

- services between the central belt and the north of Scotland;

- Bathgate to Edinburgh in the morning peak and the reverse in the evening peak; and

- services from Ayrshire to Glasgow in the morning peak and the reverse in the evening peak.

5.5   Comparison of Timetabled and Modelled Bus Journey Times

5.5.1   As modelled bus journey times are based on highway speeds (see paragraph 2.2.10), checks have been made to ensure that modelled bus journey times are representative of timetabled bus journey times. In making any comparisons, however, it should be recognised that timetables are not necessarily a true reflection of actual bus journey times as they may include allowances for layover and turnaround time.

5.5.2   The analysis was undertaken on a sample of the coded services intended to give a representative geographical spread.

5.5.3   Appendix E contains three tables and nine diagrams presenting the results of this analysis. Many routes have slightly varying timetabled journey times within each time period. The analysis is therefore undertaken between the modelled journey time and a range of journey times, from the minimum to maximum.

5.5.4   The results show, in general, a good match between modelled and timetabled bus journey times. Where there is a difference between model and timetable the model is, in most cases, quicker. This is due to the strategic nature of the model, and the consequent under-representation of journey times through small towns, villages and hamlets, especially where the services make many stops and also make detours into residential areas that are not modelled.

6 Conclusions & Recommendations

6.1 2005 Rebase

6.1.1 The 2005 rebase of TMfS has enhanced the previous (2002) public transport model, particularly relating to the modelling of rail services.

6.1.2 The rebase has included an update of all modelled rail services as well as selected inter-urban bus services. The demand matrices have also been updated to include LENNON rail ticketing data.

6.1.3 The PT assignment model procedures have been enhanced to include rail crowding in the morning and evening time periods. This has included the coding of rail service capacities as well as the introduction of crowding curves. In addition wait curves have been added to the model and the fares model updated to 2005 conditions.

6.2 Validation

6.2.1 Validation has been principally to the LENNON rail ticketing data, from which it was possible to extract count data. Several screenlines and cordons were created for validation purposes.

6.2.2 The resultant flow comparisons generally showed close correlation between the model assignment and the LENNON count data with GEHs typically less than five. Examination of the individual count locations also showed a good level of validation. This represents a significant improvement in the quality of the model assignment.

6.2.3 Comparisons have also been made with historical bus count data. This has shown validation largely in the same range as the previous version of TMfS, which is expected as no significant changes have been made to this element of the model.

6.3 Conclusions and Recommendations

6.3.1 Our view is that the PTAM has been successfully developed and is fit for its intended purpose which is to be used for the assessment of major strategic public transport schemes and policy decisions as part of the TMfS modelling system.

6.3.2 It is also fit for use as a source of travel demand and network structure for more localised models. Although it is recognised that the preparation of any local model will require a review of relevant data stored within TMfS.

6.3.3 The 2005 rebase has made a substantial improvement to the travel demand matrices from the 2002 predecessor through the inclusion of the LENNON rail ticketing data. For future development, it is recommended that the public transport matrices are enhanced using any new data as it becomes available. In particular, the model would benefit from inclusion of updated bus travel demand information, particularly in central eastern Scotland.

Appendix A

Rail Passenger Count Comps

Transport Model for Scotland
LENNON Rail Data Passenger Validation

DIRECTION 1

Location	Dir	AM LENNON Hour	AM MODELLED Hour	Diff	% Diff	GEH	IP LENNON Hour	IP MODELLED Hour	Diff	% Diff	GEH	PM LENNON Hour	PM MODELLED Hour	Diff	% Diff	GEH
West of Bishopbriggs	E	1395	1421	26	2%	1	479	557	78	16%	3	1806	1636	-170	-9%	4
Between Falkirk High and Polmont	E	1014	1111	97	10%	3	257	310	53	21%	3	912	703	-209	-23%	7
Between Larbert and Stirling	N	295	390	95	32%	5	168	221	53	32%	4	522	457	-65	-12%	3
Between Livingston and Uphall	E	447	492	45	10%	2	65	76	11	18%	1	123	129	6	5%	1
East of Edinburgh Waverley	E	266	315	49	19%	3	246	261	15	6%	1	539	515	-24	-5%	1
West of Edinburgh Haymarket	E	3791	3869	78	2%	1	891	995	104	12%	3	1835	1941	106	6%	2
Forth Bridge	N	651	730	79	12%	3	283	347	64	23%	4	1205	1334	129	11%	4
Between Inverkeithing and Rosyth	E	359	353	-6	-2%	0	48	51	3	6%	0	97	77	-20	-21%	2
Between Inverkeithing and Dalgety Bay	E	319	343	24	8%	1	182	206	24	13%	2	627	546	-81	-13%	3
Between Markinch and Ladybank	N	142	208	66	46%	5	116	137	21	18%	2	253	248	-5	-2%	0
Tay Bridge	N	107	132	25	23%	2	79	92	13	16%	1	143	185	42	29%	3
Between Dundee and Broughty Ferry	E	158	172	14	9%	1	131	147	16	12%	1	296	240	-56	-19%	3
Between Aberdeen and Portlethen	N	220	180	-40	-18%	3	99	113	14	15%	1	143	117	-26	-18%	2
Between Port Glasgow and Woodhall	E	375	290	-85	-23%	5	68	77	9	13%	1	122	124	2	2%	0
Between Ayr and Newton-On-Ayr	N	235	188	-47	-20%	3	67	66	-1	-1%	0	108	97	-11	-11%	1
Between Dalry and Kilwinning	N	796	704	-92	-12%	3	103	160	57	55%	5	258	273	15	6%	1
Between Paisley and Hillington West	E	2019	1690	-329	-16%	8	323	374	51	16%	3	604	629	25	4%	1
Between Partick and Hyndland	E	796	797	1	0%	0	258	340	82	32%	5	1205	1615	410	34%	11
Between High Street and Bellgrove	E	507	493	-14	-3%	1	155	186	31	20%	2	736	732	-4	-1%	0
Between Argyle Street and Bridgeton	E	397	623	226	57%	10	123	346	223	181%	15	617	1036	419	68%	15
Between Crosshill and Mount Florida	N	644	319	-325	-50%	15	88	51	-37	-42%	4	185	135	-50	-27%	4
Between Maxwell Park and Pollokshields West	N	337	27	-310	-92%	23	41	5	-36	-87%	7	82	11	-71	-87%	10
Between Crossmyloof and Pollokshaws West	N	975	976	1	0%	0	251	105	-146	-58%	11	327	176	-151	-46%	10
Between Hamilton West and Hamilton Central	N	285	133	-152	-53%	10	27	129	102	377%	12	45	123	78	174%	9
Between Shotts and Fauldhouse	E	16	22	6	36%	1	4	12	8	197%	3	25	14	-11	-43%	2
Between Coatdyke and Airdrie	E	163	183	20	12%	2	52	68	16	30%	2	236	262	26	11%	2
Between Dumbarton East and Dumbarton Central	E	415	417	2	0%	0	111	102	-9	-8%	1	145	130	-15	-10%	1

DIRECTION 2

Location	Dir	AM LENNON Hour	AM MODELLED Hour	Diff	% Diff	GEH	IP LENNON Hour	IP MODELLED Hour	Diff	% Diff	GEH	PM LENNON Hour	PM MODELLED Hour	Diff	% Diff	GEH
West of Bishopbriggs	W	1921	1876	-45	-2%	1	487	561	74	15%	3	1150	900	-250	-22%	8
Between Falkirk High and Polmont	W	985	964	-21	-2%	1	261	316	55	21%	3	954	844	-110	-12%	4
Between Larbert and Stirling	S	502	479	-23	-5%	1	173	228	55	32%	4	225	260	35	15%	2
Between Livingston and Uphall	W	220	222	2	1%	0	67	71	4	7%	1	363	373	10	3%	1
East of Edinburgh Waverley	W	551	427	-124	-22%	6	248	256	8	3%	0	187	305	118	63%	8
West of Edinburgh Haymarket	W	2362	2515	153	6%	3	897	1035	138	15%	4	3599	3544	-56	-2%	1
Forth Bridge	S	1262	1325	63	5%	2	280	317	37	13%	2	460	534	74	16%	3
Between Inverkeithing and Rosyth	W	173	140	-33	-19%	3	50	55	5	10%	1	298	290	-8	-3%	0
Between Inverkeithing and Dalgety Bay	W	567	534	-33	-6%	1	184	200	16	9%	1	271	337	66	24%	4
Between Markinch and Ladybank	S	164	202	38	23%	3	118	132	14	12%	1	172	240	68	39%	5
Tay Bridge	S	84	141	57	68%	5	79	95	16	21%	2	172	214	42	24%	3
Between Dundee and Broughty Ferry	W	210	251	41	20%	3	131	142	11	9%	1	233	204	-29	-12%	2
Between Aberdeen and Portlethen	S	144	170	26	18%	2	99	107	8	8%	1	225	122	-103	-46%	8
Between Port Glasgow and Woodhall	W	194	191	-3	-2%	0	69	71	2	2%	0	333	320	-13	-4%	1
Between Ayr and Newton-On-Ayr	S	156	129	-27	-17%	2	66	63	-3	-4%	0	201	183	-18	-9%	1
Between Dalry and Kilwinning	S	402	399	-3	-1%	0	102	159	57	56%	5	739	734	-5	-1%	0
Between Paisley and Hillington West	W	995	1028	33	3%	1	322	404	82	26%	4	1769	2036	267	15%	6
Between Partick and Hyndland	W	1357	1466	109	8%	3	261	314	53	20%	3	456	572	116	26%	5
Between High Street and Bellgrove	W	923	877	-46	-5%	2	159	170	11	7%	1	295	322	27	9%	2
Between Argyle Street and Bridgeton	W	1177	1100	-77	-7%	2	127	265	138	109%	10	217	345	128	59%	8
Between Crosshill and Mount Florida	S	329	170	-159	-48%	10	87	65	-22	-25%	3	682	384	-298	-44%	13
Between Maxwell Park and Pollokshields West	S	159	23	-136	-86%	14	41	20	-21	-52%	4	99	86	-13	-13%	1
Between Crossmyloof and Pollokshaws West	S	369	252	-117	-32%	7	250	138	-112	-45%	8	818	654	-164	-20%	6
Between Hamilton West and Hamilton Central	S	70	132	62	88%	6	56	150	94	168%	9	145	187	42	29%	3
Between Shotts and Fauldhouse	W	25	36	11	42%	2	4	12	8	211%	3	50	23	-27	-54%	4
Between Coatdyke and Airdrie	W	296	309	13	4%	1	52	61	9	18%	1	97	122	25	26%	2
Between Dumbarton East and Dumbarton Central	W	235	157	-78	-33%	6	105	89	-16	-15%	2	348	450	102	29%	5

Transport Model for Scotland
LENNON Rail Data Passenger Validation
Central Scotland - East West Screenline

INBOUND

Location	Dir		AM OBS Hour	AM MODELLED Hour	Diff	% Diff	GEH		IP OBS Hour	IP MODELLED Hour	Diff	% Diff	GEH		PM OBS Hour	PM MODELLED Hour	Diff	% Diff	GEH
East of Camelon Station	E		275	287	12	4%	1		60	71	11	19%	1		130	375	245	189%	15
West of Falkirk High Station	E		930	1047	117	13%	4		260	329	69	26%	4		989	773	-216	-22%	7
East of Shotts Station	E		16	22	6	36%	1		4	12	8	197%	3		25	14	-11	-43%	2
East of Carstairs Junction	E		145	194	49	34%	4		167	157	-10	-6%	1		130	175	45	35%	4
TOTAL			1366	1550	184	13%	5		491	569	78	16%	3		1274	1337	63	5%	2

OUTBOUND

Location	Dir		AM OBS Hour	AM MODELLED Hour	Diff	% Diff	GEH		IP OBS Hour	IP MODELLED Hour	Diff	% Diff	GEH		PM OBS Hour	PM MODELLED Hour	Diff	% Diff	GEH
East of Camelon Station	W		178	228	50	28%	4		60	84	24	40%	3		250	254	4	1%	0
West of Falkirk High Station	W		1042	1037	-5	0%	0		262	321	59	23%	3		849	742	-107	-13%	4
East of Shotts Station	W		25	36	11	42%	2		4	12	8	211%	3		50	23	-27	-54%	4
East of Carstairs Junction	W		39	23	-16	-42%	3		167	159	-8	-5%	1		182	235	53	29%	4
TOTAL			1284	1324	40	3%	1		493	577	84	17%	4		1331	1253	-78	-6%	2

Transport Model for Scotland
LENNON Rail Data Passenger Validation
Forth Estuary Screenline

INBOUND

Location	Dir		AM OBS Hour	AM MODELLED Hour	Diff	% Diff	GEH		IP OBS Hour	IP MODELLED Hour	Diff	% Diff	GEH		PM OBS Hour	PM MODELLED Hour	Diff	% Diff	GEH
Forth Bridge	N		651	730	79	12%	3		283	347	64	23%	4		1205	1334	129	11%	4
North of Stirling Station	N		143	176	33	23%	3		91	112	21	23%	2		226	154	-72	-32%	5
TOTAL			**794**	**906**	**112**	**14%**	**4**		**374**	**459**	**85**	**23%**	**4**		**1431**	**1488**	**57**	**4%**	**1**

OUTBOUND

Location	Dir		AM OBS Hour	AM MODELLED Hour	Diff	% Diff	GEH		IP OBS Hour	IP MODELLED Hour	Diff	% Diff	GEH		PM OBS Hour	PM MODELLED Hour	Diff	% Diff	GEH
Forth Bridge	S		1262	1325	63	5%	2		280	317	37	13%	2		460	534	74	16%	3
North of Stirling Station	S		189	149	-40	-21%	3		92	116	24	26%	2		134	57	-77	-57%	8
TOTAL			**1451**	**1474**	**23**	**2%**	**1**		**372**	**433**	**61**	**16%**	**3**		**594**	**592**	**-2**	**0%**	**0**

Transport Model for Scotland
LENNON Rail Data Passenger Validation
Edinburgh Outer Cordon Sites - Sorted Clockwise from Forth

INBOUND

Station Name	Dir	In/Out		AM OBS Hour	AM MODELLED Hour	Diff	% Diff	GEH		IP OBS Hour	IP MODELLED Hour	Diff	% Diff	GEH		PM OBS Hour	PM MODELLED Hour	Diff	% Diff	GEH
Wallyford	E	I		420	410	-10	-2%	0		236	250	14	6%	1		162	297	135	84%	9
Brunstane	E	I		66	15	-51	-77%	8		7	6	-1	-21%	1		16	7	-9	-56%	3
Slateford	W	I		160	138	-22	-14%	2		179	170	-9	-5%	1		220	250	30	14%	2
Edinburgh Park	W	I		2214	2252	38	2%	1		418	501	83	20%	4		1125	1125	0	0%	0
South Gyle	W	I		1417	1478	61	4%	2		294	323	29	10%	2		490	566	76	16%	3
TOTAL				**4277**	**4294**	**17**	**0%**	**0**		**1134**	**1251**	**117**	**10%**	**3**		**2013**	**2246**	**233**	**12%**	**5**

OUTBOUND

Station Name	Dir	In/Out		AM OBS Hour	AM MODELLED Hour	Diff	% Diff	GEH		IP OBS Hour	IP MODELLED Hour	Diff	% Diff	GEH		PM OBS Hour	PM MODELLED Hour	Diff	% Diff	GEH
Wallyford	W	O		186	309	123	66%	8		232	252	20	9%	1		408	441	33	8%	2
Brunstane	W	O		20	0	-20	-98%	6		4	1	-3	-83%	2		33	1	-32	-98%	8
Slateford	E	O		207	247	40	19%	3		179	168	-11	-6%	1		267	275	8	3%	0
Edinburgh Park	E	O		1432	1453	21	1%	1		420	495	75	18%	3		1968	1790	-178	-9%	4
South Gyle	E	O		699	772	73	10%	3		293	358	65	22%	4		1280	1409	129	10%	4
TOTAL				**2544**	**2780**	**236**	**9%**	**5**		**1128**	**1274**	**146**	**13%**	**4**		**3956**	**3916**	**-40**	**-1%**	**1**

Transport Model for Scotland
LENNON Rail Data Passenger Validation
Glasgow Outer Cordon Sites - Sorted Clockwise from Clyde

INBOUND

Station Name	Dir	In/Out		AM OBS Hour	AM MODELLED Hour	Diff	% Diff	GEH		IP OBS Hour	IP MODELLED Hour	Diff	% Diff	GEH		PM OBS Hour	PM MODELLED Hour	Diff	% Diff	GEH
Scotstounhill	E	I		289	351	62	21%	3		63	102	39	62%	4		139	196	57	41%	4
Anniesland	E	I		851	882	31	4%	1		158	168	10	7%	1		254	298	44	17%	3
Possil Park	I	I		179	81	-98	-55%	9		45	17	-28	-62%	5		3	14	11	351%	4
Bishopbriggs	I	I		1921	1876	-45	-2%	1		487	561	74	15%	3		1150	900	-250	-22%	8
Stepps	I	I		182	133	-49	-27%	4		29	37	8	28%	1		43	43	0	0%	0
Shettleston	W	I		840	866	26	3%	1		143	163	20	14%	2		275	300	25	9%	1
Carmyle	I	I		151	40	-111	-73%	11		18	9	-9	-51%	3		30	13	-17	-55%	4
Cambuslang	W	I		1111	1027	-84	-8%	3		244	282	38	16%	2		335	362	27	8%	1
Burnside	I	I		161	18	-143	-89%	15		21	15	-6	-31%	2		42	18	-24	-56%	4
Muirend	I	I		355	248	-107	-30%	6		46	29	-17	-36%	3		98	76	-22	-23%	2
Pollokshaws West	I	I		975	976	1	0%	0		251	105	-146	-58%	11		327	176	-151	-46%	10
Corkerhill	I	I		185	11	-174	-94%	18		38	26	-12	-31%	2		43	20	-23	-54%	4
Cardonald	I	I		2090	1680	-410	-20%	9		335	377	42	12%	2		617	632	15	2%	1
TOTAL				**9290**	**8187**	**-1103**	**-12%**	**12**		**1878**	**1891**	**13**	**1%**	**0**		**3356**	**3047**	**-309**	**-9%**	**5**

OUTBOUND

Station Name	Dir	In/Out		AM OBS Hour	AM MODELLED Hour	Diff	% Diff	GEH		IP OBS Hour	IP MODELLED Hour	Diff	% Diff	GEH		PM OBS Hour	PM MODELLED Hour	Diff	% Diff	GEH
Scotstounhill	W	O		234	237	3	1%	0		63	91	28	44%	3		263	321	58	22%	3
Anniesland	W	O		387	329	-58	-15%	3		134	165	31	23%	3		656	710	54	8%	2
Possil Park	O	O		12	19	7	56%	2		39	8	-31	-79%	6		26	34	8	29%	1
Bishopbriggs	O	O		1316	1422	106	8%	3		448	551	103	23%	5		1684	1603	-81	-5%	2
Stepps	O	O		48	22	-26	-53%	4		16	18	2	12%	0		95	82	-13	-13%	1
Shettleston	E	O		451	471	20	4%	1		122	157	35	29%	3		620	669	49	8%	2
Carmyle	O	O		57	29	-28	-49%	4		14	11	-3	-24%	1		102	48	-54	-53%	6
Cambuslang	E	O		596	627	31	5%	1		208	278	70	33%	4		842	836	-6	-1%	0
Burnside	O	O		40	11	-29	-73%	6		11	3	-8	-77%	3		70	12	-58	-83%	9
Muirend	O	O		132	89	-44	-33%	4		36	25	-11	-31%	2		215	196	-19	-9%	1
Pollokshaws West	O	O		366	256	-110	-30%	6		249	134	-115	-46%	8		814	633	-181	-22%	7
Corkerhill	O	O		76	26	-50	-65%	7		34	1	-33	-96%	8		137	103	-34	-25%	3
Cardonald	O	O		1015	1063	48	5%	1		332	411	79	24%	4		1819	2051	232	13%	5
TOTAL				**4730**	**4600**	**-130**	**-3%**	**2**		**1706**	**1852**	**146**	**9%**	**3**		**7343**	**7297**	**-46**	**-1%**	**1**

Appendix B

Rail Boarding Alighting Comps

Transport Model for Scotland
Comparison of Boardings and Alightings - AM Peak

Station	Node	LENNON 05		TMfS05		Difference		% Difference		GEH	
		Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Central Glasgow Stations											
Anderston	30256	29	29	174	472	145	443	501%	1528%	14.42	27.99
Argyle Street	30303	36	36	464	864	428	828	1188%	2301%	27.06	39.04
Charing Cross Glasgow	30237	280	261	251	528	-29	267	-10%	102%	1.79	13.46
Glasgow Central	30277	3159	6325	1706	3135	-1453	-3190	-46%	-50%	29.46	46.39
Glasgow Queen Street	30283	2312	3943	2114	2956	-198	-987	-9%	-25%	4.21	16.80
High Street Glasgow	30295	5	3	182	443	177	440	3550%	14671%	18.33	29.47
Total		5821	10597	4891	8399	-930	-2198	-16%	-21%	12.70	22.55
Central Edinburgh Stations											
Edinburgh	30550	1991	3211	2086	3026	95	-185	5%	-6%	2.11	3.32
Haymarket	30547	738	1223	808	1334	70	111	10%	9%	2.53	3.11
Total		2729	4434	2895	4360	166	-74	6%	-2%	3.12	1.11
All Other Stations											
Aberdeen	36006	252	407	223	258	-29	-149	-11%	-37%	1.87	8.20
Aberdour	30531	32	15	0	0	-32	-15	-100%	-100%	8.00	5.48
Addiewell	30482	0	0	1	0	1	0	-	-	-	-
Airbles	30378	5	3	0	0	-5	-3	-100%	-85%	3.16	1.95
Airdrie	30389	265	148	302	172	37	24	14%	16%	2.20	1.92
Alexandra Parade	30316	13	5	0	2	-13	-3	-97%	-65%	4.85	1.76
Alexandria	30136	40	25	0	1	-40	-24	-100%	-97%	8.94	6.77
Annan	30680	16	16	16	18	0	2	0	13%	0.00	0.49
Anniesland	30220	127	71	260	176	133	105	104%	148%	9.54	9.47
Arbroath	30770	96	51	136	92	40	41	42%	80%	3.73	4.85
Ardlui	30845	0	0	0	0	0	0	-	-	-	-
Ardrossan Harbour	30055	11	5	0	0	-11	-5	-100%	-100%	4.69	3.16
Ardrossan South Beach	30060	33	16	30	7	-3	-9	-9%	-58%	0.50	2.73
Ardrossan Town	30057	0	0	0	0	0	0	-	-	-	-
Arrochar & Tarbet	30835	0	0	32	0	32	0	-	-	-	-
Ashfield	30285	8	4	16	7	8	3	96%	71%	2.23	1.22
Auchinleck	30221	5	1	4	0	-1	-1	-20%	-100%	0.48	1.41
Ayr	30115	259	176	200	128	-59	-48	-23%	-27%	3.90	3.90
Baillieston	30340	14	6	1	5	-13	-1	-95%	-17%	4.91	0.42
Balloch	30132	92	67	92	38	-0	-29	-0%	-43%	0.01	3.93
Balmossie	30745	0	0	0	0	0	0	-	-	-	-
Barassie	30107	19	9	0	0	-19	-9	-100%	-100%	6.16	4.24
Bargeddie	30348	16	6	16	6	-0	-0	-3%	-7%	0.11	0.17
Barnhill	30308	3	1	1	0	-2	-1	-55%	-61%	1.13	0.73
Barrhead	30188	154	77	191	110	37	33	24%	43%	2.83	3.39
Barrhill	30640	0	0	0	1	0	1	-	-	-	-
Barry Links	30755	0	0	0	0	0	0	-	-	-	-
Bathgate	30479	231	113	258	114	27	1	12%	1%	1.72	0.08
Bearsden	30215	83	42	65	11	-18	-31	-22%	-74%	2.13	6.03
Bellgrove	30301	44	28	22	26	-22	-2	-49%	-7%	3.75	0.38
Bellshill	30369	120	65	54	51	-66	-14	-55%	-21%	7.02	1.80
Berwick	30725	264	257	262	266	-2	9	-1%	3%	0.10	0.54
Bishopbriggs	30312	151	80	33	6	-118	-74	-78%	-93%	12.31	11.33
Bishopton	30165	127	71	150	115	23	44	18%	62%	1.95	4.53
Blairhill	30358	163	112	153	94	-10	-18	-6%	-16%	0.79	1.75
Blantyre	30346	65	33	66	35	1	2	2%	6%	0.16	0.32
Bogston	30094	0	0	0	1	0	1	-	-	-	-
Bowling	30169	33	33	0	0	-33	-33	-99%	-100%	7.97	8.09
Branchton	30064	6	2	34	22	28	20	468%	980%	6.28	5.71
Breich	30476	0	0	0	6	0	6	-	-	-	-
Bridge of Allan	30404	26	11	26	11	-1	0	-2%	1%	0.10	0.04
Bridgeton	30309	24	12	7	12	-17	-0	-71%	-0%	4.36	0.02
Broughty Ferry	30740	0	0	1	0	1	0	-	-	-	-
Brunstane	30560	25	13	13	6	-12	-7	-48%	-52%	2.73	2.16
Burnside Strathclyde	30318	74	37	6	10	-68	-27	-92%	-72%	10.69	5.49
Burntisland	30545	32	16	44	24	12	8	39%	53%	2.00	1.87
Busby	30268	27	11	46	5	19	-6	69%	-51%	3.10	1.94
Cambuslang	30324	145	85	153	59	8	-26	5%	-31%	0.62	3.06
Camelon	30431	11	5	14	6	3	1	28%	30%	0.88	0.62
Cardenden	30535	3	1	2	1	-1	-0	-25%	-34%	0.47	0.37
Cardonald	30208	17	8	2	2	-15	-6	-88%	-81%	4.88	2.95
Cardross	30117	41	30	40	31	-1	1	-2%	2%	0.15	0.12
Carfin	30397	12	5	0	8	-12	3	-96%	56%	4.61	1.10
Carlisle	30690	148	334	159	340	11	6	8%	2%	0.90	0.33
Carluke	30420	61	31	57	31	-4	-0	-7%	-1%	0.56	0.07
Carmyle	30329	23	10	9	1	-14	-9	-59%	-92%	3.39	3.93
Carnoustie	30765	7	3	8	5	1	2	8%	63%	0.20	0.96

Station	Node	LENNON 05		TMfS05		Difference		% Difference		GEH	
		Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Carntyne	30321	23	11	6	6	-17	-5	-73%	-48%	4.38	1.84
Carstairs	30474	0	0	0	0	0	0	-	-	-	-
Cartsdyke	30084	6	2	0	0	-6	-2	-100%	-100%	3.46	2.00
Cathcart	30274	106	51	45	39	-61	-12	-57%	-23%	6.98	1.72
Clarkston	30254	122	59	141	30	19	-29	15%	-49%	1.62	4.36
Cleland	30410	6	1	7	1	1	0	19%	49%	0.44	0.44
Clydebank	30189	59	46	11	21	-48	-25	-81%	-55%	8.08	4.41
Coatbridge Central	30367	9	9	14	5	5	-4	50%	-41%	1.34	1.37
Coatbridge Sunnyside	30370	122	69	169	112	47	43	39%	63%	3.93	4.55
Coatdyke	30376	59	32	71	35	12	3	20%	9%	1.45	0.51
Corkerhill	30213	21	9	0	0	-21	-9	-98%	-99%	6.27	4.21
Cowdenbeath	30527	25	12	22	13	-3	1	-12%	5%	0.62	0.17
Craigendoran	30098	32	27	45	30	13	3	41%	9%	2.09	0.48
Crianlarich	30850	36	22	0	0	-36	-22	-100%	-100%	8.49	6.63
Croftfoot	30300	30	15	1	0	-29	-15	-96%	-97%	7.29	5.26
Crookston	30195	45	21	0	3	-45	-18	-99%	-86%	9.37	5.20
Crosshill	30276	82	56	9	31	-73	-25	-89%	-45%	10.75	3.83
Crossmyloof	30247	61	31	103	49	42	18	69%	59%	4.63	2.88
Croy	30365	223	111	331	71	108	-40	48%	-36%	6.47	4.15
Cumbernauld	30391	49	28	45	24	-4	-4	-8%	-14%	0.58	0.78
Cupar	30590	40	18	47	48	7	30	18%	165%	1.09	5.19
Curriehill	30528	8	4	0	1	-8	-3	-95%	-64%	3.70	1.56
Dalgety Bay	39000	81	39	39	3	-42	-36	-52%	-92%	5.42	7.77
Dalmarnock	30311	8	3	3	7	-5	4	-57%	125%	1.92	1.70
Dalmeny	30525	106	52	136	59	30	7	28%	14%	2.73	1.00
Dalmuir	30178	115	71	106	86	-9	15	-8%	21%	0.90	1.67
Dalreoch	30135	63	52	1	1	-62	-51	-98%	-99%	10.85	10.03
Dalry	30086	33	17	32	17	-1	-0	-3%	-0%	0.16	0.00
Drem	30606	28	11	25	1	-3	-10	-11%	-95%	0.60	4.37
Drumchapel	30198	34	18	42	14	8	-4	25%	-24%	1.37	1.08
Drumfrochar	30050	5	2	0	0	-5	-2	-100%	-100%	3.16	2.00
Drumgelloch	30398	33	17	7	11	-26	-6	-79%	-38%	5.82	1.74
Drumry	30192	26	12	45	10	19	-2	71%	-13%	3.12	0.48
Duke Street	30315	4	1	1	1	-3	0	-85%	13%	2.24	0.13
Dumbarton Central	30137	131	85	132	39	1	-46	1%	-55%	0.11	5.90
Dumbarton East	30145	46	24	64	121	18	97	39%	404%	2.40	11.38
Dumbreck	30234	23	10	1	0	-22	-10	-95%	-96%	6.27	4.19
Dumfries	30675	43	41	41	42	-2	1	-6%	2%	0.37	0.16
Dunbar	30616	63	28	56	1	-7	-27	-11%	-95%	0.91	6.93
Dunblane	30400	88	52	78	57	-10	5	-12%	9%	1.14	0.62
Dundee	30735	152	265	172	307	20	42	13%	16%	1.57	2.46
Dunfermline Queen Margaret	39001	62	29	67	31	5	2	8%	7%	0.64	0.39
Dunfermline Town	30505	194	95	196	68	2	-27	1%	-29%	0.11	3.01
Dunkeld	30810	56	53	0	6	-56	-47	-100%	-88%	10.58	8.55
Dunlop	30154	10	5	19	6	9	1	94%	30%	2.44	0.62
Dyce	36008	66	34	48	34	-18	-0	-27%	-1%	2.33	0.07
East Kilbride	30322	212	112	138	49	-74	-63	-35%	-56%	5.63	7.01
Easterhouse	30342	60	32	54	32	-6	-0	-10%	-1%	0.81	0.04
Edinburgh Park	30886	80	49	80	81	0	32	0%	66%	0.03	4.01
Elgin	36018	22	17	1	8	-21	-9	-96%	-55%	6.24	2.67
Exhibition Centre	30250	52	28	64	107	12	79	23%	281%	1.57	9.59
Fairlie	30052	4	1	0	0	-4	-1	-100%	-100%	2.83	1.41
Falkirk Grahamston	30438	133	72	150	70	17	-2	13%	-3%	1.46	0.21
Falkirk High	30436	264	123	277	140	13	17	5%	14%	0.81	1.51
Fauldhouse	30463	3	1	2	1	-1	-0	-33%	-33%	0.63	0.36
Forres	36019	28	22	21	11	-7	-11	-24%	-52%	1.37	2.82
Fort Matilda	30065	15	5	64	51	49	46	330%	918%	7.84	8.68
Garelochhead	30062	0	0	1	0	1	0	-	-	-	-
Garrowhill	30334	87	47	96	43	9	-4	10%	-9%	0.90	0.63
Garscadden	30197	19	9	24	10	5	1	28%	8%	1.14	0.23
Gartcosh	30361	16	8	0	1	-16	-7	-98%	-85%	5.48	3.18
Giffnock	30245	63	32	112	21	49	-11	77%	-34%	5.21	2.08
Gilshochill	30257	5	2	0	0	-5	-2	-98%	-99%	3.09	1.97
Girvan	30635	14	12	0	12	-14	0	-100%	2%	5.29	0.07
Gleneagles	30815	0	0	1	1	1	1	-	-	-	-
Glengarnock	30103	46	27	53	27	7	0	16%	1%	1.05	0.03
Glenrothes with Thornton	30555	8	4	0	0	-8	-4	-96%	-97%	3.79	2.69
Golf Street	30760	0	0	0	0	0	0	-	-	-	-
Gourock	30061	84	48	30	2	-54	-46	-64%	-95%	7.11	9.12
Greenfaulds	30387	16	6	23	9	7	3	41%	55%	1.49	1.19
Greenock Central	30078	60	35	0	0	-60	-35	-100%	-100%	10.95	8.37
Greenock West	30070	80	46	81	62	1	16	2%	35%	0.16	2.22
Gretna Green	30685	1	1	2	0	1	-1	100%	-98%	0.82	1.37
Hairmyres	30305	100	47	129	49	29	2	29%	4%	2.68	0.27
Hamilton Central	30356	138	81	120	124	-18	43	-13%	53%	1.60	4.24
Hamilton West	30352	137	70	114	84	-23	14	-17%	21%	2.04	1.64

Station	Node	LENNON 05		TMfS05		Difference		% Difference		GEH	
		Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Hartwood	30421	0	0	0	0	0	0	-	-	-	-
Hawkhead	30186	24	10	7	6	-17	-4	-71%	-40%	4.32	1.39
Helensburgh Central	30090	169	105	161	106	-8	1	-5%	1%	0.65	0.08
Helensburgh Upper	30087	0	0	0	0	0	0	-	-	-	-
Hillfoot	30230	40	21	30	5	-10	-16	-25%	-75%	1.71	4.34
Hillington East	30200	30	13	6	2	-24	-11	-79%	-83%	5.56	3.93
Hillington West	30194	43	26	28	76	-15	50	-35%	191%	2.49	6.96
Holytown	30392	18	7	15	8	-3	1	-15%	10%	0.68	0.25
Howwood	30010	8	3	0	0	-8	-3	-100%	-100%	4.00	2.45
Huntly	36013	12	5	8	5	-4	-0	-37%	-1%	1.40	0.03
Hyndland	30229	186	99	267	139	81	40	44%	40%	5.41	3.65
IBM	30058	25	14	1	1	-24	-13	-98%	-95%	6.85	4.93
Insch	36011	14	7	10	7	-4	0	-29%	0	1.15	0.00
Invergowrie	30825	0	0	0	0	0	0	-	-	-	-
Inverkeithing	30519	327	165	495	317	168	152	51%	92%	8.26	9.79
Inverkip	30049	6	2	5	2	-1	0	-23%	2%	0.59	0.03
Inverurie	36010	37	18	0	0	-37	-18	-100%	-100%	8.60	6.00
Irvine	30100	155	97	152	95	-3	-2	-2%	-2%	0.22	0.19
Johnstone	30163	279	151	358	159	79	8	28%	5%	4.43	0.64
Jordanhill	30219	50	25	2	8	-48	-17	-95%	-67%	9.31	4.10
Keith	36015	10	4	1	1	-9	-3	-86%	-65%	3.60	1.57
Kennishead	30216	0	0	13	3	13	3	-	-	-	-
Kilmarnock	30161	98	47	1	20	-97	-27	-99%	-57%	13.83	4.64
Kilmaurs	30153	15	6	13	0	-2	-6	-10%	-100%	0.41	3.46
Kilpatrick	30171	37	33	2	4	-35	-29	-96%	-89%	8.05	6.84
Kilwinning	30085	188	108	241	154	53	46	28%	42%	3.60	4.01
Kinghorn	30552	22	10	0	0	-22	-10	-100%	-100%	6.63	4.47
Kings Park	30287	22	10	2	2	-20	-8	-92%	-79%	5.88	3.18
Kingsknowe	30536	2	1	0	0	-2	-1	-94%	-91%	1.83	1.23
Kirkcaldy	30554	246	126	317	191	71	65	29%	52%	4.24	5.16
Kirkconnel	30660	0	0	0	0	0	0	-	-	-	-
Kirkhill	30326	19	8	1	10	-18	2	-95%	29%	5.73	0.76
Kirknewton	30506	13	5	12	1	-1	-4	-9%	-81%	0.32	2.35
Kirkwood	30355	34	16	4	8	-30	-8	-87%	-49%	6.75	2.26
Ladybank	30568	5	1	4	1	-1	0	-16%	25%	0.37	0.24
Lanark	30439	52	25	40	4	-12	-21	-22%	-86%	1.71	5.69
Langbank	30127	4	2	11	19	7	17	187%	847%	2.69	5.23
Langside	30258	39	17	3	3	-36	-14	-91%	-85%	7.72	4.62
Larbert	30427	115	58	160	74	45	16	39%	28%	3.83	2.02
Largs	30048	69	42	43	13	-26	-29	-38%	-68%	3.51	5.45
Lenzie	30330	233	147	223	151	-10	4	-4%	3%	0.63	0.34
Leuchars	30601	67	37	75	62	8	25	11%	69%	0.91	3.61
Linlithgow	30486	374	183	326	198	-48	15	-13%	8%	2.57	1.10
Livingston North	30493	216	107	234	109	18	2	8%	1%	1.21	0.15
Livingston South	30495	72	34	65	27	-7	-7	-10%	-20%	0.85	1.23
Lochgelly	30529	5	2	6	2	1	-0	14%	-2%	0.30	0.03
Lochwinnoch	30123	19	15	36	7	17	-8	91%	-50%	3.28	2.25
Longniddry	30600	41	19	38	10	-3	-9	-8%	-47%	0.50	2.35
Markinch	30563	30	12	57	41	27	29	90%	244%	4.09	5.68
Maryhill	30238	11	4	2	1	-9	-3	-79%	-85%	3.37	2.24
Maxwell Park	30244	32	15	4	7	-28	-8	-86%	-52%	6.48	2.32
Maybole	30625	4	4	0	0	-4	-4	-100%	-98%	2.83	2.75
Milliken Park	30156	19	9	6	5	-13	-4	-68%	-45%	3.66	1.52
Milngavie	30233	160	88	167	71	7	-17	4%	-20%	0.53	1.95
Monifieth	30750	0	0	1	0	1	0	-	-	-	-
Montrose	36001	64	32	85	53	21	21	33%	66%	2.45	3.25
Mosspark	30207	44	22	1	1	-43	-21	-98%	-93%	9.14	6.00
Motherwell	30377	210	126	197	154	-13	28	-6%	23%	0.93	2.39
Mount Florida	30273	159	77	33	41	-126	-36	-79%	-47%	12.90	4.74
Mount Vernon	30337	8	3	1	0	-7	-3	-86%	-97%	3.20	2.34
Muirend	30251	89	51	85	4	-4	-47	-4%	-92%	0.38	8.88
Musselburgh	30579	65	29	2	0	-63	-29	-97%	-100%	10.83	7.61
Neilston	30175	130	94	133	90	3	-4	2%	-5%	0.22	0.46
New Cumnock	30655	1	0	1	0	-1	0	-50%	-	0.58	-
Newcraighall	30561	41	20	2	0	-39	-20	-95%	-98%	8.42	6.16
Newton	30332	71	35	78	23	7	-12	10%	-34%	0.78	2.21
Newton-on-Ayr	30114	0	0	0	2	0	2	-	-	-	-
Nitshill	30196	4	2	2	1	-2	-1	-58%	-54%	1.36	0.89
North Berwick	30610	103	47	31	33	-72	-14	-70%	-30%	8.83	2.20
North Queensferry	30518	23	10	30	17	7	7	30%	73%	1.34	1.98
Paisley Canal	30177	51	23	3	17	-48	-6	-93%	-27%	9.12	1.39
Paisley Gilmour St	30176	639	430	421	438	-218	8	-34%	2%	9.48	0.40
Paisley St James	30173	0	0	9	18	9	18	-	-	-	-
Partick	30235	194	153	108	97	-86	-56	-44%	-37%	6.96	5.06
Patterton	30212	96	73	59	88	-37	15	-38%	21%	4.18	1.70
Perth	30790	96	56	113	109	17	53	17%	95%	1.64	5.85

Station	Node	LENNON 05		TMfS05		Difference		% Difference		GEH	
		Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Pollokshaws East	30243	27	11	8	2	-19	-9	-70%	-78%	4.49	3.29
Pollokshaws West	30236	6	3	61	15	55	12	918%	390%	9.51	3.93
Pollokshields East	30266	38	15	7	6	-31	-9	-81%	-58%	6.49	2.67
Pollokshields West	30249	35	16	0	17	-35	1	-99%	6%	8.29	0.25
Polmont	30467	161	75	150	74	-11	-1	-7%	-1%	0.85	0.13
Port Glasgow	30102	74	44	66	33	-8	-11	-10%	-24%	0.90	1.71
Portlethen	36004	0	0	0	0	0	0	-	-	-	-
Possilpark	30280	6	2	0	0	-6	-2	-92%	-86%	3.08	1.61
Prestonpans	30592	38	17	0	0	-38	-17	-100%	-100%	8.71	5.83
Prestwick Airport	30118	16	7	7	6	-9	-1	-56%	-20%	2.65	0.55
Prestwick Town	30119	49	25	29	19	-20	-6	-42%	-24%	3.27	1.27
Priesthill	30209	5	2	2	1	-3	-1	-61%	-56%	1.62	0.92
Queens Park Glasgow	30265	76	41	31	20	-45	-21	-59%	-50%	6.14	3.72
Renton	30130	3	0	0	0	-3	0	-100%	-	2.45	-
Rosyth	30508	62	30	61	26	-1	-4	-2%	-12%	0.18	0.68
Rutherglen	30317	88	49	112	76	24	27	27%	54%	2.38	3.37
Saltcoats	30063	55	31	0	1	-55	-30	-99%	-97%	10.36	7.55
Sanquhar	30665	1	0	0	0	-1	0	-100%	-	1.41	-
Scotstounhill	30205	39	19	29	27	-10	8	-26%	44%	1.75	1.74
Shawlands	30241	46	34	1	2	-45	-32	-97%	-94%	9.21	7.57
Shettleston	30328	159	116	145	108	-14	-8	-9%	-7%	1.10	0.78
Shieldmuir	30395	0	0	22	1	22	1	-	-	-	-
Shotts	30433	29	12	10	13	-19	1	-67%	12%	4.42	0.40
Singer	30185	82	61	90	39	8	-22	10%	-36%	0.88	3.08
Slateford	30540	0	0	2	2	2	2	-	-	-	-
South Gyle	30530	111	66	151	94	40	28	36%	43%	3.47	3.18
Springburn	30299	28	13	5	9	-23	-4	-84%	-28%	5.81	1.10
Springfield	30584	0	0	0	0	0	0	-	-	-	-
Stepps	30333	72	35	67	30	-5	-5	-6%	-13%	0.55	0.82
Stevenston	30069	10	2	2	10	-8	8	-75%	383%	3.01	3.17
Stewarton	30157	54	24	57	40	3	16	5%	67%	0.37	2.83
Stirling	30408	386	225	403	288	17	63	4%	28%	0.87	3.91
Stonehaven	36003	111	55	38	53	-73	-2	-66%	-4%	8.49	0.32
Stranraer	30650	2	1	0	0	-2	-1	-100%	-100%	2.00	1.41
Summerston	30246	15	6	2	0	-13	-6	-89%	-98%	4.65	3.36
Thornliebank	30228	15	6	44	14	29	8	196%	127%	5.40	2.44
Thorntonhall	30279	0	0	0	0	0	0	-	-	-	-
Troon	30106	110	67	107	66	-3	-1	-3%	-1%	0.27	0.08
Uddingston	30345	154	82	150	97	-4	15	-3%	18%	0.36	1.60
Uphall	30496	82	38	5	30	-77	-8	-94%	-22%	11.65	1.46
Wallyford	30586	40	18	0	0	-40	-18	-100%	-99%	8.94	5.92
Wemyss Bay	30044	35	16	33	23	-2	7	-7%	45%	0.42	1.61
West Calder	30488	28	13	27	13	-1	0	-2%	1%	0.11	0.02
West Kilbride	30051	28	16	9	2	-19	-14	-67%	-86%	4.32	4.57
Wester Hailes	30534	0	0	20	1	20	1	-	-	-	-
Westerton	30214	134	71	103	94	-31	23	-23%	32%	2.86	2.49
Whifflet	30373	56	26	20	17	-36	-9	-65%	-33%	5.92	1.83
Whinhill	30080	1	0	0	18	-1	18	-100%	-	1.41	-
Whitecraigs	30222	88	42	58	4	-30	-38	-34%	-90%	3.51	7.88
Williamwood	30239	71	36	31	25	-40	-11	-56%	-31%	5.60	2.01
Wishaw	30405	47	26	35	2	-12	-24	-26%	-93%	1.91	6.50
Woodhall	30112	0	0	0	14	0	14	-	-	-	-
Yoker	30193	7	3	2	5	-5	2	-74%	74%	2.47	1.10

Transport Model for Scotland
Comparison of Boardings and Alightings - Inter Peak

Station	Node	LENNON 05		TMfS05		Difference		% Difference		GEH	
		Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Central Glasgow Stations											
Anderston	30256	0	0	86	72	86	72	-	-	-	-
Argyle Street	30303	18	18	250	241	232	223	1287%	1236%	20.03	19.57
Charing Cross Glasgow	30237	56	56	88	105	32	49	58%	88%	3.81	5.50
Glasgow Central	30277	1136	1152	667	602	-469	-550	-41%	-48%	15.61	18.59
Glasgow Queen Street	30283	817	837	856	791	39	-46	5%	-5%	1.36	1.61
High Street Glasgow	30295	0	0	71	88	71	88	-	-	-	-
Total		2027	2063	2019	1899	-8	-164	-0%	-8%	0.18	3.69
Central Edinburgh Stations											
Edinburgh	30550	782	774	1003	949	221	175	28%	23%	7.39	5.96
Haymarket	30547	223	226	334	343	111	117	50%	52%	6.67	6.93
Total		1005	1000	1337	1292	332	292	33%	29%	9.70	8.62
All Other Stations											
Aberdeen	36006	135	137	134	141	-1	4	-0%	3%	0.05	0.33
Aberdour	30531	4	4	0	0	-4	-4	-100%	-100%	2.83	2.83
Addiewell	30482	0	0	0	0	0	0	-	-	-	-
Airbles	30378	2	2	0	0	-2	-2	-96%	-85%	1.87	1.57
Airdrie	30389	48	48	57	64	9	16	19%	32%	1.27	2.08
Alexandra Parade	30316	1	1	0	1	-1	0	-64%	27%	0.78	0.25
Alexandria	30136	10	10	1	3	-9	-7	-86%	-71%	3.62	2.81
Annan	30680	9	9	9	10	0	1	3%	8%	0.08	0.24
Anniesland	30220	24	23	51	64	27	41	113%	177%	4.43	6.18
Arbroath	30770	20	20	20	20	0	0	2%	2%	0.08	0.10
Ardlui	30845	0	0	0	0	0	0	-	-	-	-
Ardrossan Harbour	30055	0	0	0	0	0	0	-	-	-	-
Ardrossan South Beach	30060	6	6	2	4	-4	-2	-63%	-39%	1.86	1.06
Ardrossan Town	30057	0	0	6	3	6	3	-	-	-	-
Arrochar & Tarbet	30835	0	0	0	0	0	0	-	-	-	-
Ashfield	30285	1	1	11	10	10	9	963%	907%	3.99	3.86
Auchinleck	30221	0	0	1	2	1	2	-	-	-	-
Ayr	30115	77	76	72	69	-5	-7	-6%	-9%	0.53	0.79
Baillieston	30340	1	1	1	3	-0	2	-31%	235%	0.34	1.59
Balloch	30132	18	17	29	28	11	11	62%	67%	2.29	2.40
Balmossie	30745	0	0	0	0	0	0	-	-	-	-
Barassie	30107	2	2	0	0	-2	-2	-100%	-100%	2.00	2.00
Bargeddie	30348	1	1	2	5	1	4	141%	370%	1.08	2.19
Barnhill	30308	0	0	0	0	0	0	-	-	-	-
Barrhead	30188	26	27	45	41	19	14	73%	52%	3.19	2.41
Barrhill	30640	0	0	0	0	0	0	-	-	-	-
Barry Links	30755	0	0	0	0	0	0	-	-	-	-
Bathgate	30479	35	36	45	40	10	4	28%	10%	1.54	0.59
Bearsden	30215	10	11	10	11	0	-0	3%	-4%	0.11	0.12
Bellgrove	30301	12	12	15	14	3	2	28%	17%	0.90	0.55
Bellshill	30369	25	24	47	41	22	17	90%	70%	3.72	2.94
Berwick	30725	204	204	212	214	8	10	4%	5%	0.58	0.66
Bishopbriggs	30312	33	33	13	17	-20	-16	-60%	-48%	4.09	3.13
Bishopton	30165	23	23	41	45	18	22	80%	96%	3.24	3.77
Blairhill	30358	22	23	26	24	4	1	17%	3%	0.77	0.13
Blantyre	30346	8	8	19	17	11	9	133%	113%	2.91	2.55
Bogston	30094	0	0	0	1	0	1	-	-	-	-
Bowling	30169	2	2	0	0	-2	-2	-92%	-87%	1.77	1.62
Branchton	30064	1	1	2	3	1	2	110%	197%	0.88	1.40
Breich	30476	0	0	0	0	0	0	-	-	-	-
Bridge of Allan	30404	4	4	11	16	7	12	170%	301%	2.50	3.80
Bridgeton	30309	3	3	5	8	2	5	73%	161%	1.09	2.08
Broughty Ferry	30740	0	0	1	0	1	0	-	-	-	-
Brunstane	30560	2	2	5	8	3	6	155%	298%	1.64	2.67
Burnside Strathclyde	30318	10	10	8	11	-2	1	-24%	11%	0.79	0.33
Burntisland	30545	3	3	5	5	2	2	58%	65%	0.88	0.98
Busby	30268	1	1	3	8	2	7	223%	734%	1.53	3.40
Cambuslang	30324	38	37	33	41	-5	4	-14%	11%	0.92	0.66
Camelon	30431	0	0	6	3	6	3	-	-	-	-
Cardenden	30535	1	1	1	1	-0	-0	-16%	-17%	0.17	0.18
Cardonald	30208	1	1	0	1	-1	-0	-60%	-31%	0.72	0.34
Cardross	30117	4	4	3	2	-1	-2	-30%	-43%	0.64	0.96
Carfin	30397	1	1	0	1	-1	0	-62%	40%	0.75	0.37
Carlisle	30690	255	255	175	169	-80	-86	-31%	-34%	5.44	5.90
Carluke	30420	11	11	15	14	4	3	39%	24%	1.18	0.76
Carmyle	30329	3	2	3	3	-0	1	-3%	60%	0.05	0.74
Carnoustie	30765	0	0	13	5	13	5	-	-	-	-

Station	Code									
Carntyne	30321	6	6	3	6	-3	0	-51%	2%	1.44	0.04
Carstairs	30474	0	0	10	10	10	10	-	-	-	-
Cartsdyke	30084	1	1	0	0	-1	-1	-100%	-100%	1.41	1.41
Cathcart	30274	14	13	9	19	-5	6	-36%	47%	1.47	1.53
Clarkston	30254	17	17	6	13	-11	-4	-67%	-25%	3.40	1.10
Cleland	30410	0	0	5	3	5	3	-	-	-	-
Clydebank	30189	6	6	3	9	-3	3	-54%	46%	1.55	1.02
Coatbridge Central	30367	4	4	10	11	6	7	162%	171%	2.41	2.51
Coatbridge Sunnyside	30370	23	22	33	34	10	12	44%	56%	1.92	2.34
Coatdyke	30376	7	7	9	10	2	3	25%	40%	0.63	0.97
Corkerhill	30213	2	2	1	0	-1	-2	-35%	-87%	0.54	1.62
Cowdenbeath	30527	6	5	6	5	-0	-0	-3%	-1%	0.07	0.03
Craigendoran	30098	3	3	8	7	5	4	156%	122%	2.02	1.67
Crianlarich	30850	14	12	14	6	-0	-6	-1%	-53%	0.03	2.13
Croftfoot	30300	3	3	3	2	0	-1	5%	-24%	0.09	0.44
Crookston	30195	13	11	3	0	-10	-11	-73%	-97%	3.32	4.45
Crosshill	30276	7	7	2	4	-5	-3	-68%	-41%	2.20	1.22
Crossmyloof	30247	5	5	17	19	12	14	243%	286%	3.65	4.10
Croy	30365	34	36	44	47	10	11	31%	30%	1.67	1.66
Cumbernauld	30391	11	11	23	22	12	11	105%	103%	2.81	2.77
Cupar	30590	9	9	7	9	-2	-0	-23%	-4%	0.74	0.11
Curriehill	30528	0	0	0	0	0	0	-	-	-	-
Dalgety Bay	39000	9	10	7	8	-2	-2	-27%	-18%	0.86	0.60
Dalmarnock	30311	5	4	3	5	-2	1	-49%	17%	1.27	0.33
Dalmeny	30525	10	10	11	11	1	1	8%	15%	0.24	0.45
Dalmuir	30178	25	24	27	28	2	4	7%	18%	0.33	0.84
Dalreoch	30135	8	8	0	0	-8	-8	-99%	-100%	3.93	3.99
Dalry	30086	9	9	9	9	-0	-0	-1%	-1%	0.04	0.04
Drem	30606	2	2	3	4	1	2	56%	96%	0.70	1.12
Drumchapel	30198	6	6	12	15	6	9	94%	156%	1.90	2.86
Drumfrochar	30050	1	1	0	0	-1	-1	-100%	-100%	1.41	1.41
Drumgelloch	30398	4	4	4	4	-0	0	-3%	4%	0.05	0.07
Drumry	30192	3	3	4	9	1	6	41%	189%	0.65	2.35
Duke Street	30315	0	0	1	1	1	1	-	-	-	-
Dumbarton Central	30137	37	35	18	19	-19	-16	-52%	-46%	3.68	3.12
Dumbarton East	30145	10	10	41	38	31	28	309%	277%	6.12	5.66
Dumbreck	30234	3	3	0	1	-3	-2	-90%	-79%	2.11	1.75
Dumfries	30675	25	25	25	26	0	1	1%	5%	0.07	0.25
Dunbar	30616	11	12	88	89	77	77	702%	645%	10.96	10.87
Dunblane	30400	25	25	27	27	2	2	8%	6%	0.37	0.30
Dundee	30735	93	94	101	100	8	6	8%	6%	0.80	0.57
Dunfermline Queen Margaret	39001	7	7	10	10	3	3	38%	41%	0.93	0.99
Dunfermline Town	30505	27	29	28	31	1	2	4%	6%	0.21	0.32
Dunkeld	30810	37	37	14	14	-23	-23	-63%	-63%	4.66	4.64
Dunlop	30154	1	1	2	6	1	5	102%	499%	0.83	2.67
Dyce	36008	8	8	10	11	2	3	21%	32%	0.57	0.85
East Kilbride	30322	35	35	22	17	-13	-18	-36%	-52%	2.36	3.54
Easterhouse	30342	8	8	9	14	1	6	10%	78%	0.27	1.88
Edinburgh Park	30886	6	6	12	20	6	14	104%	229%	2.06	3.83
Elgin	36018	10	11	8	6	-2	-5	-24%	-45%	0.82	1.69
Exhibition Centre	30250	12	12	43	28	31	16	261%	134%	5.95	3.59
Fairlie	30052	0	0	0	0	0	0	-	-	-	-
Falkirk Grahamston	30438	26	26	43	34	17	8	67%	32%	2.94	1.53
Falkirk High	30436	47	49	58	72	11	23	24%	46%	1.58	2.92
Fauldhouse	30463	0	0	10	10	10	10	-	-	-	-
Forres	36019	16	15	11	13	-5	-2	-31%	-16%	1.34	0.66
Fort Matilda	30065	1	1	19	19	18	18	1828%	1810%	5.74	5.71
Garelochhead	30062	0	0	0	0	0	0	-	-	-	-
Garrowhill	30334	13	12	16	18	3	6	24%	53%	0.81	1.63
Garscadden	30197	2	1	7	4	5	3	245%	298%	2.32	1.89
Gartcosh	30361	2	2	1	2	-1	-0	-38%	-6%	0.60	0.09
Giffnock	30245	10	10	8	16	-2	6	-15%	56%	0.50	1.56
Gilshochill	30257	1	1	0	0	-1	-1	-67%	-88%	0.82	1.18
Girvan	30635	5	5	5	5	0	0	0	1%	0.00	0.03
Gleneagles	30815	0	0	1	0	1	0	-	-	-	-
Glengarnock	30103	8	7	11	10	3	3	31%	46%	0.83	1.09
Glenrothes with Thornton	30555	1	1	0	0	-1	-1	-96%	-62%	1.33	0.75
Golf Street	30760	0	0	0	0	0	0	-	-	-	-
Gourock	30061	19	19	2	1	-17	-18	-89%	-94%	5.22	5.59
Greenfaulds	30387	2	2	18	20	16	18	813%	880%	5.11	5.36
Greenock Central	30078	12	12	0	0	-12	-12	-100%	-100%	4.90	4.90
Greenock West	30070	21	21	42	31	21	10	99%	48%	3.70	1.97
Gretna Green	30685	0	0	1	0	1	0	-	-	-	-
Hairmyres	30305	12	12	19	17	7	5	61%	41%	1.85	1.28
Hamilton Central	30356	32	31	160	159	128	128	401%	412%	13.09	13.12
Hamilton West	30352	17	18	31	30	14	12	82%	66%	2.85	2.43
Hartwood	30421	0	0	0	0	0	0	-	-	-	-
Hawkhead	30186	3	3	4	1	1	-2	35%	-57%	0.56	1.18

Helensburgh Central	30090	43	43	43	37	0	-6	0%	-13%	0.03	0.88
Helensburgh Upper	30087	0	0	0	0	0	0	-	-	-	-
Hillfoot	30230	5	5	9	9	4	4	75%	86%	1.43	1.61
Hillington East	30200	2	2	1	5	-1	3	-52%	154%	0.85	1.64
Hillington West	30194	15	14	17	16	2	2	12%	14%	0.45	0.52
Holytown	30392	2	2	20	19	18	17	924%	875%	5.51	5.34
Howwood	30010	0	0	0	0	0	0	-	-	-	-
Huntly	36013	1	1	1	1	-0	-0	-6%	-6%	0.06	0.06
Hyndland	30229	36	36	67	68	31	32	87%	88%	4.34	4.41
IBM	30058	0	1	0	0	0	-1	-	-89%	-	1.19
Insch	36011	2	1	2	1	-0	-0	-5%	-8%	0.07	0.08
Invergowrie	30825	0	0	0	0	0	0	-	-	-	-
Inverkeithing	30519	49	51	64	75	15	24	31%	47%	1.99	3.01
Inverkip	30049	0	0	0	0	0	0	-	-	-	-
Inverurie	36010	4	4	0	0	-4	-4	-100%	-100%	2.83	2.83
Irvine	30100	43	42	42	41	-1	-1	-3%	-2%	0.22	0.15
Johnstone	30163	53	54	54	53	1	-1	2%	-2%	0.13	0.11
Jordanhill	30219	6	6	0	1	-6	-5	-95%	-85%	3.21	2.75
Keith	36015	2	2	2	2	-0	-0	-8%	-8%	0.11	0.12
Kennishead	30216	0	0	7	5	7	5	-	-	-	-
Kilmarnock	30161	19	19	19	16	-0	-3	-2%	-16%	0.11	0.73
Kilmaurs	30153	1	1	1	1	0	0	4%	5%	0.04	0.05
Kilpatrick	30171	17	17	1	4	-16	-13	-92%	-79%	5.14	4.19
Kilwinning	30085	42	42	51	56	9	14	22%	32%	1.34	1.95
Kinghorn	30552	2	2	0	0	-2	-2	-100%	-100%	2.00	2.00
Kings Park	30287	2	2	3	9	1	7	53%	361%	0.67	3.05
Kingsknowe	30536	0	0	0	0	0	0	-	-	-	-
Kirkcaldy	30554	63	62	99	98	36	36	58%	59%	4.04	4.06
Kirkconnel	30660	0	0	0	0	0	0	-	-	-	-
Kirkhill	30326	2	2	2	2	0	-0	21%	-14%	0.28	0.20
Kirknewton	30506	0	0	0	0	0	0	-	-	-	-
Kirkwood	30355	5	4	15	6	10	2	194%	48%	3.09	0.87
Ladybank	30568	0	0	0	0	0	0	-	-	-	-
Lanark	30439	11	11	9	10	-2	-1	-17%	-6%	0.58	0.21
Langbank	30127	0	0	2	4	2	4	-	-	-	-
Langside	30258	5	5	1	8	-4	3	-73%	69%	2.06	1.34
Larbert	30427	19	20	27	28	8	8	42%	40%	1.68	1.64
Largs	30048	17	17	13	13	-4	-4	-25%	-23%	1.12	0.99
Lenzie	30330	48	44	62	58	14	14	30%	33%	1.95	2.01
Leuchars	30601	26	25	23	25	-3	-0	-11%	-2%	0.55	0.08
Linlithgow	30486	59	57	61	61	2	4	4%	6%	0.28	0.46
Livingston North	30493	30	31	32	32	2	1	6%	3%	0.32	0.15
Livingston South	30495	7	8	9	9	2	1	33%	11%	0.81	0.31
Lochgelly	30529	1	1	1	0	-0	-1	-21%	-53%	0.22	0.62
Lochwinnoch	30123	7	7	4	4	-3	-3	-46%	-47%	1.37	1.42
Longniddry	30600	5	4	13	12	8	8	156%	210%	2.62	2.93
Markinch	30563	5	5	5	4	-0	-1	-5%	-12%	0.10	0.28
Maryhill	30238	1	1	1	2	0	1	7%	54%	0.07	0.48
Maxwell Park	30244	4	4	1	3	-3	-1	-79%	-37%	2.01	0.82
Maybole	30625	2	2	0	0	-2	-2	-97%	-97%	1.90	1.91
Milliken Park	30156	3	3	5	3	2	0	50%	16%	0.78	0.27
Milngavie	30233	30	30	32	33	2	3	7%	10%	0.36	0.52
Monifieth	30750	0	0	0	0	0	0	-	-	-	-
Montrose	36001	17	16	17	16	0	0	2%	2%	0.07	0.08
Mosspark	30207	13	13	7	0	-6	-13	-49%	-97%	2.05	4.85
Motherwell	30377	56	56	69	68	13	12	23%	22%	1.63	1.55
Mount Florida	30273	27	27	9	15	-18	-12	-65%	-43%	4.11	2.51
Mount Vernon	30337	0	0	2	10	2	10	-	-	-	-
Muirend	30251	9	10	1	5	-8	-5	-89%	-46%	3.57	1.66
Musselburgh	30579	5	5	0	1	-5	-4	-98%	-85%	3.06	2.52
Neilston	30175	17	17	18	14	1	-3	4%	-18%	0.17	0.76
New Cumnock	30655	0	0	0	0	0	0	-	-	-	-
Newcraighall	30561	5	4	0	1	-5	-3	-91%	-83%	2.74	2.18
Newton	30332	9	9	19	21	10	12	108%	131%	2.62	3.05
Newton-on-Ayr	30114	0	0	0	0	0	0	-	-	-	-
Nitshill	30196	0	0	1	1	1	1	-	-	-	-
North Berwick	30610	21	20	19	19	-2	-1	-9%	-7%	0.44	0.32
North Queensferry	30518	4	4	6	15	2	11	48%	272%	0.86	3.54
Paisley Canal	30177	7	7	14	1	7	-6	100%	-85%	2.16	2.96
Paisley Gilmour St	30176	181	180	167	191	-14	11	-8%	6%	1.04	0.81
Paisley St James	30173	0	0	2	9	2	9	-	-	-	-
Partick	30235	70	70	48	37	-22	-33	-31%	-47%	2.80	4.48
Patterton	30212	9	8	12	11	3	3	32%	34%	0.90	0.89
Perth	30790	42	40	57	56	15	16	37%	40%	2.18	2.33
Pollokshaws East	30243	1	1	4	2	3	1	287%	135%	1.84	1.04
Pollokshaws West	30236	1	1	14	15	13	14	1271%	1353%	4.69	4.86
Pollokshields East	30266	5	5	1	1	-4	-4	-75%	-78%	2.11	2.23
Pollokshields West	30249	4	4	0	8	-4	4	-95%	94%	2.63	1.55

Polmont	30467	27	26	38	29	11	3	40%	13%	1.89	0.66
Port Glasgow	30102	17	17	17	16	0	-1	3%	-7%	0.10	0.30
Portlethen	36004	0	0	0	0	0	0	-	-	-	-
Possilpark	30280	0	0	0	1	0	1	-	-	-	-
Prestonpans	30592	3	3	0	0	-3	-3	-100%	-98%	2.45	2.38
Prestwick Airport	30118	1	1	1	1	-0	0	-2%	2%	0.02	0.02
Prestwick Town	30119	7	7	8	8	1	1	15%	20%	0.37	0.51
Priesthill	30209	0	0	1	2	1	2	-	-	-	-
Queens Park Glasgow	30265	17	15	6	10	-11	-5	-66%	-36%	3.32	1.55
Renton	30130	0	0	0	0	0	0	-	-	-	-
Rosyth	30508	5	6	6	8	1	2	20%	33%	0.43	0.75
Rutherglen	30317	19	19	14	44	-5	25	-24%	131%	1.12	4.43
Saltcoats	30063	11	11	1	0	-10	-11	-95%	-97%	4.35	4.45
Sanquhar	30665	0	0	0	0	0	0	-	-	-	-
Scotstounhill	30205	5	4	10	7	5	3	102%	82%	1.86	1.38
Shawlands	30241	6	6	3	4	-3	-2	-49%	-39%	1.36	1.05
Shettleston	30328	28	25	29	27	1	2	4%	6%	0.21	0.30
Shieldmuir	30395	0	0	0	1	0	1	-	-	-	-
Shotts	30433	5	4	9	8	4	4	73%	100%	1.40	1.64
Singer	30185	25	24	28	28	3	4	10%	18%	0.51	0.84
Slateford	30540	0	0	1	0	1	0	-	-	-	-
South Gyle	30530	12	11	21	25	9	14	76%	127%	2.24	3.30
Springburn	30299	4	4	4	8	0	4	7%	108%	0.14	1.74
Springfield	30584	0	0	0	0	0	0	-	-	-	-
Stepps	30333	13	12	16	15	3	3	21%	27%	0.73	0.89
Stevenston	30069	1	1	12	7	11	6	1071%	617%	4.25	3.05
Stewarton	30157	6	6	7	12	1	6	23%	97%	0.54	1.94
Stirling	30408	122	118	158	156	36	38	30%	32%	3.06	3.23
Stonehaven	36003	18	18	17	16	-1	-2	-8%	-10%	0.34	0.42
Stranraer	30650	1	1	1	1	0	0	0	26%	0.00	0.24
Summerston	30246	2	2	1	0	-1	-2	-72%	-87%	1.27	1.64
Thornliebank	30228	1	1	18	35	17	34	1685%	3408%	5.49	8.02
Thorntonhall	30279	0	0	0	0	0	0	-	-	-	-
Troon	30106	25	24	23	26	-2	2	-9%	9%	0.48	0.42
Uddingston	30345	24	25	30	39	6	14	26%	56%	1.18	2.49
Uphall	30496	9	10	9	14	0	4	0	40%	0.00	1.17
Wallyford	30586	3	3	1	0	-2	-3	-71%	-96%	1.52	2.32
Wemyss Bay	30044	5	5	5	5	0	0	6%	9%	0.13	0.19
West Calder	30488	3	2	4	3	1	1	28%	48%	0.45	0.61
West Kilbride	30051	5	5	0	0	-5	-5	-100%	-100%	3.16	3.16
Wester Hailes	30534	0	0	1	1	1	1	-	-	-	-
Westerton	30214	21	22	30	35	9	13	42%	60%	1.74	2.48
Whifflet	30373	8	8	17	16	9	8	110%	96%	2.49	2.24
Whinhill	30080	0	0	0	5	0	5	-	-	-	-
Whitecraigs	30222	11	12	3	3	-8	-9	-70%	-79%	2.86	3.52
Williamwood	30239	8	7	7	9	-1	2	-18%	23%	0.54	0.57
Wishaw	30405	9	8	4	4	-5	-4	-56%	-47%	1.98	1.53
Woodhall	30112	0	0	0	3	0	3	-	-	-	-
Yoker	30193	1	1	2	2	1	1	56%	100%	0.49	0.82

Transport Model for Scotland
Comparison of Boardings and Alightings - PM Peak

Station	Node	LENNON 05		TMfS05		Difference		% Difference		GEH	
		Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Central Glasgow Stations											
Anderston	30256	16	16	340	99	324	83	2027%	519%	24.30	10.95
Argyle Street	30303	25	25	729	312	704	287	2815%	1146%	36.25	22.09
Charing Cross Glasgow	30237	176	195	490	210	314	15	178%	8%	17.21	1.04
Glasgow Central	30277	5334	1838	3571	1036	-1763	-802	-33%	-44%	26.42	21.17
Glasgow Queen Street	30283	3486	1667	2919	1252	-567	-415	-16%	-25%	10.03	10.86
High Street Glasgow	30295	1	2	305	146	304	144	30372%	7198%	24.57	16.74
Total		9038	3743	8353	3054	-685	-689	-8%	-18%	7.34	11.82
Central Edinburgh Stations											
Edinburgh	30550	3064	1539	2982	1681	-82	142	-3%	9%	1.49	3.54
Haymarket	30547	1124	554	1164	652	40	98	4%	18%	1.17	3.98
Total		4188	2093	4145	2333	-43	240	-1%	11%	0.66	5.10
All Other Stations											
Aberdeen	36006	403	232	260	176	-143	-56	-35%	-24%	7.84	3.92
Aberdour	30531	8	26	0	0	-8	-26	-100%	-98%	4.00	7.05
Addiewell	30482	0	0	0	0	0	0	-	-	-	-
Airbles	30378	1	5	1	0	-0	-5	-8%	-94%	0.08	2.87
Airdrie	30389	89	213	115	250	26	37	29%	18%	2.56	2.45
Alexandra Parade	30316	2	10	0	2	-2	-8	-80%	-83%	1.46	3.44
Alexandria	30136	15	31	0	69	-15	38	-100%	121%	5.48	5.32
Annan	30680	12	13	12	13	0	-0	1%	-0%	0.03	0.00
Anniesland	30220	41	101	98	389	57	288	139%	285%	6.83	18.38
Arbroath	30770	31	82	44	93	13	11	41%	14%	2.10	1.20
Ardlui	30845	0	0	0	0	0	0	-	-	-	-
Ardrossan Harbour	30055	2	9	0	0	-2	-9	-100%	-100%	2.00	4.24
Ardrossan South Beach	30060	10	30	15	28	5	-2	51%	-7%	1.43	0.37
Ardrossan Town	30057	0	0	0	11	0	11	-	-	-	-
Arrochar & Tarbet	30835	0	0	0	0	0	0	-	-	-	-
Ashfield	30285	1	7	7	13	6	6	600%	88%	3.00	1.94
Auchinleck	30221	0	4	1	10	1	6	-	147%	-	2.23
Ayr	30115	122	219	106	183	-16	-36	-13%	-16%	1.47	2.53
Baillieston	30340	1	11	1	4	-0	-7	-27%	-62%	0.29	2.49
Balloch	30132	44	70	40	165	-4	95	-9%	135%	0.60	8.74
Balmossie	30745	0	0	0	0	0	0	-	-	-	-
Barassie	30107	6	20	0	0	-6	-20	-100%	-100%	3.46	6.32
Bargeddie	30348	3	12	4	19	1	7	41%	58%	0.65	1.77
Barnhill	30308	0	2	0	1	0	-1	-	-69%	-	1.19
Barrhead	30188	45	125	69	142	24	17	53%	14%	3.17	1.50
Barrhill	30640	0	0	0	0	0	0	-	-	-	-
Barry Links	30755	0	0	0	0	0	0	-	-	-	-
Bathgate	30479	62	186	67	187	5	1	8%	0%	0.60	0.04
Bearsden	30215	22	63	15	21	-7	-42	-30%	-66%	1.54	6.45
Bellgrove	30301	15	33	39	27	24	-6	158%	-20%	4.57	1.19
Bellshill	30369	36	100	24	92	-12	-8	-33%	-8%	2.15	0.81
Berwick	30725	235	249	258	272	23	23	10%	9%	1.47	1.42
Bishopbriggs	30312	49	126	2	37	-47	-89	-96%	-70%	9.34	9.82
Bishopton	30165	45	102	71	159	26	57	57%	55%	3.40	4.96
Blairhill	30358	73	128	71	106	-2	-22	-3%	-17%	0.24	2.05
Blantyre	30346	18	51	24	55	6	4	31%	8%	1.23	0.58
Bogston	30094	0	0	0	1	0	1	-	-	-	-
Bowling	30169	23	23	0	1	-23	-22	-99%	-97%	6.72	6.46
Branchton	30064	1	5	12	33	11	28	1068%	562%	4.24	6.44
Breich	30476	0	0	2	0	2	0	-	-	-	-
Bridge of Allan	30404	6	25	6	19	-0	-6	-2%	-24%	0.05	1.29
Bridgeton	30309	6	18	8	23	2	5	41%	26%	0.91	1.02
Broughty Ferry	30740	0	0	1	9	1	9	-	-	-	-
Brunstane	30560	5	18	4	37	-1	19	-19%	105%	0.45	3.61
Burnside Strathclyde	30318	20	62	8	28	-12	-34	-62%	-54%	3.31	4.99
Burntisland	30545	8	29	12	40	4	11	54%	39%	1.36	1.92
Busby	30268	7	20	3	15	-4	-5	-56%	-25%	1.74	1.21
Cambuslang	30324	51	116	41	181	-10	65	-20%	56%	1.47	5.34
Camelon	30431	2	10	6	11	4	1	176%	8%	1.82	0.24
Cardenden	30535	0	3	0	2	0	-1	-	-25%	-	0.46
Cardonald	30208	3	14	1	5	-2	-9	-62%	-63%	1.29	2.82
Cardross	30117	18	30	5	10	-13	-20	-74%	-67%	3.98	4.53
Carfin	30397	1	10	0	1	-1	-9	-76%	-92%	0.97	3.93
Carlisle	30690	291	291	205	292	-86	1	-30%	0%	5.48	0.03
Carluke	30420	17	51	17	51	0	0	1%	0%	0.04	0.03
Carmyle	30329	5	17	2	3	-3	-14	-59%	-82%	1.56	4.39
Carnoustie	30765	1	5	10	17	9	12	909%	241%	3.86	3.63

Carntyne	30321	6	19	5	8	-1	-11	-24%	-56%	0.63	2.86
Carstairs	30474	0	0	0	1	0	1	-	-	-	-
Cartsdyke	30084	0	5	0	0	0	-5	-	-100%	-	3.16
Cathcart	30274	28	85	40	56	12	-29	45%	-34%	2.13	3.42
Clarkston	30254	32	96	4	62	-28	-34	-88%	-35%	6.70	3.79
Cleland	30410	0	6	1	3	1	-3	-	-42%	-	1.16
Clydebank	30189	30	43	21	17	-9	-26	-32%	-60%	1.88	4.70
Coatbridge Central	30367	5	5	14	42	9	37	172%	733%	2.83	7.59
Coatbridge Sunnyside	30370	42	98	63	153	21	55	51%	56%	2.95	4.93
Coatdyke	30376	17	46	21	46	4	-0	22%	-1%	0.84	0.06
Corkerhill	30213	3	17	0	2	-3	-15	-84%	-88%	1.90	4.87
Cowdenbeath	30527	7	24	9	21	2	-3	24%	-13%	0.60	0.68
Craigendoran	30098	17	23	11	77	-6	54	-33%	236%	1.47	7.66
Crianlarich	30850	13	32	0	0	-13	-32	-100%	-100%	5.10	8.00
Croftfoot	30300	8	25	1	18	-7	-7	-84%	-30%	3.10	1.60
Crookston	30195	12	39	2	24	-11	-15	-88%	-37%	4.04	2.59
Crosshill	30276	36	63	12	28	-24	-35	-66%	-55%	4.87	5.16
Crossmyloof	30247	17	47	20	88	3	41	20%	87%	0.77	4.99
Croy	30365	67	189	23	199	-44	10	-66%	5%	6.57	0.69
Cumbernauld	30391	14	36	22	57	8	21	57%	58%	1.89	3.06
Cupar	30590	11	36	10	17	-1	-19	-8%	-53%	0.27	3.75
Curriehill	30528	2	6	0	0	-2	-6	-93%	-99%	1.80	3.42
Dalgety Bay	39000	21	65	7	19	-14	-46	-65%	-70%	3.60	7.02
Dalmarnock	30311	2	8	2	9	0	1	4%	17%	0.06	0.46
Dalmeny	30525	29	87	33	102	4	15	13%	18%	0.68	1.57
Dalmuir	30178	39	85	66	107	27	22	68%	25%	3.67	2.21
Dalreoch	30135	34	47	7	6	-27	-41	-78%	-87%	5.85	7.91
Dalry	30086	11	31	12	28	1	-3	5%	-9%	0.18	0.52
Drem	30606	5	22	6	18	1	-4	19%	-17%	0.41	0.85
Drumchapel	30198	10	27	19	50	9	23	86%	85%	2.28	3.71
Drumfrochar	30050	0	4	0	0	0	-4	-	-100%	-	2.83
Drumgelloch	30398	9	24	8	11	-1	-13	-15%	-53%	0.48	3.05
Drumry	30192	6	21	9	30	3	9	45%	44%	1.00	1.83
Duke Street	30315	0	3	1	1	1	-2	-	-59%	-	1.22
Dumbarton Central	30137	50	101	16	54	-34	-47	-69%	-47%	6.00	5.35
Dumbarton East	30145	14	35	66	103	52	68	371%	194%	8.21	8.19
Dumbreck	30234	4	19	0	4	-4	-15	-96%	-80%	2.64	4.52
Dumfries	30675	37	41	37	37	0	-4	0%	-10%	0.00	0.65
Dunbar	30616	23	74	23	69	0	-5	1%	-7%	0.04	0.58
Dunblane	30400	34	82	31	72	-3	-10	-10%	-12%	0.60	1.16
Dundee	30735	337	204	284	166	-54	-38	-16%	-19%	3.04	2.79
Dunfermline Queen Margaret	39001	16	51	16	56	0	5	1%	9%	0.02	0.66
Dunfermline Town	30505	54	157	46	160	-8	3	-16%	2%	1.19	0.23
Dunkeld	30810	54	59	0	0	-54	-59	-100%	-100%	10.39	10.84
Dunlop	30154	1	8	4	11	3	3	259%	33%	1.71	0.86
Dyce	36008	18	50	26	94	8	44	43%	89%	1.65	5.21
East Kilbride	30322	65	167	30	148	-35	-19	-53%	-11%	5.02	1.53
Easterhouse	30342	19	46	21	51	2	5	10%	11%	0.44	0.71
Edinburgh Park	30886	29	58	42	60	13	2	44%	4%	2.15	0.32
Elgin	36018	22	27	8	1	-14	-26	-62%	-96%	3.53	6.93
Exhibition Centre	30250	15	41	132	61	117	20	777%	49%	13.61	2.84
Fairlie	30052	0	3	0	0	0	-3	-	-100%	-	2.45
Falkirk Grahamston	30438	49	126	53	185	4	59	8%	47%	0.53	4.74
Falkirk High	30436	83	265	87	258	4	-7	5%	-3%	0.45	0.41
Fauldhouse	30463	0	2	0	2	0	0	-	1%	-	0.01
Forres	36019	29	39	23	42	-6	3	-21%	7%	1.18	0.45
Fort Matilda	30065	4	15	33	80	29	65	733%	431%	6.78	9.40
Garelochhead	30062	0	0	0	0	0	0	-	-	-	-
Garrowhill	30334	28	70	31	83	3	13	12%	18%	0.64	1.46
Garscadden	30197	3	14	6	21	3	7	105%	51%	1.47	1.71
Gartcosh	30361	2	13	1	4	-1	-9	-68%	-68%	1.17	3.01
Giffnock	30245	17	49	16	62	-1	13	-6%	26%	0.24	1.73
Gilshochill	30257	0	5	0	0	0	-5	-	-98%	-	3.09
Girvan	30635	8	10	0	10	-8	-0	-100%	-3%	3.97	0.08
Gleneagles	30815	0	0	3	4	3	4	-	-	-	-
Glengarnock	30103	14	39	17	47	3	8	20%	21%	0.71	1.24
Glenrothes with Thornton	30555	2	8	0	2	-2	-6	-88%	-80%	1.66	2.93
Golf Street	30760	0	0	0	1	0	1	-	-	-	-
Gourock	30061	32	73	3	4	-29	-69	-90%	-95%	6.89	11.15
Greenfaulds	30387	3	13	31	16	28	3	948%	24%	6.85	0.81
Greenock Central	30078	23	52	0	0	-23	-52	-100%	-100%	6.78	10.20
Greenock West	30070	31	74	55	75	24	1	77%	2%	3.66	0.14
Gretna Green	30685	1	1	0	2	-1	1	-100%	82%	1.41	0.69
Hairmyres	30305	26	80	31	87	5	7	19%	9%	0.92	0.79
Hamilton Central	30356	47	106	85	128	38	22	82%	20%	4.72	2.01
Hamilton West	30352	40	109	65	93	25	-16	62%	-15%	3.42	1.61
Hartwood	30421	0	0	0	0	0	0	-	-	-	-
Hawkhead	30186	5	19	6	9	1	-10	12%	-52%	0.26	2.65

Station	Code									
Helensburgh Central	30090	75	155	57	75	-18	-80	-24%	-52%	2.26	7.46
Helensburgh Upper	30087	0	0	0	0	0	0	-	-	-	-
Hillfoot	30230	10	31	7	24	-3	-7	-30%	-22%	1.04	1.30
Hillington East	30200	6	24	2	20	-4	-4	-68%	-17%	2.06	0.88
Hillington West	30194	14	36	13	8	-1	-29	-5%	-79%	0.19	6.11
Holytown	30392	4	14	7	17	3	3	66%	18%	1.14	0.65
Howwood	30010	1	5	0	0	-1	-5	-100%	-100%	1.41	3.15
Huntly	36013	3	10	5	5	2	-5	59%	-48%	0.89	1.73
Hyndland	30229	57	147	120	267	63	120	110%	82%	6.66	8.35
IBM	30058	11	26	0	1	-11	-25	-97%	-96%	4.48	6.84
Insch	36011	4	13	11	9	7	-4	165%	-30%	2.44	1.16
Invergowrie	30825	0	0	0	0	0	0	-	-	-	-
Inverkeithing	30519	101	273	170	466	69	193	69%	71%	5.96	10.02
Inverkip	30049	0	5	0	15	0	10	-	197%	-	3.12
Inverurie	36010	8	28	0	0	-8	-28	-100%	-100%	4.00	7.48
Irvine	30100	66	139	67	138	1	-1	1%	-1%	0.12	0.07
Johnstone	30163	88	222	94	232	6	10	7%	5%	0.68	0.68
Jordanhill	30219	13	38	5	7	-8	-31	-64%	-82%	2.81	6.57
Keith	36015	2	9	0	0	-2	-9	-86%	-97%	1.60	4.03
Kennishead	30216	0	0	5	24	5	24	-	-	-	-
Kilmarnock	30161	29	91	39	4	10	-87	36%	-95%	1.78	12.55
Kilmaurs	30153	4	16	4	15	-0	-1	-1%	-7%	0.01	0.29
Kilpatrick	30171	22	27	2	2	-20	-25	-93%	-93%	5.93	6.58
Kilwinning	30085	75	177	82	204	7	27	9%	15%	0.74	1.95
Kinghorn	30552	5	19	0	0	-5	-19	-100%	-100%	3.16	6.16
Kings Park	30287	5	17	2	7	-3	-10	-67%	-60%	1.83	2.94
Kingsknowe	30536	0	1	0	0	0	-1	-	-71%	-	0.88
Kirkcaldy	30554	91	248	122	270	31	22	34%	9%	3.00	1.35
Kirkconnel	30660	0	0	1	1	1	1	-	-	-	-
Kirkhill	30326	4	14	3	8	-1	-6	-17%	-41%	0.36	1.72
Kirknewton	30506	3	10	0	9	-3	-1	-91%	-6%	2.14	0.20
Kirkwood	30355	8	28	3	9	-5	-19	-59%	-67%	1.99	4.32
Ladybank	30568	0	4	0	3	0	-1	-	-20%	-	0.43
Lanark	30439	15	46	14	5	-1	-41	-7%	-89%	0.28	8.11
Langbank	30127	0	3	18	24	18	21	-	691%	-	5.67
Langside	30258	9	30	1	17	-8	-13	-92%	-43%	3.78	2.66
Larbert	30427	36	104	37	159	1	55	2%	53%	0.12	4.79
Largs	30048	27	57	20	38	-7	-19	-27%	-33%	1.52	2.70
Lenzie	30330	92	184	96	153	4	-31	4%	-17%	0.37	2.38
Leuchars	30601	23	63	23	43	0	-20	1%	-31%	0.06	2.69
Linlithgow	30486	107	314	243	350	136	36	127%	12%	10.30	2.00
Livingston North	30493	61	177	62	187	1	10	1%	5%	0.11	0.71
Livingston South	30495	17	60	10	52	-7	-8	-38%	-14%	1.76	1.12
Lochgelly	30529	0	4	1	3	1	-1	-	-33%	-	0.71
Lochwinnoch	30123	9	14	4	14	-5	0	-55%	1%	1.95	0.02
Longniddry	30600	10	32	7	39	-3	7	-31%	23%	1.07	1.22
Markinch	30563	8	28	10	24	2	-4	29%	-14%	0.76	0.77
Maryhill	30238	1	8	1	10	-0	2	-21%	31%	0.22	0.82
Maxwell Park	30244	7	25	1	11	-6	-14	-89%	-54%	3.15	3.17
Maybole	30625	2	2	0	0	-2	-2	-100%	-100%	2.00	2.00
Milliken Park	30156	3	13	0	18	-3	5	-89%	38%	2.07	1.25
Milngavie	30233	52	126	45	129	-7	3	-14%	2%	1.06	0.26
Monifieth	30750	0	0	0	1	0	1	-	-	-	-
Montrose	36001	23	62	22	62	-1	0	-3%	1%	0.16	0.05
Mosspark	30207	11	39	3	58	-8	19	-76%	50%	3.23	2.78
Motherwell	30377	81	171	215	233	134	62	166%	36%	11.04	4.37
Mount Florida	30273	43	128	26	86	-17	-43	-39%	-33%	2.88	4.11
Mount Vernon	30337	0	6	1	1	1	-5	-	-88%	-	2.89
Muirend	30251	29	69	3	23	-26	-46	-89%	-67%	6.43	6.82
Musselburgh	30579	16	50	0	35	-16	-15	-100%	-31%	5.66	2.38
Neilston	30175	61	98	64	102	2	4	4%	4%	0.32	0.38
New Cumnock	30655	0	1	0	1	0	-0	-	-49%	-	0.56
Newcraighall	30561	11	33	3	1	-8	-32	-72%	-98%	2.99	7.93
Newton	30332	20	58	21	31	1	-27	3%	-46%	0.15	4.01
Newton-on-Ayr	30114	0	0	0	3	0	3	-	-	-	-
Nitshill	30196	0	2	1	3	1	1	-	31%	-	0.40
North Berwick	30610	30	103	28	63	-2	-40	-6%	-39%	0.35	4.40
North Queensferry	30518	6	20	3	86	-3	66	-51%	332%	1.43	9.10
Paisley Canal	30177	12	40	13	13	1	-27	6%	-67%	0.20	5.16
Paisley Gilmour St	30176	277	497	294	707	17	210	6%	42%	1.00	8.57
Paisley St James	30173	0	0	2	25	2	25	-	-	-	-
Partick	30235	102	148	147	115	45	-33	44%	-22%	4.02	2.88
Patterton	30212	48	70	54	43	6	-27	12%	-38%	0.82	3.54
Perth	30790	65	121	14	69	-51	-52	-79%	-43%	8.13	5.29
Pollokshaws East	30243	5	21	1	19	-4	-2	-71%	-10%	1.99	0.45
Pollokshaws West	30236	0	4	14	33	14	29	-	727%	-	6.75
Pollokshields East	30266	8	30	6	8	-2	-22	-29%	-74%	0.90	5.12
Pollokshields West	30249	9	26	0	29	-9	3	-100%	13%	4.24	0.63

Polmont	30467	54	165	60	165	6	0	12%	0%	0.85	0.02
Port Glasgow	30102	25	56	26	53	1	-3	6%	-6%	0.28	0.44
Portlethen	36004	0	0	0	0	0	0	-	-	-	-
Possilpark	30280	0	4	1	2	1	-2	-	-54%	-	1.25
Prestonpans	30592	9	30	0	4	-9	-26	-100%	-87%	4.24	6.33
Prestwick Airport	30118	3	12	3	12	0	0	5%	3%	0.08	0.09
Prestwick Town	30119	16	48	14	47	-2	-1	-15%	-2%	0.62	0.12
Priesthill	30209	0	3	0	8	0	5	-	162%	-	2.08
Queens Park Glasgow	30265	24	64	24	57	-0	-7	-0%	-11%	0.02	0.90
Renton	30130	0	2	0	0	0	-2	-	-100%	-	2.00
Rosyth	30508	18	51	7	47	-11	-4	-63%	-8%	3.24	0.60
Rutherglen	30317	28	69	55	124	27	55	97%	80%	4.22	5.59
Saltcoats	30063	19	49	2	3	-17	-46	-91%	-94%	5.38	9.06
Sanquhar	30665	0	1	0	0	0	-1	-	-95%	-	1.31
Scotstounhill	30205	10	32	31	40	21	8	206%	23%	4.58	1.26
Shawlands	30241	21	36	1	21	-20	-15	-97%	-42%	6.20	2.87
Shettleston	30328	75	124	74	115	-1	-9	-1%	-7%	0.10	0.84
Shieldmuir	30395	0	0	0	2	0	2	-	-	-	-
Shotts	30433	6	23	7	8	1	-15	17%	-64%	0.39	3.69
Singer	30185	39	61	55	57	16	-4	42%	-7%	2.39	0.52
Slateford	30540	0	0	1	4	1	4	-	-	-	-
South Gyle	30530	39	83	70	95	31	12	80%	14%	4.20	1.25
Springburn	30299	7	22	6	13	-1	-9	-9%	-39%	0.24	2.05
Springfield	30584	0	0	0	0	0	0	-	-	-	-
Stepps	30333	19	59	18	54	-1	-5	-7%	-9%	0.30	0.69
Stevenston	30069	2	8	20	43	18	35	923%	432%	5.51	6.87
Stewarton	30157	15	51	18	53	3	2	20%	4%	0.73	0.29
Stirling	30408	159	364	266	366	107	2	67%	1%	7.32	0.12
Stonehaven	36003	34	92	31	10	-3	-82	-10%	-89%	0.57	11.46
Stranraer	30650	2	3	0	0	-2	-3	-95%	-100%	1.84	2.45
Summerston	30246	2	13	0	1	-2	-12	-79%	-90%	1.42	4.34
Thornliebank	30228	3	13	9	48	6	35	186%	266%	2.32	6.28
Thorntonhall	30279	0	0	0	0	0	0	-	-	-	-
Troon	30106	47	102	41	109	-6	7	-12%	7%	0.85	0.70
Uddingston	30345	48	124	50	133	2	9	4%	7%	0.29	0.76
Uphall	30496	21	65	8	63	-13	-2	-61%	-3%	3.33	0.25
Wallyford	30586	9	30	0	2	-9	-28	-100%	-93%	4.21	6.93
Wemyss Bay	30044	9	31	9	28	0	-3	0%	-10%	0.00	0.55
West Calder	30488	7	24	7	22	0	-2	0%	-8%	0.00	0.42
West Kilbride	30051	10	27	0	2	-10	-25	-96%	-94%	4.24	6.67
Wester Hailes	30534	0	0	1	11	1	11	-	-	-	-
Westerton	30214	42	109	59	85	17	-24	41%	-22%	2.42	2.42
Whifflet	30373	13	45	19	31	6	-14	49%	-32%	1.57	2.32
Whinhill	30080	0	1	0	45	0	44	-	4446%	-	9.22
Whitecraigs	30222	23	70	5	64	-18	-6	-80%	-8%	4.93	0.69
Williamwood	30239	19	55	36	71	17	16	89%	29%	3.21	2.01
Wishaw	30405	15	37	2	2	-13	-35	-90%	-95%	4.69	7.99
Woodhall	30112	0	0	0	6	0	6	-	-	-	-
Yoker	30193	1	6	4	9	3	3	285%	54%	1.83	1.17

Appendix C

Bus Passenger Count Comps

Transport Model for Scotland
Validation Summary
Screenline / Cordon Totals

Glasgow Bus

Cordon / Screenline	AM OBSERVED		AM MODELLED				IP OBSERVED		IP MODELLED				PM OBSERVED		PM MODELLED			
	Period	M Hour	M Hour	Diff	% Diff	GEH	Period	M Hour	M Hour	Diff	% Diff	GEH	Period	M Hour	M Hour	Diff	% Diff	GEH
Glasgow City Centre Cordon_I	42123	18883	16603	-2280	-12%	17	24063	4010	4066	55	1%	1	18164	7009	5720	-1289	-18%	16
Glasgow City Centre Cordon_O	16444	7275	5846	-1429	-20%	18	31833	5305	5328	23	0%	0	49317	20264	12266	-7998	-39%	63
Glasgow Outer Cordon_I	16820	8173	8563	390	5%	4	8605	1434	2081	646	45%	15	7078	2597	2840	244	9%	5
Glasgow Outer Cordon_O	6047	2335	2593	258	11%	5	9194	1532	2255	723	47%	17	17296	8070	5663	-2406	-30%	29

Edinburgh Bus

Cordon / Screenline	AM OBSERVED		AM MODELLED				IP OBSERVED		IP MODELLED				PM OBSERVED		PM MODELLED			
	Period	M Hour	M Hour	Diff	% Diff	GEH	Period	M Hour	M Hour	Diff	% Diff	GEH	Period	M Hour	M Hour	Diff	% Diff	GEH
Edinburgh Outer Cordon_I		5328	6682	1354	25%	17		2306	1310	-996	-43%	23		2339	2095	-244	-10%	5
Edinburgh Outer Cordon_O		2768	2313	-455	-16%	9		2093	1316	-776	-37%	19		6368	5543	-825	-13%	11

Other Cordons / Screenlines

Cordon / Screenline	AM OBSERVED		AM MODELLED				IP OBSERVED		IP MODELLED				PM OBSERVED		PM MODELLED			
	Period	M Hour	M Hour	Diff	% Diff	GEH	Period	M Hour	M Hour	Diff	% Diff	GEH	Period	M Hour	M Hour	Diff	% Diff	GEH
Clyde Glasgow_N	18296	8068	10926	2858	35%	29	10255	1709	2432	723	42%	16	7795	2875	3276	402	14%	7
Clyde Glasgow_S	6396	2818	3106	289	10%	5	12045	2007	3050	1043	52%	21	19501	7707	6133	-1574	-20%	19
N-S Glasgow_E	10755	4429	3263	-1166	-26%	19	16870	2812	2818	6	0%	0	26305	10377	6745	-3632	-35%	39
N-S Glasgow_W	22929	9641	9368	-273	-3%	3	16803	2800	2437	-364	-13%	7	12773	5170	3465	-1705	-33%	26
Kilmarnock_I	1128	534	412	-122	-23%	6	1047	175	113	-61	-35%	5	1068	371	320	-50	-14%	3
Kilmarnock_O	824	346	493	148	43%	7	1430	238	142	-96	-40%	7	1423	500	311	-188	-38%	9

Transport Model for Scotland
Glasgow Bus Passenger Validation
Screenline / Cordon Sites - Sorted Clockwise from the Clyde

INBOUND

Site ID	Site Name	AM OBSERVED Period	AM OBSERVED M Hour	AM MODELLED M Hour	Diff	% Diff	GEH	IP OBSERVED Period	IP OBSERVED M Hour	IP MODELLED M Hour	Diff	% Diff	GEH	PM OBSERVED Period	PM OBSERVED M Hour	PM MODELLED M Hour	Diff	% Diff	GEH
40E	A814, Dumbarton Road	1360	518	991	473	91%	17	656	109	226	117	107%	9	878	352	225	-127	-36%	7
39E	A82, Great Western Road	489	189	249	60	32%	4	453	76	250	175	231%	14	486	148	275	127	86%	9
38S	A809, near the Railway Station	623	318	552	234	74%	11	110	18	129	110	602%	13	152	70	77	7	10%	1
37S	A81, Milngavie Road	480	208	475	268	129%	14	148	25	96	72	291%	9	247	72	135	63	87%	6
36S	A879, between Balmuildy Road and the roundabout	0	0	0		0%	0	0	0	0		0%	0	0	0	0		0%	0
35S	A803, between the A807 and the B820	916	396	328	-68	-17%	4	447	75	109	34	46%	4	246	57	142	85	151%	9
34W	B757, between the north and south junctions of the B81	220	133	0	-133	-100%	16	66	11	0	-11	-100%	5	53	25	217	192	769%	17
33W	A80, Cumbernauld Road	2168	1023	339	-683	-67%	26	992	165	121	-44	-27%	4	871	310	136	-174	-56%	12
32W	M8 at Junction 9, Easterhouse	2210	1408	625	-782	-56%	25	752	125	40	-85	-68%	9	633	260	127	-133	-51%	10
31W	A89, Baillieston	265	88	102	15	17%	2	273	46	49	3	7%	0	183	43	60	17	41%	2
30W	A74, near the roundabout of Junction 3 of the M74	687	305	379	74	24%	4	344	57	78	21	36%	3	216	143	179	36	25%	3
29N	A724, Hamilton Road	908	380	86	-294	-77%	19	406	68	21	-47	-69%	7	342	129	55	-74	-57%	8
28N	Kingsway at Stewartfield Way	1316	498	631	133	27%	6	747	125	134	9	8%	1	607	253	309	56	22%	3
27W	A726, East Kilbride Road	274	187	100	-87	-46%	7	110	18	81	63	346%	9	119	35	103	68	193%	8
26N	B767, Eaglesham Road	65	28	102	74	270%	9	103	17	32	14	85%	3	43	5	48	43	863%	8
25N	Mearns Road	347	144	129	-15	-10%	1	140	23	97	73	314%	9	50	18	65	47	269%	7
24N	Near Whitecraigs Train Station	45	10	41	31	308%	6	165	28	25	-3	-10%	1	153	41	23	-18	-44%	3
23N	M77, south of Junction 3	253	193	754	561	292%	26	76	13	35	22	174%	5	73	0	9	9	0%	4
22E	B773, Darnley Road	48	48	0	-48	-100%	10	18	3	0	-3	-100%	2	0	0	0		0%	0
21E	A726, Hurlet Road	261	154	85	-68	-44%	6	93	15	27	11	73%	2	48	18	18	1	4%	0
20E	Glasgow Road	1187	485	1422	938	194%	30	1182	197	423	226	115%	13	1068	435	510	75	17%	3
19E	Arkleston Road	63	25	0	-25	-100%	7	0	0	0		0%	0	0	0	0		0%	0
18E	M8, Junction 27, Paisley Road	1247	729	963	234	32%	9	725	121	31	-89	-74%	10	360	76	81	6	8%	1
17E	Inchinnan Road	1395	713	210	-503	-71%	23	604	101	78	-23	-22%	2	255	110	47	-63	-57%	7
			8173	8563	390	5%	4		1434	2081	646	45%	15		2597	2840	244	9%	5

OUTBOUND

Site ID	Site Name	AM OBSERVED Period	AM OBSERVED M Hour	AM MODELLED M Hour	Diff	% Diff	GEH	IP OBSERVED Period	IP OBSERVED M Hour	IP MODELLED M Hour	Diff	% Diff	GEH	PM OBSERVED Period	PM OBSERVED M Hour	PM MODELLED M Hour	Diff	% Diff	GEH
40W	A814, Dumbarton Road	538	188	196	8	4%	1	731	122	260	139	114%	10	1060	466	459	-7	-1%	0
39W	A82, Great Western Road	471	205	257	53	26%	3	444	74	267	193	261%	15	358	125	396	271	217%	17
38N	A809, near the Railway Station	124	67	105	38	57%	4	130	22	182	161	741%	16	557	287	490	204	71%	10
37N	A81, Milngavie Road	159	92	153	61	66%	6	165	27	157	129	472%	13	505	138	415	277	202%	17
36N	A879, between Balmuildy Road and the roundabout	3	3	0	-3	-100%	2	3	1	0	-1	-100%	1	15	0	0		0%	0
35N	A803, between the A807 and the B819	354	63	121	58	92%	6	476	79	134	55	69%	5	1291	461	397	-64	-14%	3
34E	B757, between the north and south junctions of the B81	61	50	162	112	227%	11	23	4	0	-4	-100%	3	196	182	0	-182	-100%	19
33E	A80, Cumbernauld Road	940	278	79	-199	-72%	15	1287	214	136	-79	-37%	6	3410	1698	329	-1369	-81%	43
32E	M8 at Junction 9, Easterhouse	529	78	30	-48	-62%	7	817	136	36	-100	-73%	11	1913	1013	449	-564	-56%	21
31E	A89, Baillieston	216	80	39	-41	-51%	5	373	62	22	-40	-65%	6	275	103	106	4	4%	0
30E	A74, near the roundabout of Junction 3 of the M74	203	108	148	41	38%	4	405	67	58	-10	-14%	1	610	274	226	-48	-17%	3
29S	A724, Hamilton Road	275	123	61	-61	-50%	6	408	68	18	-50	-73%	8	630	229	72	-157	-68%	13
28S	Kingsway at Stewartfield Way	652	252	256	4	2%	0	682	114	168	55	48%	5	1392	640	466	-174	-27%	7
27E	A726, East Kilbride Road	80	45	110	65	145%	7	170	28	77	49	173%	7	403	215	121	-94	-44%	7
26S	B767, Eaglesham Road	90	23	11	-11	-51%	3	58	10	26	16	172%	4	48	18	23	5	31%	1
25S	Mearns Road	72	19	61	42	221%	7	88	15	120	105	720%	13	168	63	166	103	165%	10
24S	Near Whitecraigs Train Station	10	0	0		0%	0	289	48	39	-10	-20%	1	267	120	50	-70	-58%	8
23S	M77, south of Junction 3	65	28	108	81	294%	10	83	14	38	25	179%	5	565	233	431	198	85%	11
22W	B773, Darnley Road	5	5	0	-5	-100%	3	5	1	0	-1	-100%	1	0	0	0		0%	0
21W	A726, Hurlet Road	53	38	18	-19	-51%	4	75	13	23	10	82%	2	275	150	99	-51	-34%	5
20W	Glasgow Road	660	398	544	146	37%	7	917	153	339	186	122%	12	1287	652	489	-163	-25%	7
19W	Arkleston Road	0	0	0		0%	0	0	0	0		0%	0	25	0	0		0%	0
18W	M8, Junction 27, Paisley Road	305	113	58	-55	-49%	6	778	130	103	-27	-21%	2	960	558	343	-215	-39%	10
17W	Inchinnan Road	187	84	74	-10	-12%	1	794	132	53	-80	-60%	8	1091	450	136	-314	-70%	18
			2335	2593	258	11%	5		1532	2255	723	47%	17		8070	5663	-2406	-30%	29

Transport Model for Scotland
Glasgow Bus Passenger Validation
Screenline / Cordon Sites

Site ID	Site Name	Screenline	Screenline ID	Direction	Screenline by Direction	re	A Node	B Node	Unique	AM Obs Period	AM Obs M Hour	AM Mod M Hour	AM Diff	AM % Diff	AM GEH	IP Obs Period	IP Obs M Hour	IP Mod M Hour	IP Diff	IP % Diff	IP GEH	PM Obs Period	PM Obs M Hour	PM Mod M Hour	PM Diff	PM % Diff	PM GEH
7W	Cathedral Street	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	W	11159	11188	1115911188	7925	3940	2151	-1789	-45%	32	4599	767	568	-198	-26%	8	3465	1197	1402	205	17%	6
2N	King GeorgeV Bridge	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	N	11673	11353	1167311353	8121	3672	4006	334	9%	5	3950	658	1010	352	53%	12	2648	1170	1263	93	8%	3
4N	Victoria Bridge	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	N	16861	11370	1686111370	6182	2526	2652	127	5%	2	3346	558	434	-124	-22%	6	1828	666	739	73	11%	3
5W	Trongate	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	W	11385	11382	1138511382	4150	1969	1201	-768	-39%	19	2242	374	283	-90	-24%	5	1689	678	432	-246	-36%	10
10S	Gascube Road	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	S	11035	11125	1103511125	3782	1692	2009	317	19%	7	2051	342	423	81	24%	4	1481	571	613	43	7%	2
15E	Bothwell Street	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	E	11296	11293	1129611293	2510	1163	1456	293	25%	8	1031	172	143	-29	-17%	2	666	174	189	15	9%	1
8S	North Hanover Street	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	S	11054	11111	1105411111	2783	1110	1197	88	8%	3	1422	237	293	56	24%	3	1187	398	372	-25	-6%	1
12E	Sauchiehall Street	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	E	11136	11138	1113611138	2010	801	384	-417	-52%	17	2388	398	203	-195	-49%	11	2457	992	171	-821	-83%	34
11E	West Graham Street	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	E	11127	11125	1112711125	1734	658	328	-330	-50%	15	1193	199	339	140	71%	9	1193	568	205	-363	-64%	18
14E	St Vincent Street	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	E	11272	11273	1127211273	1171	498	349	-149	-30%	7	792	132	131	-1	0%		863	255	164	-91	-36%	6
6W	George Street	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	W	11219	11218	1121911218	873	418	377	-41	-10%	2	448	75	123	48	64%	5	216	46	132	87	190%	9
1E	Argyle Street	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	E	11331	11330	1133111330	804	363	396	33	9%	2	520	87	98	11	13%	1	463	298	27	-270	-91%	21
9E	Port Duradas Road	Glasgow City Centre Cordon	1	I	Glasgow City Centre Cordon_I	E	11115	11152	1111511152	80	75	96	21	28%	2	83	14	17	3	21%		13	13				5
5E	Trongate	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	E	11382	11385	1138211385	2659	1206	528	-678	-56%	23	5855	976	439	-537	-55%	20	6603	2349	852	-1496	-64%	37
3S	Glasgow Bridge	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	S	11358	11356	1135811356	2652	1008	1020	12	1%	0	5657	943	1149	207	22%	6	9903	4038	2294	-1744	-43%	31
13W	Bath Street	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	W	11185	11187	1118511187	2120	990	283	-707	-71%	28	1369	228	199	-29	-13%	2	1961	800	384	-416	-52%	17
7E	Cathedral Street	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	E	11188	11159	1118811159	2174	783	615	-168	-21%	6	4914	819	703	-116	-14%	4	8006	3445	2264	-1181	-34%	22
4S	Victoria Bridge	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	S	11370	16861	1137016861	1541	734	817	83	11%	3	3939	657	547	-110	-17%	4	5451	2218	1739	-478	-22%	11
11W	West Graham Street	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	W	11125	11127	1112511127	994	469	366	-102	-22%	5	1439	240	530	291	121%	15	2688	919	636	-282	-31%	10
10N	Gascube Road	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	N	11125	11035	1112511035	1089	458	560	103	22%	5	2822	470	655	184	39%	8	4179	1879	1799	-80	-4%	2
8N	North Hanover Street	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	N	11111	11054	1111111054	873	409	415	6	1%	0	2401	400	347	-53	-13%	3	3889	1459	1052	-406	-28%	11
9W	Port Duradas Road	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	W	11152	11115	1115211115	418	383	5	-378	-99%	27	0	0	4	4	0%		100	53	8	-45	-85%	8
14W	St Vincent Street	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	W	11273	11272	1127311272	820	308	108	-200	-65%	14	1063	177	168	-10	-5%	1	1575	688	149	-539	-78%	26
6E	George Street	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	E	11218	11219	1121811219	392	208	103	-104	-50%	8	738	123	161	38	31%	3	1137	465	367	-97	-21%	5
1W	Argyle Street	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	W	11330	11331	1133011331	373	180	805	625	347%	28	520	87	231	144	167%	11	915	423	394	-29	-7%	1
16W	Waterloo Street	Glasgow City Centre Cordon	91	O	Glasgow City Centre Cordon_O	W	11311	11308	1131111308	342	143	222	79	56%	6	1119	186	196	10	5%	1	2913	1533	327	-1206	-79%	40
32W	M8 at Junction 9, Easterhouse	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	W	16128	16126	1612816126	2210	1408	625	-782	-56%	25	752	125	40	-85	-68%	9	633	260	127	-133	-51%	10
33W	A80, Cumbernauld Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	W	13092	16630	1309216630	2168	1023	339	-683	-67%	26	992	165	121	-44	-27%	4	871	310	136	-174	-56%	12
18E	M8, Junction 27, Paisley Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	E	16151	14730	1615114730	1247	729	963	234	32%	8	725	121	31	-89	-74%	10	360	76	81	6	8%	1
17E	Inchinnan Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	E	14104	14105	1410414105	1395	713	210	-503	-71%	23	604	101	78	-23	-22%	2	255	110	47	-63	-57%	7
40E	A814, Dumbarton Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	E	12110	12109	1211012109	1360	518	991	473	91%	17	656	109	226	117	107%	9	878	352	225	-127	-36%	7
28N	Kingsway at Stewartfield Way	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	N	13551	17412	1355117412	1316	498	631	133	27%	6	747	125	134	9	8%	1	607	253	309	56	22%	3
20E	Glasgow Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	E	14136	14137	1413614137	1187	485	1422	938	194%	30	1182	197	423	226	115%	13	1068	435	510	75	17%	3
35S	A803, between the A807 and the B820	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	S	12501	12668	1250112668	916	396	328	-68	-17%	4	447	75	109	34	46%	4	246	57	142	85	151%	9
29N	A724, Hamilton Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	N	13548	13541	1354813541	908	380	86	-294	-77%	19	406	68	21	-47	-69%	7	342	129	55	-74	-57%	8
38S	A809, near the Railway Station	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	S	12012	12035	1201212035	623	318	552	234	74%	11	110	18	129	110	602%	13	152	70	77	7	10%	1
30W	A74, near the roundabout of Junction 3 of the	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	W	13162	13161	1316213161	687	305	379	74	24%	4	344	57	78	21	36%	3	216	143	179	36	25%	3
37S	A81, Milngavie Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	S	12028	12025	1202812025	480	208	475	268	129%	14	148	25	96	72	291%	9	247	72	135	63	87%	6
23N	M77, south of Junction 3	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	N	15019	15017	1501915017	253	193	754	561	292%	26	76	13	35	22	174%	5	73	0	9	9	0%	
39E	A82, Great Western Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	E	12136	16904	1213616904	489	189	249	60	32%	4	453	76	250	175	231%	14	486	148	275	127	86%	9
27W	A726, East Kilbride Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	W	9345	13736	934513736	274	187	100	-87	-46%	7	110	18	81	63	346%	9	119	35	103	68	193%	8
21E	A726, Hurlet Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	E	14182	14183	1418214183	261	154	85	-68	-44%	6	93	15	27	11	73%	2	48	18	18	1	4%	0
25N	Mearns Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	N	13855	16021	1385516021	347	144	129	-15	-10%	1	140	23	97	73	314%	7	50	18	65	47	269%	7
34W	B757, between the north and south junctions	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	W	12522	12520	1252212520	220	133	0	-133	-100%	16	66	11	0	-11	-100%	5	53	25	217	192	769%	17
31W	A89, Baillieston	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	W	5077	13153	507713153	265	88	102	15	17%	2	273	46	49	3	7%		183	43	60	17	41%	2
22E	B773, Darnley Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	E	14167	14194	1416714194	48	48	0	-48	-100%	10	18	3	0				0	0				0
26N	B767, Eaglesham Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	N	13851	13780	1385113780	65	28	102	74	270%	9	103	17	32	14	85%	3	43	5	48	43	863%	9
19E	Arkleston Road	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	E	14013	14209	1401314209	63	25	0	-25	-100%	7	0	0					0	0				0
24N	Near Whitecraigs Train Station	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	N	13733	13732	1373313732	45	10	41	31	308%	6	165	28	25	-3	-10%	1	153	41	23	-18	-44%	3
36S	A879, between Balmuildy Road and the round	Glasgow Outer Cordon	2	I	Glasgow Outer Cordon_I	S	16177	12559	1617712559	0	0					0	0					0	0				0
20W	Glasgow Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	W	14137	14136	1413714136	660	398	544	146	37%	7	917	153	339	186	122%	12	1287	652	489	-163	-25%	7
33E	A80, Cumbernauld Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	E	16630	13092	1663013092	940	278	79	-199	-72%	15	1287	214	136	-79	-37%	6	3410	1698	329	-1369	-81%	43
28S	Kingsway at Stewartfield Way	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	S	17412	13551	1741213551	652	252	256	4	2%	0	682	114	168	55	48%	5	1392	640	466	-174	-27%	7
39W	A82, Great Western Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	W	16904	12136	1690412136	471	205	257	53	26%	4	444	74	267	193	261%	15	358	125	396	271	217%	17
40W	A814, Dumbarton Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	W	12109	12110	1210912110	538	188	196	8	4%	1	731	122	260	139	114%	10	1060	466	459	-7	-1%	0
29S	A724, Hamilton Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	S	13541	13548	1354113548	275	123	61	-61	-50%	6	408	68	18	-50	-73%	7	630	229	72	-157	-68%	13
18W	M8, Junction 27, Paisley Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	W	14729	14727	1472914727	305	113	58	-55	-49%	6	778	130	103	-27	-21%	2	960	558	343	-215	-39%	10
30E	A74, near the roundabout of Junction 3 of the	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	E	13161	13162	1316113162	203	108	148	41	38%	4	405	67	58	-10	-14%	1	610	274	226	-48	-17%	3
37N	A81, Milngavie Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	N	12025	12028	1202512028	159	92	153	61	66%	9	165	27	157	129	472%	13	505	138	415	277	202%	17
17W	Inchinnan Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	W	14105	14104	1410514104	187	84	74	-10	-12%	1	794	132	53	-80	-60%	8	1091	450	136	-314	-70%	18
31E	A89, Baillieston	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	E	13153	5077	1315305077	216	80	39	-41	-51%	6	373	62	22	-40	-65%	6	275	103	106	4	4%	0
32E	M8 at Junction 9, Easterhouse	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	E	14695	16132	1469516132	529	78	30	-48	-62%	7	817	136	36	-100	-73%	11	1913	1013	449	-564	-56%	21
38N	A809, near the Railway Station	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	N	12035	12012	1203512012	124	67	105	38	57%	4	130	22	182	161	741%	16	557	287	490	204	71%	10
35N	A803, between the A807 and the B819	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	N	12668	12501	1266812501	354	63	121	58	92%	6	476	79	134	55	69%	5	1291	461	397	-64	-14%	3
34E	B757, between the north and south junctions	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	E	12520	12522	1252012522	61	50	162	112	227%	11	23	4	0	-4	-100%		196	182	0	-182	-100%	19
27E	A726, East Kilbride Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	E	13736	9345	1373609345	80	45	110	65	145%	7	170	28	77	49	173%	7	403	215	121	-94	-44%	7
21W	A726, Hurlet Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	W	14183	14182	1418314182	53	38	18	-19	-51%	4	75	13	23	10	82%	2	275	150	99	-51	-34%	5
23S	M77, south of Junction 3	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	S	15018	15019	1501615018	65	28	108	81	294%	10	83	14	38	25	179%	5	565	233	431	198	85%	11
26S	B767, Eaglesham Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	S	13780	13851	1378013851	90	23	11	-11	-51%	3	58	10	26	16	172%	4	48	18	23	-5	-35%	1
25S	Mearns Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	S	16021	13855	1602113855	72	19	61	42	221%	7	88	15	120	105	720%	13	168	63	166	103	165%	10
22W	B773, Darnley Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	W	14194	14167	1419414167	5	5	0	-5	-100%	3	1	0	-1	-100%		1	0	0				0
36N	A879, between Balmuildy Road and the round	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	N	12559	16177	1255916177	3	3	0	-3	-100%	2	3	1	0	-1	-100%	1	15	0				0
19W	Arkleston Road	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	W	14209	14013	1420914013	0	0			0%		0	0		-1	-100%		25	0				0
24S	Near Whitecraigs Train Station	Glasgow Outer Cordon	92	O	Glasgow Outer Cordon_O	S	13732	13733	1373213733	0	0			0%		389	48	39	-10	-20%		267	120	50	-70	-58%	
2N	King GeorgeV Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	N	11673	11353	1167311353	8121	3672	4006	334	9%	5	3950	658	1010	352	53%	12	2648	1170	1263	93	8%	3
4N	Victoria Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	N	16861	11370	1686111370	6182	2526	2652	127	5%	2	3346	558	434	-124	-22%	6	1828	666	739	73	11%	3
75E	Kingston Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	E	14535	14539	1453514539	1622	712	2044	1332	187%	36	819	137	194	58	42%	4	822	112	246	135	121%	10
79N	Dalmarnock Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	N	25178	17383	2517817383	846	582	990	408	70%	15	449	75	217	142	190%	12	1007	338	312	-26	-8%	1
84E	Clyde Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	E	13618	5236	1361905236	743	433	346	-87	-20%	4	130	22	327	190	138	42%	12	561	303	459	156	51%	5
83N	M74 at Strathclyde Country Park	Clyde Glasgow	3	N	Clyde Glasgow_N	N	14716	14704	1471614704	319	60	500	440	740%	26	130	22	73	51	237%	7	127	13	148	135	1180%	16
82N	Bothwell Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	N	13564	5103	1356405103	283	43	1	-42	-98%	9	505	84	3	-81	-96%	12	409	125	1	-124	-99%	16
821N	Under Bothwell Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	N	13565	13563	1356513563	71	25	46	21	82%	3	22	4	62	59	1636%	10	308	118	66	-52	-44%	5
74N	ClydeTunnel	Clyde Glasgow	3	N	Clyde Glasgow_N	N	14227	12189	1422712189	91	17	262	245	1443%	21	125	21	87	67	321%	9	57	24	15	-9	-39%	
76N	Albert Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	N	16860	11377	1686011377	0	0			0%		0	0					0	0				0
78N	Rutherglen Bridge	Clyde Glasgow	3	N	Clyde Glasgow_N	N	11641	11649	1164911641	0	0			0%		33	5	0	-5	-91%	4	19	5	0	-5	-100%	3
81N	Clydeford Road	Clyde Glasgow	3	N	Clyde Glasgow_N	N	25176	13144	2517613144	10	0	78	78	0%	12	38	6	23	17	269%	4	6	3	18	15	484%	5
85N	Garrionhurst	Clyde Glasgow	3	N	Clyde Glasgow_N	N	12995	13271	1299512271	10		1	1		1%	0	15	3	1	-2	-78%							
3S	Glasgow Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	S	11358	11356	1135811356	2652	1008	1020	12	1%	0	5657	943	1149	207	22%	6	9903	4038	2294	-1744	-43%	31
4S	Victoria Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	S	11370	16861	1137016861	1541	734	817	83	11%	3	3939	657	547	-110	-17%	4	5451	2218	1739	-478	-22%	11
75W	Kingston Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	W	14649	14651	1464914651	621	329	291	-29	-9%	2	455	75	367	292	388%	20	643	111	794	683	618%	32
84W	Clyde Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	W	5236	13618	523613618	560	228	467	239	105%	13	271	45	451	406	898%	26	260	73	323	250	343%	18
79S	Dalmarnock Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	S	17383	25178	1738325178	435	225	312	87	38%	5	955	159	320	161	101%	10	1801	690	485	-205	-30%	8
74S	ClydeTunnel	Clyde Glasgow	93	S	Clyde Glasgow_S	S	16112	14229	1611214229	223	133	73	-59	-45%	6	281	47	76	29	62%	4	334	170	77	-93	-55%	8
821S	Under Bothwell Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	S	13563	13565	1356313565	270	118	76	-41	-35%	4	138	23	56	33	142%	5	225	73	37	-35	-48%	5
78S	Rutherglen Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	S	11641	11649	1164111649	30	23	0	-23	-100%	7	3	1	2	2	374%	2	0	0				2
85S	Garrionhurst	Clyde Glasgow	93	S	Clyde Glasgow_S	S	13271	12995	1327112995	26	13	4	-9	-67%	3	69	11	0	-11	-96%	5	0	0	6	6	0%	4
83S	M74 at Strathclyde Country Park	Clyde Glasgow	93	S	Clyde Glasgow_S	S	14711	14714	1471114714	23	13	12	-1	-6%	0	228	38	62	24	63%	3	830	332	359	27	8%	1

Site ID	Site Name	Screenline	Screenline ID	Direction	Screenline by Direction	re	A Node	B Node	Unique	AM OBSERVED		AM MODELLED				IP OBSERVED		IP MODELLED				PM OBSERVED		PM MODELLED			
										Period	M Hour	M Hour	Diff	% Diff	GEH	Period	M Hour	M Hour	Diff	% Diff	GEH	Period	M Hour	M Hour	Diff	% Diff	GEH
82S	Bothwell Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	S	5103	13564	510313564	10	5	1	-4	-85%	3	0	0	4	4	0%	0	33	0	2	2	0%	2
76S	Albert Bridge	Clyde Glasgow	93	S	Clyde Glasgow_S	S	11377	16860	1137716860	7	0	0	0	0%	0	0	0	0	7	0%	0	0	0	0		0%	0
81S	Clydeford Road	Clyde Glasgow	93	S	Clyde Glasgow_S	S	13144	25176	1314425176	0	0	34	34	0%	8	55	9	16	7	73%	2	23	5	18	13	252%	4
64E	Nelson Mandella Place	N-S Glasgow	4	E	N-S Glasgow_E	E	11210	11211	1121011211	2671	1008	457	-551	-55%	20	3040	507	480	-26	-5%	3	3308	1128	1084	-44	-4%	1
62E	Argyle Street at Buchanan Street	N-S Glasgow	4	E	N-S Glasgow_E	E	11328	11459	1132811459	2605	1004	668	-336	-33%	12	4374	729	374	-355	-49%	15	7735	3006	302	-2704	-90%	66
58S	Global Cross	N-S Glasgow	4	E	N-S Glasgow_E	S	11666	11663	1166611663	1475	601	948	347	58%	12	3107	518	658	141	27%	6	4673	2172	2070	-102	-5%	2
66E	Killermont Street, east of West Nile Street	N-S Glasgow	4	E	N-S Glasgow_E	E	11152	11014	1115211014	1156	441	157	-284	-64%	16	1379	230	49	-181	-79%	15	2714	1168	459	-709	-61%	25
72S	Balmore Road	N-S Glasgow	4	E	N-S Glasgow_E	S	12567	12568	1256712568	612	336	168	-168	-50%	11	295	49	49	0	0%	0	230	75	92	17	22%	2
69N	Possil Road	N-S Glasgow	4	E	N-S Glasgow_E	N	11594	17509	1159417509	706	309	210	-98	-32%	6	1723	287	317	30	10%	2	1703	570	941	372	65%	14
52S	Carmunnock Road	N-S Glasgow	4	E	N-S Glasgow_E	S	13702	17704	1370217704	322	163	91	-72	-44%	6	376	63	152	89	143%	9	909	301	224	-77	-26%	5
56E	Aikenhead Road	N-S Glasgow	4	E	N-S Glasgow_E	E	13813	17413	1381317413	287	145	109	-36	-25%	3	454	76	172	97	128%	9	1167	471	485	14	3%	1
57S	Cathcart Road	N-S Glasgow	4	E	N-S Glasgow_E	S	11657	11655	1165711655	286	123	237	114	93%	9	909	151	300	149	98%	10	2011	835	770	-65	-8%	2
54S	King's Park Avenue	N-S Glasgow	4	E	N-S Glasgow_E	S	13657	13656	1365713656	240	114	45	-69	-61%	8	591	98	114	15	15%	1	1029	341	167	-174	-51%	11
71E	Bisland Drive	N-S Glasgow	4	E	N-S Glasgow_E	E	12599	17192	1259917192	103	63	68	5	9%	1	110	18	73	55	301%	8	93	50	46	-4	-8%	1
53E	Menock Road	N-S Glasgow	4	E	N-S Glasgow_E	E	13702	13703	1370213703	182	59	0	-59	-100%	11	200	33	0	-33	-100%	8	373	105	0	-105	-100%	14
51E	A726, between the B759 and the B766	N-S Glasgow	4	E	N-S Glasgow_E	E	2279	13736	227913736	85	50	79	29	57%	4	132	22	61	39	178%	6	265	138	96	-42	-30%	4
70S	Bardowne Street	N-S Glasgow	4	E	N-S Glasgow_E	S	12644	17278	1264417278	17	8	1	-7	-87%	3	71	12	1	-10	-87%	4	66	8	4	-4	-45%	1
50E	Eaglesham Road	N-S Glasgow	4	E	N-S Glasgow_E	E	13738	13739	1373813739	5	5	28	23	450%	6	3	1	15	15	2936%	5	16	0	7	7	0%	4
67E	Cowcaddens Road	N-S Glasgow	4	E	N-S Glasgow_E	E	11115	11114	1111511114	6	3	0	-3	-100%	2	13	2	1	-1	-64%	1	13	13	0	-13	-100%	5
73E	B8049, Boclair Road	N-S Glasgow	4	E	N-S Glasgow_E	E	12022	12019	1202212019	0	0	0	0	0%	0	44	7	0	-7	-100%	4	0	0	0		0%	0
68E	Dobbies Loan, M8 east to west of Junction 6	N-S Glasgow	4	E	N-S Glasgow_E	E	11042	11044	1104211044	0	0	0	0	0%	0	53	9	0	-9	-100%	4	3	0	0		0%	0
58N	Global Cross	N-S Glasgow	94	W	N-S Glasgow_W	N	11663	11666	1166311666	5893	2468	2982	514	21%	10	4169	695	500	-195	-28%	8	2391	960	830	-129	-13%	4
65W	Bath Street at Buchanan Street	N-S Glasgow	94	W	N-S Glasgow_W	W	11167	11168	1116711168	4027	1912	876	-1036	-54%	28	2301	383	373	-10	-3%	1	1929	704	462	-241	-34%	10
61W	Howard Street and Dixon Street	N-S Glasgow	94	W	N-S Glasgow_W	W	5132	11358	513211358	3670	1141	1213	73	6%	2	3058	510	298	-211	-41%	11	1195	509	499	-10	-2%	0
63W	St Vincent Place at Buchanan Street	N-S Glasgow	94	W	N-S Glasgow_W	W	11242	11245	1124211245	1663	806	798	-8	-1%	0	1044	174	287	113	65%	7	1263	562	324	-238	-42%	11
69S	Possil Road	N-S Glasgow	94	W	N-S Glasgow_W	S	17509	11594	1750911594	2025	748	904	156	21%	5	1115	186	244	58	31%	4	859	284	289	5	2%	0
56W	Aikenhead Road	N-S Glasgow	94	W	N-S Glasgow_W	W	17413	13813	1741313813	1531	591	713	122	21%	5	615	102	87	-16	-15%	2	416	156	179	-23	-15%	2
57N	Cathcart Road	N-S Glasgow	94	W	N-S Glasgow_W	N	11655	11657	1165511657	939	499	1118	620	124%	22	709	118	169	51	44%	4	673	252	297	46	18%	2
55W	Calder Street	N-S Glasgow	94	W	N-S Glasgow_W	W	13819	17686	1381917686	855	369	107	-262	-71%	17	629	105	38	-67	-64%	8	359	123	70	-53	-43%	5
54N	King's Park Avenue	N-S Glasgow	94	W	N-S Glasgow_W	N	13656	13657	1365613657	565	225	125	-100	-45%	8	596	99	116	16	16%	2	452	143	76	-67	-47%	6
52N	Carmunnock Road	N-S Glasgow	94	W	N-S Glasgow_W	N	17704	13702	1770413702	462	203	235	32	16%	2	314	52	113	61	116%	7	283	67	107	40	61%	4
72N	Balmore Road	N-S Glasgow	94	W	N-S Glasgow_W	N	12568	12567	1256812567	264	173	73	-100	-58%	9	376	63	55	-7	-12%	1	544	221	191	-29	-13%	2
51W	A726, between the B759 and the B766	N-S Glasgow	94	W	N-S Glasgow_W	W	13736	2279	1373602279	232	145	65	-79	-55%	8	90	15	57	42	283%	7	165	80	64	-16	-20%	2
53W	Menock Road	N-S Glasgow	94	W	N-S Glasgow_W	W	13703	13702	1370313702	311	122	0	-122	-100%	16	176	29	0	-29	-100%	8	174	72	0	-72	-100%	12
66W	Killermont Street, east of West Nile Street	N-S Glasgow	94	W	N-S Glasgow_W	W	11014	11152	1101411152	238	87	32	-55	-63%	7	1438	240	11	-229	-96%	20	1897	1003	15	-987	-98%	44
71W	Bisland Drive	N-S Glasgow	94	W	N-S Glasgow_W	W	17192	12599	1719212599	130	78	70	-8	-10%	1	75	13	75	63	501%	9	125	18	17	-1	-3%	0
73W	B8049, Boclair Road	N-S Glasgow	94	W	N-S Glasgow_W	W	12019	12022	1201912022	70	60	0	-60	-100%	11	77	13	0	-3	-100%	3	11	8	0	-8	-100%	4
70N	Bardowne Street	N-S Glasgow	94	W	N-S Glasgow_W	N	17278	12644	1727812644	48	18	18	0	-1%	0	77	13	6	-7	-51%	2	32	3	15	12	409%	4
50W	Eaglesham Road	N-S Glasgow	94	W	N-S Glasgow_W	W	13739	13738	1373913738	5	0	0	0	0%	0	10	2	7	5	292%	2	11	10	18	8	77%	2
67W	Cowcaddens Road	N-S Glasgow	94	W	N-S Glasgow_W	W	11114	11115	1111411115	0	0	38	38	0%	9	0	0	1	1	0%	1	0	0	10	10	0%	4
68W	Dobbies Loan, M8 east to west of Junction 6	N-S Glasgow	94	W	N-S Glasgow_W	W	11044	11042	1104211042	5	0	0	0	0%	0	0	0	0	0	0%	0	0	0	0		0%	0
46N	A76 at the junction with the B7073	Kilmarnock	5	I	Kilmarnock_I	N	20373	20370	2037320370	193	155	0	-155	-100%	18	48	8	0	-8	-100%	4	55	18	0	-18	-100%	6
45S	A77 at the junction with the B7038	Kilmarnock	5	I	Kilmarnock_I	S	15035	15097	1503515097	235	130	123	-7	-6%	1	213	35	40	5	14%	1	468	140	219	79	56%	6
47W	A71, east of Galston	Kilmarnock	5	I	Kilmarnock_I	W	20398	20392	2039820392	322	120	92	-28	-23%	3	76	13	28	15	119%	3	100	18	10	-7	-42%	2
42E	B7081, between the B7064 west and the B706	Kilmarnock	5	I	Kilmarnock_I	E	17260	20309	1726020309	282	104	157	53	51%	5	623	104	42	-62	-60%	7	370	163	86	-77	-47%	7
44E	A759, near the roundabout with the B7064	Kilmarnock	5	I	Kilmarnock_I	E	20278	19977	2027819977	58	15	0	-15	-100%	5	23	4	0	-4	-100%	3	35	15	0	-15	-100%	5
41S	A735 at Kirktoun	Kilmarnock	5	I	Kilmarnock_I	S	20298	15122	2029815122	39	10	41	31	310%	6	65	11	4	-7	-64%	3	41	18	6	-12	-68%	4
45N	A77 at the junction with the B7038	Kilmarnock	95	O	Kilmarnock_O	N	15096	15094	1509615094	438	213	413	201	95%	11	165	28	44	16	59%	3	243	88	48	-39	-45%	5
42W	B7081, between the B7064 west and the B706	Kilmarnock	95	O	Kilmarnock_O	W	20309	17260	2030917260	203	96	68	-28	-29%	3	709	118	50	-68	-58%	7	493	175	124	-51	-29%	4
47E	A71, east of Galston	Kilmarnock	95	O	Kilmarnock_O	E	20392	20398	2039220398	117	23	8	-15	-65%	4	319	53	38	-15	-29%	2	342	115	108	-7	-6%	1
41N	A735 at Kirktoun	Kilmarnock	95	O	Kilmarnock_O	N	15122	20298	1512220298	31	15	4	-11	-70%	3	85	14	10	-4	-26%	1	117	58	31	-27	-46%	4
44W	A759, near the roundabout with the B7064	Kilmarnock	95	O	Kilmarnock_O	W	19977	20278	1997720278	5	0	0	0	0%	0	23	4	0	-4	-100%	3	35	15	0	-15	-100%	5
46S	A76 at the junction with the B7073	Kilmarnock	95	O	Kilmarnock_O	S	20370	20373	2037020373	30	0	0	0	0%	0	130	22	0	-22	-100%	7	195	50	0	-50	-100%	10

Transport Model for Scotland
Edinburgh Bus Passenger Validation
Outer Cordon Sites

INBOUND

Location	ID	A node	B node	AM OBS M Hour	AM MODELLED M Hour	Diff	% Diff	GEH	IP OBS M Hour	IP MODELLED M Hour	Diff	% Diff	GEH	PM OBS M Hour	PM MODELLED M Hour	Diff	% Diff	GEH
A199, Edinburgh Road	1b	1416	2232	996	1199	203	20%	6	267	253	-14	-5%	1	334	299	-35	-10%	2
A1, Musselburgh Bypass	2b	1793	1794	313	451	138	44%	7	88	157	69	79%	6	4	189	185	4622%	19
Newcraighall Road	3b	1791	2354	59	204	145	246%	13	58	154	96	165%	9	38	261	223	588%	18
A7, Old Dalkeith Road	5b	1429	1459	386	632	246	64%	11	97	80	-17	-18%	2	85	81	-4	-5%	0
A772, Gilmerton Road	6b	1764	17568	268	507	239	89%	12	99	168	70	70%	6	105	171	66	63%	6
Lasswade Road	7b	41282	41283	131	456	325	248%	19	39	49	11	28%	2	0	64	64		11
A701, Straton Road	8b	1757	41294	525	382	-143	-27%	7	218	90	-127	-59%	10	279	81	-198	-71%	15
A702, Biggar Road	9b	1300	1990	117	233	116	99%	9	30	64	35	118%	5	0	43	43		9
Dreghorn Link	10b	1703	1706	111	0	-111	-100%	15	13	0	-13	-100%	5	81	0	-81	-100%	13
A70, Lanark Road	11b	1389	1327	426	13	-413	-97%	28	213	6	-206	-97%	20	150	25	-125	-83%	13
A71, Calder Road	13b	1342	1861	690	575	-115	-17%	5	353	116	-237	-67%	15	538	418	-120	-22%	6
A8, Glasgow Road	14b	1820	3442	525	1255	730	139%	24	434	84	-350	-81%	22	311	276	-35	-11%	2
South Gyle Broadway	15b	1744	2283	60	145	85	141%	8	99	6	-93	-94%	13	33	7	-26	-78%	6
A90, Cramond Bridge	17b	1850	3510	721	631	-90	-13%	3	300	81	-219	-73%	16	381	180	-201	-53%	12
TOTAL				**5328**	**6682**	**1354**	**25%**	**17**	**2306**	**1310**	**-996**	**-43%**	**23**	**2339**	**2095**	**-244**	**-10%**	**5**

OUTBOUND

Location	ID	A node	B node	AM OBS M Hour	AM MODELLED M Hour	Diff	% Diff	GEH	IP OBS M Hour	IP MODELLED M Hour	Diff	% Diff	GEH	PM OBS M Hour	PM MODELLED M Hour	Diff	% Diff	GEH
A199, Edinburgh Road	1b	2232	1416	87	347	260	299%	18	249	253	5	2%	0	1168	1084	-84	-7%	3
A1, Musselburgh Bypass	2b	1794	1893	78	221	143	183%	12	78	153	75	96%	7	380	310	-70	-18%	4
Newcraighall Road	3b	2354	1791	67	214	147	219%	12	93	131	38	41%	4	178	188	10	6%	1
A7, Old Dalkeith Road	5b	1459	1429	125	58	-67	-53%	7	94	90	-5	-5%	0	417	395	-22	-5%	1
A772, Gilmerton Road	6b	17568	1764	68	159	91	133%	9	101	129	29	29%	3	412	655	243	59%	11
Lasswade Road	7b	41283	41282	30	26	-4	-15%	1	34	46	11	33%	2	217	395	178	82%	10
A701, Straton Road	8b	41294	1757	383	101	-282	-74%	18	286	122	-164	-57%	12	433	391	-42	-10%	2
A702, Biggar Road	9b	1990	1300	31	18	-13	-41%	3	25	71	47	189%	7	109	85	-24	-22%	2
Dreghorn Link	10b	1706	1703	16	0	-16	-100%	6	31	0	-31	-100%	8	12	0	-12	-100%	5
A70, Lanark Road	11b	1327	1389	242	26	-216	-89%	19	171	10	-161	-94%	17	414	25	-389	-94%	26
A71, Calder Road	13b	1862	1860	653	610	-43	-7%	2	336	142	-194	-58%	13	536	555	19	4%	1
A8, Glasgow Road	14b	3442	1820	801	398	-403	-50%	16	261	91	-170	-65%	13	1036	1173	137	13%	4
South Gyle Broadway	15b	2283	1744	65	37	-28	-43%	4	104	4	-100	-96%	14	397	1	-396	-100%	28
A90, Cramond Bridge	17b	3510	1849	122	99	-23	-19%	2	230	75	-155	-68%	13	659	285	-374	-57%	17
TOTAL				**2768**	**2313**	**-455**	**-16%**	**9**	**2093**	**1316**	**-776**	**-37%**	**19**	**6368**	**5543**	**-825**	**-13%**	**11**

Appendix D
Rail Capacities

Transport Model for Scotland
Rail Loading vs Capacity Ratios - AM Peak

Line	Origin	Destination	Unit Type	No. Seats	No. Units	Services per Hour	Capacity	Max TMfS Loading	Loading/ Capacity
7000	Glasgow Queen Street	Edinburgh	170	192	2	1	384	308.39	80%
7001	Glasgow Queen Street	Edinburgh	170	192	2	1	384	313.43	82%
7002	Glasgow Queen Street	Edinburgh	170	192	2	1	384	290.39	76%
7009	Edinburgh	Glasgow Queen Street	170	192	2	1	384	279.53	73%
7010	Edinburgh	Glasgow Queen Street	170	192	2	1	384	302.58	79%
7011	Edinburgh	Glasgow Queen Street	170	192	2	1	384	272.85	71%
7016	Edinburgh	Glasgow Queen Street	170	192	2	1	384	287.35	75%
7020	Glasgow Queen Street	Edinburgh	170	192	2	1	384	308.39	80%
7021	Perth	Aberdeen	170	192	1	1	192	29.23	15%
7022	Edinburgh	Aberdeen	170	192	1	1	192	224.18	117%
7023	Glasgow Queen Street	Dyce	170	192	1	1	192	78.95	41%
7024	Perth	Dundee	170	192	1	1	192	11.01	6%
7025	Perth	Dyce	170	192	1	1	192	29.9	16%
7040	Aberdeen	Glasgow Queen Street	170	192	1	1	192	122.43	64%
7066	Dundee	Edinburgh	170	192	1	1	192	227.08	118%
7067	Perth	Edinburgh	170	192	1	1	192	52.62	27%
7068	Aberdeen	Edinburgh	170	192	1	1	192	116.97	61%
7069	Dundee	Edinburgh	170	192	1	1	192	220.79	115%
7070	Carnoustie	Edinburgh	170	192	1	1	192	52.3	27%
7091	Glasgow Queen Street	Dunkeld	170	192	1	1	192	66.96	35%
7110	Edinburgh	Dundee	170	192	1	1	192	124.49	65%
7120	Aberdeen	Forres	158	138	1	1	138	33.37	24%
7132	Forres	Aberdeen	158	138	1	1	138	80.35	58%
7143	Arrochar & Tarbet	Glasgow Queen Street	156	142	1	1	142	53.02	37%
7159	Dumfries	Carlisle	156	142	1	1	142	42.02	30%
7177	Carlisle	Glasgow Central	156	142	1	1	142	161.15	113%
7199	Glasgow Queen Street	Perth	170	192	1	1	192	66.96	35%
7201	Newcraighall	Dunblane	158	138	2	2	552	227.12	41%
7202	Glasgow Queen Street	Dunblane	158/170 Mix	165	1	1	165	94.98	58%
7207	Glasgow Queen Street	Stirling	158/170 Mix	165	1	1	165	94.23	57%
7219	Perth	Edinburgh	170	192	1	1	192	1.32	1%
7220	Stirling	Glasgow Queen Street	158/170 Mix	165	1	2	330	207.25	63%
7221	Perth	Edinburgh	170	192	1	1	192	156.63	82%
7222	Perth	Glasgow Queen Street	170	192	1	1	192	117.22	61%
7223	Dunblane	Edinburgh	158	138	2	1	276	61.55	22%
7224	Dunblane	Glasgow Queen Street	158/170 Mix	165	1	1	165	113.05	69%
7226	Perth	Glasgow Queen Street	170	192	1	1	192	76.38	40%
7227	Stirling	Edinburgh	158	138	2	1	276	143.99	52%
7240	Edinburgh	Bathgate	158	138	2	2	552	272.37	49%
7243	Bathgate	Newcraighall	158	138	2	2	552	512.84	93%
7246	West Calder	Edinburgh	156SPT	150	2	1	300	42.92	14%
7247	Glasgow Central	Edinburgh	156SPT	150	2	1	300	35.86	12%
7248	Glasgow Central	Edinburgh	156SPT	150	2	1	300	61.22	20%
7254	Edinburgh	Glasgow Central	156SPT	150	2	1	300	54.22	18%
7260	Edinburgh	North Berwick	322	252	1	1	252	33.05	13%
7261	Haymarket	Longniddry	322	252	1	1	252	10.05	4%
7264	Prestonpans	Edinburgh	322	252	1	1	252	1.11	0%
7265	North Berwick	Haymarket	322	252	1	1	252	93.97	37%
7271	Edinburgh	Edinburgh	170	192	2	2	768	270.06	35%
7272	Glenrothes With Thornton	Edinburgh	170	192	2	1	384	131.96	34%
7273	Glenrothes With Thornton	Edinburgh	170	192	2	1	384	168.94	44%
7274	Kirkcaldy	Edinburgh	170	192	2	1	384	50.87	13%
7275	Kirkcaldy	Edinburgh	170	192	2	1	384	1.32	0%
7276	Edinburgh	Markinch	170	192	2	1	384	61.93	16%
7277	Markinch	Edinburgh	170	192	2	1	384	82.97	22%
7278	Markinch	Edinburgh	170	192	2	1	384	52.34	14%
7279	Kirkcaldy	Edinburgh	170	192	2	1	384	128.14	33%
7280	Edinburgh	Edinburgh	170	192	2	1	384	131.97	34%
7301	Haymarket	Newcraighall	158	138	2	2	552	1.85	0%
7305	Newcraighall	Edinburgh	158	138	2	3	828	5.41	1%
7311	Glasgow Central	Paisley Canal	156SPT	150	1	2	300	26.38	9%
7314	Paisley Canal	Glasgow Central	156SPT	150	1	2	300	10.58	4%
7320	Glasgow Central	Gourock	334	183	2	1	366	89.26	24%
7321	Glasgow Central	Gourock	334	183	2	1	366	90.56	25%
7322	Glasgow Central	Wemyss Bay	334	183	2	1	366	117.85	32%
7323	Glasgow Central	Gourock	334	183	2	1	366	90.56	25%
7335	Wemyss Bay	Glasgow Central	334	183	2	1	366	86.74	24%
7336	Gourock	Glasgow Central	334	183	2	1	366	96.85	26%
7337	Gourock	Glasgow Central	334	183	2	1	366	74.98	20%
7338	Gourock	Glasgow Central	334	183	2	1	366	92.98	25%
7339	Wemyss Bay	Glasgow Central	334	183	2	1	366	82.57	23%
7340	Gourock	Glasgow Central	334	183	2	1	366	84.91	23%
7350	Glasgow Central Low Level	Whifflet	156SPT	150	1	2	300	29.97	10%
7354	Whifflet	Glasgow Central Low Level	156SPT	150	1	2	300	40.19	13%
7360	Glasgow Central	Largs	334	183	2	1	366	149.98	41%
7361	Glasgow Central	Ayr	334	183	2	1	366	207.59	57%
7362	Glasgow Central	Ayr	334	183	2	1	366	221.91	61%
7363	Glasgow Central	Barrhill	156SPT	150	1	1	150	94.96	63%
7379	Ayr	Glasgow Central	334	183	2	1	366	237.59	65%
7380	Ayr	Glasgow Central	334	183	2	1	366	200.9	55%
7381	Largs	Glasgow Central	334	183	2	1	366	76.27	21%
7382	Ayr	Glasgow Central	334	183	2	1	366	229.33	63%
7383	Largs	Glasgow Central	334	183	2	1	366	220.07	60%
7384	Ayr	Glasgow Central	334	183	2	1	366	229.29	63%
7401	Glasgow Central	East Kilbride	156SPT	150	2	1	300	34.32	11%
7402	Glasgow Central	East Kilbride	156SPT	150	2	1	300	34.32	11%
7403	Glasgow Central	Barrhead	156SPT	150	2	1	300	34.76	12%
7404	Glasgow Central	East Kilbride	156SPT	150	2	2	600	68.64	11%
7405	Glasgow Central	Barrhead	156SPT	150	2	1	300	34.76	12%
7406	Glasgow Central	Stewarton	156SPT	150	2	1	300	70.66	24%
7420	East Kilbride	Glasgow Central	156SPT	150	2	3	900	321.32	36%
7421	Barrhead	Glasgow Central	156SPT	150	2	2	600	135.1	23%
7422	East Kilbride	Glasgow Central	156SPT	150	2	1	300	65.19	22%
7423	Busby	Glasgow Central	156SPT	150	2	3	900	176.4	20%
7424	East Kilbride	Glasgow Central	314	212	1	1	212	88.94	42%
7431	Kilmarnock	Glasgow Central	156SPT	150	2	1	300	123.07	41%
7450	Glasgow Central	Newton	314	212	1	1	212	7.66	4%

7451	Glasgow Central	Neilston	314	212	1	1	212	21.46	10%
7452	Glasgow Central	Glasgow Central	314	212	1	3	636	36.76	6%
7453	Glasgow Central	Neilston	314	212	1	3	636	100.29	16%
7454	Glasgow Central	Glasgow Central	314	212	1	3	636	41.38	7%
7455	Glasgow Central	Newton	314	212	1	2	424	29.21	7%
7472	Newton	Glasgow Central	314	212	1	1	212	5.45	3%
7474	Newton	Glasgow Central	314	212	1	1	212	16.91	8%
7476	Neilston	Glasgow Central	314	212	1	1	212	55.77	26%
7500	Glasgow Queen Street	Cumbernauld	156/170 Mix	171	1	1	171	24.42	14%
7501	Glasgow Queen Street	Falkirk Grahamston	156/170 Mix	171	1	1	171	27.96	16%
7508	Cumbernauld	Glasgow Queen Street	156/170 Mix	171	1	1	171	55.52	32%
7509	Falkirk Grahamston	Glasgow Queen Street	156/170 Mix	171	1	1	171	77.37	45%
7520	Dalmuir	Lanark	318	216	2	1	432	137.59	32%
7521	Dalmuir	Larkhall	318	216	2	2	864	174.38	20%
7522	Milngavie	Motherwell	318	216	2	2	864	192.53	22%
7523	Balloch	Airdrie	320	230	2	2	920	328.82	36%
7524	Dalmuir	Motherwell	318	216	2	1	432	104.06	24%
7525	Helensburgh Central	Drumgelloch	320	230	2	1	460	148.07	32%
7526	Dalmuir	Springburn	320	230	2	1	460	50.59	11%
7527	Milngavie	Motherwell	318	216	2	1	432	98.39	23%
7528	Helensburgh Central	Drumgelloch	320	230	2	1	460	150.15	33%
7529	Balloch	Springburn	320	230	2	1	460	46.84	10%
7530	Dalmuir	High Street Glasgow	320	230	2	1	460	49.94	11%
7531	Milngavie	Springburn	320	230	2	1	460	44.4	10%
7532	Anniesland	High Street Glasgow	320	230	2	1	460	47.04	10%
7533	Milngavie	High Street Glasgow	320	230	2	1	460	101.42	22%
7601	Drumgelloch	Helensburgh Central	320	230	2	2	920	333.44	36%
7602	Airdrie	Balloch	320	230	2	2	920	326.99	36%
7603	Airdrie	Milngavie	320	230	2	2	920	210.04	23%
7604	Springburn	Dalmuir	320	230	2	2	920	70.6	8%
7606	Larkhall	Dalmuir	318	216	2	1	432	87.08	20%
7607	Motherwell	Milngavie	318	216	2	1	432	138.12	32%
7608	Lanark	Dalmuir	318	216	2	1	432	191.27	44%
7611	Lanark	Dalmuir	318	216	2	1	432	101.77	24%
7612	Larkhall	Dalmuir	318	216	2	1	432	137.11	32%
7613	Motherwell	Anderston	318	216	2	1	432	136.32	32%
7614	Coatbridge Central	Milngavie	318	216	2	1	432	141.16	33%
7615	Lanark	Garscadden	318	216	2	1	432	134.12	31%
7803	Motherwell	Cumbernauld	318	216	2	1	432	14.87	3%
7812	Cumbernauld	Motherwell	156SPT	150	1	1	150	23.66	16%
7900	Glasgow Queen Street	Anniesland	156SPT	150	1	2	300	19.26	6%
7903	Anniesland	Glasgow Queen Street	170	192	1	2	384	36.35	9%
7911	Kirkcaldy	Glasgow Queen Street	170	192	1	1	192	120.2	63%
7999	Neilston	Glasgow Central	314	212	1	3	636	215.07	34%
8008	Berwick	Edinburgh	Intercity	400	1	1	400	317.02	79%
8020	Glasgow Central	Carlisle	Intercity	400	1	1	400	102.02	26%
8041	Edinburgh	Carlisle	Intercity	400	1	1	400	196	49%
8045	Edinburgh	Berwick	Intercity	400	1	1	400	265.66	66%
8200	Dunblane	Edinburgh	158	138	2	1	276	156.65	57%

Transport Model for Scotland
Rail Loading vs Capacity Ratios - PM Peak

Line	Origin	Destination	Unit Type	No. Seats	No. Units	Services per Hour	Capacity	Max TMfS Loading	Loading/ Capacity
7005	Glasgow Queen Street	Edinburgh	170	192	2	1	384	231.83	60%
7006	Glasgow Queen Street	Edinburgh	170	192	2	1	384	195.11	51%
7007	Glasgow Queen Street	Edinburgh	170	192	2	1	384	246.7	64%
7008	Glasgow Queen Street	Edinburgh	170	192	2	1	384	202.95	53%
7014	Edinburgh	Glasgow Queen Street	170	192	2	1	384	210.57	55%
7015	Edinburgh	Glasgow Queen Street	170	192	2	1	384	252.64	66%
7017	Edinburgh	Glasgow Queen Street	170	192	2	1	384	210.57	55%
7018	Edinburgh	Glasgow Queen Street	170	192	2	1	384	252.64	66%
7038	Edinburgh	Dyce	170	192	1	1	192	191.62	100%
7039	Glasgow Queen Street	Aberdeen	170	192	1	1	192	75.71	39%
7045	Aberdeen	Glasgow Queen Street	170	192	1	1	192	51.16	27%
7064	Edinburgh	Carnoustie	170	192	1	1	192	113.02	59%
7065	Edinburgh	Perth	170	192	1	1	192	33.73	18%
7066	Edinburgh	Perth	170	192	1	1	192	111.05	58%
7083	Dyce	Edinburgh	170	192	1	1	192	243.81	127%
7084	Dundee	Aberdeen	170	192	1	1	192	26.27	14%
7085	Dundee	Aberdeen	170	192	1	1	192	46.34	24%
7101	Edinburgh	Dunkeld	170	192	1	1	192	111.05	58%
7128	Aberdeen	Forres	158	138	1	1	138	78.09	57%
7129	Aberdeen	Dyce	158	138	1	1	138	30.12	22%
7139	Dyce	Aberdeen	158	138	1	2	276	12.21	4%
7140	Forres	Aberdeen	158	138	1	1	138	43.07	31%
7155	Stranraer	Girvan	156SPT	150	1	1	150	0.11	0%
7166	Glasgow Central	Carlisle	156	142	1	1	142	133.93	94%
7183	Carlisle	Glasgow Central	156	142	1	1	142	34.99	25%
7184	Girvan	Ayr	156SPT	150	1	1	150	0.04	0%
7211	Glasgow Queen Street	Perth	170	192	1	1	192	66.43	35%
7212	Glasgow Queen Street	Perth	170	192	1	1	192	96.53	50%
7213	Glasgow Queen Street	Lenzie	158/170 Mix	165	1	1	165	59.42	36%
7215	Newcraighall	Dunblane	158	138	2	2	552	446.45	81%
7216	Glasgow Queen Street	Dunblane	158/170 Mix	165	1	1	165	182.89	111%
7234	Stirling	Glasgow Queen Street	158/170 Mix	165	1	1	165	107.38	65%
7235	Dunblane	Edinburgh	158	138	2	1	276	100.79	37%
7237	Dunblane	Edinburgh	158	138	2	1	276	100.76	37%
7242	Edinburgh	Bathgate	158	138	2	2	552	455.58	83%
7245	Bathgate	Newcraighall	158	138	2	2	552	149.85	27%
7253	Glasgow Central	Edinburgh	156SPT	150	2	1	300	27.49	9%
7256	Edinburgh	Motherwell	156SPT	150	2	1	300	50.68	17%
7257	Edinburgh	Glasgow Central	156SPT	150	2	1	300	52	17%
7263	Haymarket	North Berwick	322	252	1	2	504	159.38	32%
7269	North Berwick	Edinburgh	322	252	1	1	252	26.22	10%
7270	North Berwick	Haymarket	322	252	1	1	252	14.05	6%
7295	Edinburgh	Edinburgh	170	192	2	1	384	159.38	42%
7296	Edinburgh	Markinch	170	192	2	1	384	103.31	27%
7297	Edinburgh	Markinch	170	192	2	1	384	178.31	46%
7298	Edinburgh	Edinburgh	170	192	2	1	384	112.13	29%
7299	Edinburgh	Edinburgh	170	192	2	1	384	178.31	46%
7300	Edinburgh	Kirkcaldy	170	192	2	1	384	108.83	28%
7301	Edinburgh	Markinch	170	192	2	1	384	50.13	13%
7302	Markinch	Edinburgh	170	192	2	2	768	91.71	12%
7304	Edinburgh	Newcraighall	158	138	2	2	552	13.07	2%
7310	Newcraighall	Edinburgh	158	138	2	2	552	3.54	1%
7313	Glasgow Central	Paisley Canal	156SPT	150	1	2	300	106.79	36%
7316	Paisley Canal	Glasgow Central	156SPT	150	1	2	300	20.51	7%
7330	Glasgow Central	Gourock	334	183	2	1	366	151.82	41%
7331	Glasgow Central	Wemyss Bay	334	183	2	1	366	149.76	41%
7332	Glasgow Central	Gourock	334	183	2	1	366	112.09	31%
7333	Glasgow Central	Gourock	334	183	2	1	366	151.82	41%
7334	Glasgow Central	Wemyss Bay	334	183	2	1	366	150.45	41%
7346	Gourock	Glasgow Central	334	183	2	1	366	57.95	16%
7347	Gourock	Glasgow Central	334	183	2	1	366	53.48	15%
7348	Gourock	Glasgow Central	334	183	2	1	366	57.93	16%
7349	Wemyss Bay	Glasgow Central	334	183	2	1	366	47.43	13%
7353	Glasgow Central Low Level	Whifflet	334	183	2	2	732	50.55	7%
7356	Whifflet	Glasgow Central Low Level	156SPT	150	1	1	150	6.69	4%
7357	Whifflet	Glasgow Central Low Level	156SPT	150	1	1	150	6.69	4%
7372	Glasgow Central	Ayr	334	183	2	1	366	302.43	83%
7373	Glasgow Central	Ayr	334	183	2	1	366	249.41	68%
7374	Glasgow Central	Largs	334	183	2	1	366	194.29	53%
7375	Glasgow Central	Ayr	334	183	2	1	366	191.54	52%
7377	Glasgow Central	Ardrossan Town	334	183	2	1	366	194.5	53%
7378	Glasgow Central	Largs	334	183	2	1	366	206.61	56%
7379	Ayr	Girvan	156SPT	150	1	1	150	9.73	6%
7394	Ayr	Glasgow Central	334	183	2	1	366	123.93	34%
7395	Ardrossan South Beach	Glasgow Central	334	183	2	1	366	76.76	21%
7396	Largs	Glasgow Central	334	183	2	1	366	86.03	24%
7397	Ayr	Glasgow Central	334	183	2	1	366	129.04	35%
7413	Glasgow Central	Barrhead	156SPT	150	2	1	300	77.08	26%
7414	Glasgow Central	East Kilbride	156SPT	150	2	1	300	68.13	23%
7415	Glasgow Central	East Kilbride	156SPT	150	2	1	300	124.25	41%
7416	Glasgow Central	Barrhead	156SPT	150	2	1	300	75.12	25%
7417	Glasgow Central	East Kilbride	156SPT	150	2	1	300	124.25	41%
7418	Glasgow Central	East Kilbride	156SPT	150	2	1	300	124.25	41%
7431	Barrhead	Glasgow Central	156SPT	150	2	2	600	40.15	7%
7432	East Kilbride	Glasgow Central	156SPT	150	2	1	300	31.94	11%
7433	East Kilbride	Glasgow Central	156SPT	150	2	1	300	31.94	11%
7434	Kilmarnock	Glasgow Central	156SPT	150	2	1	300	67.81	23%
7464	Glasgow Central	Newton	314	212	1	2	424	81.92	19%
7465	Glasgow Central	Glasgow Central	314	212	1	2	424	68.91	16%
7466	Glasgow Central	Neilston	314	212	1	1	212	60.85	29%
7467	Glasgow Central	Neilston	314	212	1	1	212	83	39%
7468	Glasgow Central	Neilston	314	212	1	2	424	166.87	39%
7469	Glasgow Central	Newton	314	212	1	1	212	45.36	21%
7470	Glasgow Central	Glasgow Central	314	212	1	1	212	44.12	21%
7485	Neilston	Glasgow Central	314	212	1	1	212	31.14	15%
7487	Newton	Glasgow Central	314	212	1	1	212	8.84	4%
7489	Neilston	Glasgow Central	314	212	1	2	424	62.55	15%

7490	Newton	Glasgow Central	314	212	1	1	212	10.33	5%
7491	Neilston	Glasgow Central	314	212	1	1	212	14.59	7%
7506	Glasgow Queen Street	Falkirk Grahamston	156/170 Mix	171	1	1	171	78.21	46%
7507	Glasgow Queen Street	Cumbernauld	156/170 Mix	171	1	1	171	56.78	33%
7513	Cumbernauld	Glasgow Queen Street	156/170 Mix	171	1	1	171	15.2	9%
7514	Falkirk Grahamston	Glasgow Queen Street	156/170 Mix	171	1	1	171	27.61	16%
7552	Dalmuir	Carstairs	318	216	2	1	432	185.35	43%
7553	Dalmuir	Springburn	318	216	2	2	864	58.95	7%
7554	Milngavie	Larkhall	318	216	2	1	432	147.85	34%
7555	Dalmuir	Motherwell	318	216	2	2	864	346.12	40%
7556	Milngavie	High Street Glasgow	320	230	2	1	460	34.78	8%
7557	Helensburgh Central	Drumgelloch	320	230	2	2	920	358.28	39%
7558	Dalmuir	Larkhall	318	216	2	1	432	103.1	24%
7559	Milngavie	Lanark	318	216	2	1	432	202.84	47%
7560	Balloch	Airdrie	320	230	2	2	920	358.96	39%
7638	Bellgrove	Milngavie	320	230	2	2	920	284.86	31%
7639	Bellgrove	Balloch	320	230	2	1	460	112.17	24%
7640	Springburn	Dalmuir	320	230	2	2	920	145.2	16%
7641	Larkhall	Dalmuir	318	216	2	1	432	72.86	17%
7642	Drumgelloch	Helensburgh Central	320	230	2	2	920	290.71	32%
7643	Airdrie	Balloch	320	230	2	2	920	372.37	40%
7644	Motherwell	Milngavie	318	216	2	1	432	80.5	19%
7645	Coatbridge Central	Dalmuir	318	216	2	2	864	155.92	18%
7646	Lanark	Dalmuir	318	216	2	1	432	90.43	21%
7647	Larkhall	Milngavie	318	216	2	1	432	79.82	18%
7806	Motherwell	Cumbernauld	156SPT	150	1	1	150	18.63	12%
7807	Motherwell	Coatbridge Central	156SPT	150	1	2	300	13.8	5%
7814	Cumbernauld	Motherwell	156SPT	150	1	1	150	39.02	26%
7815	Coatbridge Central	Motherwell	156SPT	150	1	2	300	3.35	1%
7902	Glasgow Queen Street	Anniesland	170	192	1	2	384	37.65	10%
7905	Anniesland	Glasgow Queen Street	170	192	1	2	384	16.01	4%
7910	Glasgow Queen Street	Kirkcaldy	158	138	2	1	276	295.88	107%
8011	Berwick	Edinburgh	Intercity	400	1	1	400	129.08	32%
8026	Glasgow Central	Carlisle	Intercity	400	1	1	400	129.14	32%
8035	Carlisle	Glasgow Central	Intercity	400	1	1	400	84.84	21%
8044	Edinburgh	Carlisle	Intercity	400	1	1	400	175.39	44%
8047	Edinburgh	Berwick	Intercity	400	1	1	400	82.9	21%
8049	Berwick	Edinburgh	Intercity	400	1	1	400	129.08	32%
8050	Carlisle	Edinburgh	Intercity	400	1	1	400	165.65	41%
9500	Glasgow Central	Berwick	Intercity	400	1	1	400	117.45	29%
9501	Edinburgh	Berwick	Intercity	400	1	1	400	117.45	29%

Appendix E

Journey Time Val

Table E1: Bus Routes for Journey Time Comparison: AM Peak (minutes)

Operator	From	To	Via	Dir	Timetabled Avge	Max	Min	Modelled
Citylink	Dundee	Edinburgh	Perth	S	120	-	-	93
Citylink	Edinburgh	Glasgow		W	75	-	-	93
Citylink	Glasgow	Edinburgh		E	85	90	80	101
Citylink	Glasgow Apt	Glasgow		W	28	30	25	24
Citylink	Gourock	Glasgow		E	71	72	70	65
Stagecoach Glasgow	Ayr	Glasgow		N	110	-	-	99
Stagecoach Glasgow	Fenwick	Ayr		S	58	-	-	43
Glasgow City Bus	Glasgow	Clydebank		W	37	39	35	37
Glasgow City Bus	Clydebank	Glasgow		E	49	52	45	46
First Glasgow	Drumchapel	Linwood		S	93	93	93	82
First Glasgow	Linwood	Drumchapel		N	92	-	-	84
First Glasgow	Auchinairn	Rutherglen		N	63	66	60	67
First Glasgow	Rutherglen	Auchinairn		S	62	64	60	64
First Glasgow	Easterhouse	Glasgow Cross		W	35	-	-	40
First Glasgow	Glasgow Cross	Easterhouse		E	51	-	-	41
First Glasgow	Glasgow	East Kilbride		S	71	71	70	47
First Glasgow	East Kilbride	Glasgow		N	73	74	72	53
First Glasgow	Govan	Castlemilk		E	48	50	45	38
First Glasgow	Castlemilk	Govan		W	53	-	-	38
First Glasgow	Clydebank	Easterhouse		E	97	99	94	87
First Glasgow	Easterhouse	Clydebank		W	111	114	108	80
Mckinless Group	Hamilton	Wishaw		E	25	-	-	25
Mckinless Group	Wishaw	Hamilton		W	25	-	-	26
First Group	Falkirk	Falkirk	Stenhousemuir	-	42	-	-	26
First Group	Falkirk	Falkirk	Stenhousemuir	-	42	-	-	25
First Group	Stirling	St Andrews		E	115	-	-	107
Arriva	Barrhead	Paisley		N	25	-	-	14
Arriva	Paisley	Barrhead		S	25	-	-	12
Arriva	Erskine	Glasgow		E	55	60	50	40
Arriva	Glasgow	Erskine		W	54	57	50	44
Arriva	Kilbarchan	Glasgow		E	62	-	-	44
Arriva	Glasgow	Kilbarchan		W	61	-	-	48
Stagecoach Perth	Perth	Spittalfield		N	30	-	-	31
Stagecoach Perth	Spittalfield	Perth		S	47	47	46	32
Stagecoach Bluebird	Inverness	Aberdeen	Starts at Elgin	S	151	-	-	142
Stagecoach Bluebird	Aberdeen	Inverness	Stops at Elgin	S	144	-	-	142
Stagecoach Bluebird	Fraserburgh	Fraserburgh	New Pitsligo	-	50	-	-	43
Stagecoach Bluebird	Aberdeen	Ballater		W	105	-	-	74
Stagecoach Bluebird	Ballater	Aberdeen		E	103	-	-	76
Stagecoach Bluebird	Aberdeen	Aberdeen	Inverurie	-	120	-	-	71
Stagecoach Fife	Cupar	Dundee		N	41	-	-	39
Stagecoach Fife	Dundee	Cupar		S	41	-	-	38
Stagecoach	Stirling	Dunfermline		E	79	81	76	63
Stagecoach	Dunfermline	Stirling		W	80	-	-	63

Table E2: Bus Routes for Journey Time Comparison: Interpeak (minutes)

Operator	From	To	Via	Dir	Timetabled Avge	Max	Min	Modelled
Citylink	Edinburgh	Perth	Dunfermline	N	90	-	-	97
Citylink	Perth	Edinburgh	Dunfermline	S	90	-	-	99
Citylink	Edinburgh	Glasgow		W	73	75	70	85
Citylink	Glasgow	Edinburgh		E	80	85	75	89
Citylink	Glasgow Apt	Glasgow		W	28	30	25	23
Citylink	Gourock	Glasgow		E	70	-	-	66
Stagecoach Glasgow	Ayr	Glasgow	Kilmarnock	N	110	-	-	96
Stagecoach Glasgow	Glasgow	Ayr	Kilmarnock	S	110	-	-	101
Glasgow City Bus	Glasgow	Clydebank		W	39	-	-	35
Glasgow City Bus	Clydebank	Glasgow		E	48	50	45	39
First Glasgow	Drumchapel	Linwood		S	93	-	-	76
First Glasgow	Linwood	Drumchapel		N	92	-	-	72
First Glasgow	Auchinairn	Rutherglen		N	65	-	-	61
First Glasgow	Rutherglen	Auchinairn		S	65	-	-	61
First Glasgow	Easterhouse	Glasgow Cross		W	35	-	-	38
First Glasgow	Glasgow Cross	Easterhouse		E	51	-	-	40
First Glasgow	Glasgow	East Kilbride		S	72	74	70	49
First Glasgow	East Kilbride	Glasgow		N	74	75	72	46
First Glasgow	Govan	Castlemilk		E	47	-	-	33
First Glasgow	Castlemilk	Govan		W	46	-	-	34
First Glasgow	Clydebank	Easterhouse		E	102	103	101	83
First Glasgow	Easterhouse	Clydebank		W	113	-	-	78
Mckinless Group	Hamilton	Wishaw		E	25	-	-	25
Mckinless Group	Wishaw	Hamilton		W	25	-	-	25
First Group	Falkirk	Falkirk	Stenhousemuir	-	42	-	-	29
First Group	Falkirk	Falkirk	Stenhousemuir	-	42	-	-	28
First Group	Stirling	St Andrews		E	114	-	-	112
First Group	St Andrews	Stirling		W	114	-	-	112
Arriva	Barrhead	Paisley		N	25	-	-	11
Arriva	Paisley	Barrhead		S	25	-	-	11
Arriva	Erskine	Glasgow		E	57	-	-	41
Arriva	Glasgow	Erskine		W	55	-	-	44
Arriva	Kilbarchan	Glasgow		E	63	-	-	42
Arriva	Glasgow	Kilbarchan		W	61	-	-	44
Stagecoach Perth	Perth	Spittalfield		N	33	-	-	32
Stagecoach Perth	Spittalfield	Perth		S	36	-	-	32
Stagecoach Bluebird	Inverness	Aberdeen	Starts at Elgin	S	141	-	-	135
Stagecoach Bluebird	Aberdeen	Inverness	Stops at Elgin	N	144	-	-	135
Stagecoach Bluebird	Fraserburgh	Fraserburgh	New Pitsligo	-	43	-	-	44
Stagecoach Bluebird	Aberdeen	Ballater		W	103	105	100	71
Stagecoach Bluebird	Ballater	Aberdeen		E	98	-	-	71
Stagecoach Bluebird	Aberdeen	Aberdeen	Inverurie	-	114	115	113	60
Stagecoach Fife	Cupar	Dundee		N	39	-	-	39
Stagecoach Fife	Dundee	Cupar		S	38	-	-	39
Stagecoach	Stirling	Dunfermline		E	76	-	-	68
Stagecoach	Dunfermline	Stirling		W	83	-	-	66

Table E3: Bus Routes for Journey Time Comparison: PM Peak (minutes)

Operator	From	To	Via	Dir	Timetabled Avge	Max	Min	Modelled
Citylink	Edinburgh	Perth	Dunfermline	N	85	95	75	116
Citylink	Inverness	Edinburgh	Starts at Ballinluig	S	130	-	-	139
Citylink	Edinburgh	Glasgow		W	73	75	70	88
Citylink	Glasgow	Edinburgh		E	80	-	-	100
Citylink	Glasgow Apt	Glasgow		W	28	30	25	23
Stagecoach Glasgow	Ayr	Glasgow		N	110	-	-	94
Stagecoach Glasgow	Glasgow	Ayr		S	108	110	106	105
Glasgow City Bus	Glasgow	Clydebank		W	39	-	-	42
Glasgow City Bus	Clydebank	Glasgow		E	45	-	-	40
First Glasgow	Drumchapel	Linwood		S	104	-	-	83
First Glasgow	Linwood	Drumchapel		N	108	-	-	80
First Glasgow	Auchinairn	Rutherglen		N	65	-	-	62
First Glasgow	Rutherglen	Auchinairn		S	65	71	70	62
First Glasgow	Easterhouse	Glasgow Cross		W	35	-	-	42
First Glasgow	Glasgow Cross	Easterhouse		E	51	-	-	42
First Glasgow	Glasgow	East Kilbride		S	75	76	73	51
First Glasgow	East Kilbride	Glasgow		N	71	72	69	47
First Glasgow	Govan	Castlemilk		E	47	-	-	39
First Glasgow	Castlemilk	Govan		W	46	-	-	38
First Glasgow	Clydebank	Easterhouse		E	96	98	93	84
First Glasgow	Easterhouse	Clydebank		W	113	-	-	83
Mckinless Group	Hamilton	Wishaw		E	25	-	-	26
Mckinless Group	Wishaw	Hamilton		W	25	-	-	27
First Group	Falkirk	Falkirk	Stenhousemuir	-	42	-	-	26
First Group	Falkirk	Falkirk	Stenhousemuir	-	42	-	-	25
First Group	Stirling	St Andrews		E	114	-	-	110
First Group	St Andrews	Stirling		W	114	-	-	108
Arriva	Barrhead	Paisley		N	25	-	-	11
Arriva	Paisley	Barrhead		S	25	-	-	14
Arriva	Erskine	Glasgow		E	68	70	65	41
Arriva	Glasgow	Erskine		W	53	55	50	46
Arriva	Kilbarchan	Glasgow		E	63	65	64	42
Arriva	Glasgow	Kilbarchan		W	61	-	-	49
Stagecoach Perth	Perth	Spittalfield		N	33	-	-	31
Stagecoach Perth	Spittalfield	Perth		S	36	36	33	32
Stagecoach Bluebird	Inverness	Aberdeen	Starts at Elgin	S	141	-	-	140
Stagecoach Bluebird	Aberdeen	Inverness	Stops at Elgin	N	144	-	-	148
Stagecoach Bluebird	Fraserburgh	Fraserburgh	New Pitsligo	-	43	-	-	43
Stagecoach Bluebird	Aberdeen	Braemar		W	131	-	-	84
Stagecoach Bluebird	Banchory	Aberdeen		E	54	-	-	34
Stagecoach Bluebird	Aberdeen	Aberdeen	Inverurie	-	115	117	113	69
Stagecoach Fife	Cupar	Dundee		N	39	41	39	38
Stagecoach Fife	Dundee	Cupar		S	38	-	-	38
Stagecoach	Stirling	Dunfermline		E	76	-	-	65
Stagecoach	Dunfermline	Stirling		W	77	-	-	62

Figure E1: Bus Timetable v Modelled Time Comparison: AM Peak (1 of 3)
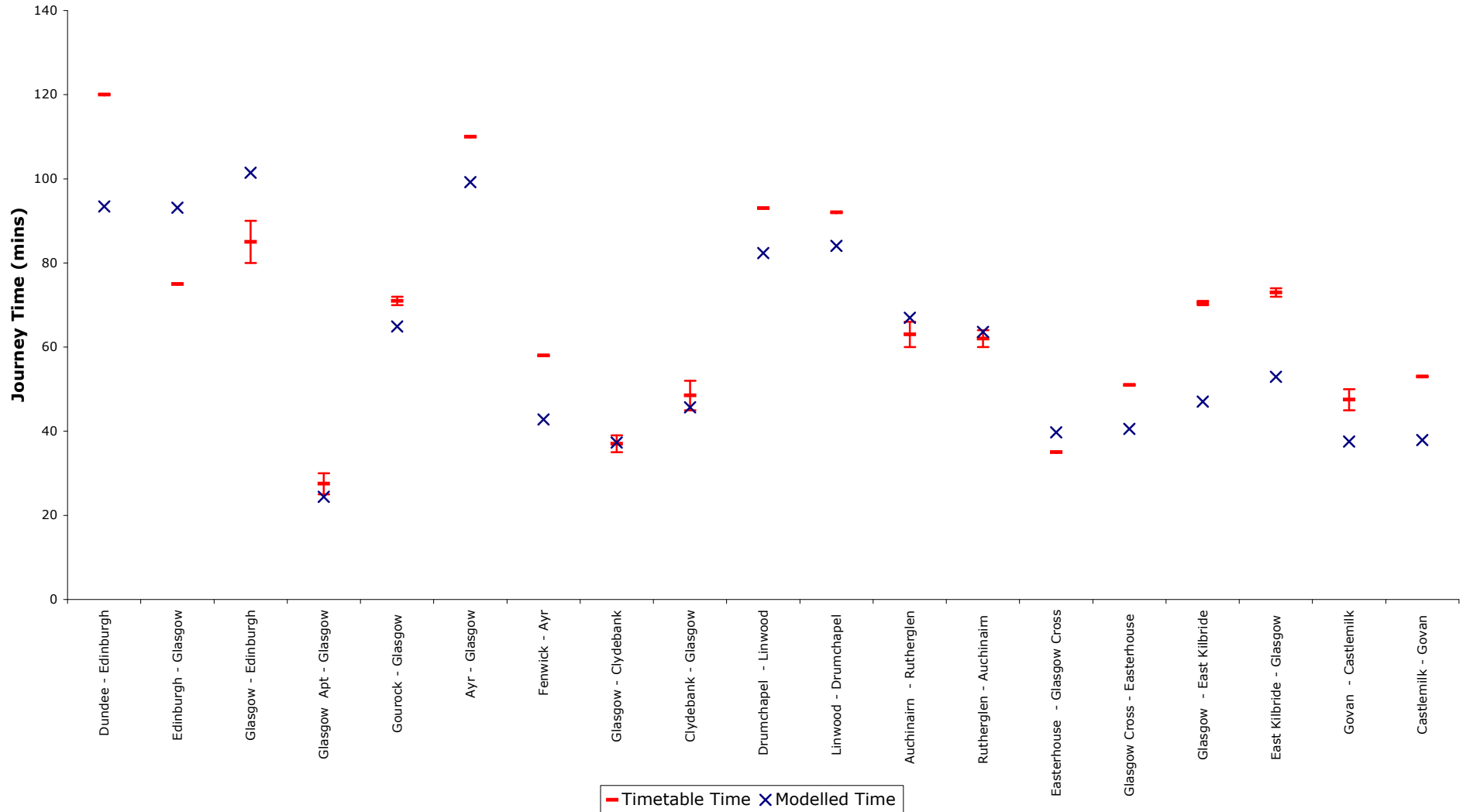
Y-axis: Journey Time (mins)

X-axis categories:
Dundee - Edinburgh, Edinburgh - Glasgow, Glasgow - Edinburgh, Glasgow Apt - Glasgow, Gourock - Glasgow, Ayr - Glasgow, Fenwick - Ayr, Glasgow - Clydebank, Clydebank - Glasgow, Drumchapel - Linwood, Linwood - Drumchapel, Auchinairn - Rutherglen, Rutherglen - Auchinairn, Easterhouse - Glasgow Cross, Glasgow Cross - Easterhouse, Glasgow - East Kilbride, East Kilbride - Glasgow, Govan - Castlemilk, Castlemilk - Govan

Legend: — Timetable Time   ✕ Modelled Time

Figure E2: Bus Timetable v Modelled Time Comparison: AM Peak (2 of 3)
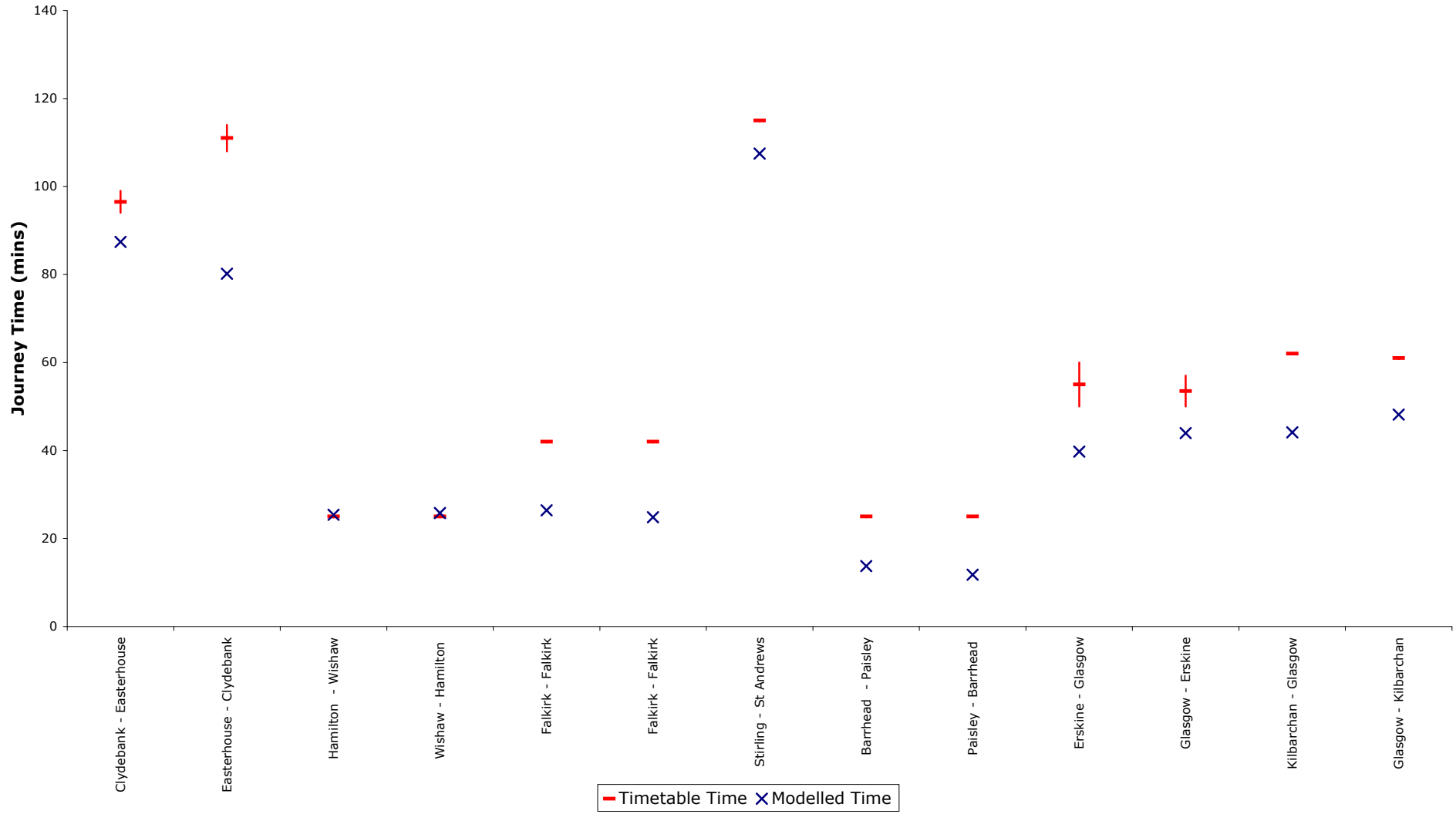
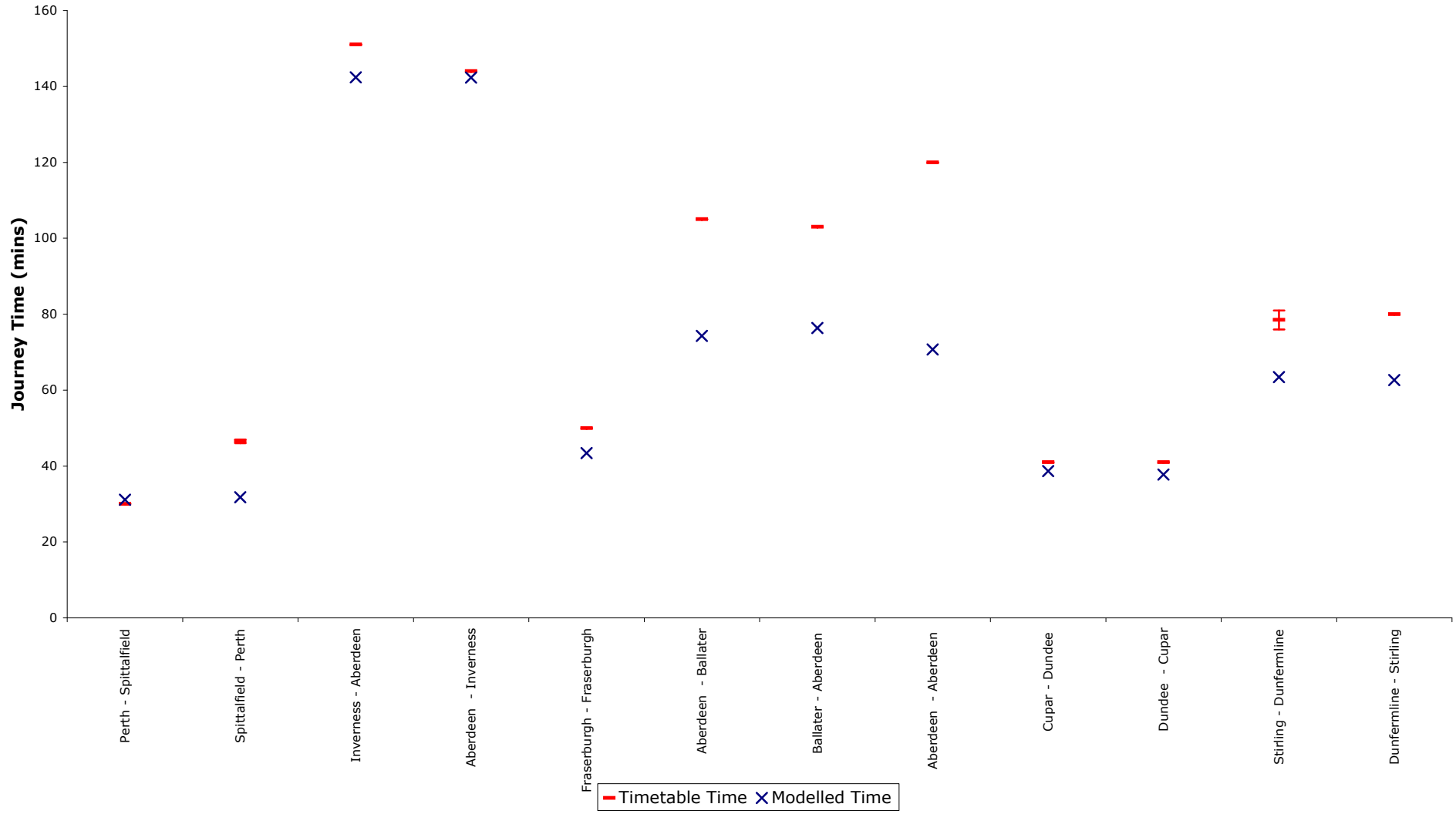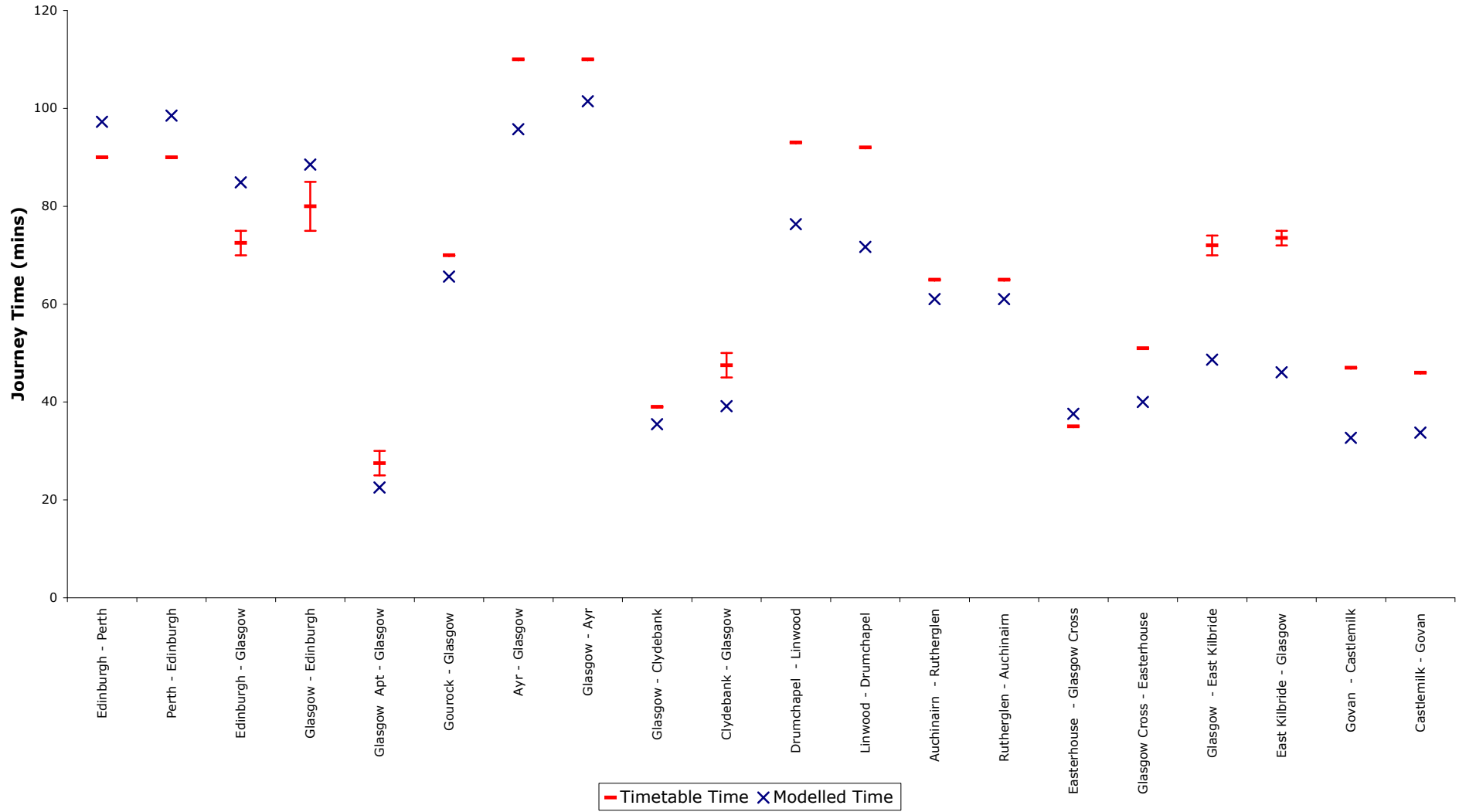**Figure E3: Bus Timetable v Modelled Time Comparison: AM Peak (3 of 3)**

Journey Time (mins)

Perth - Spittalfield
Spittalfield - Perth
Inverness - Aberdeen
Aberdeen - Inverness
Fraserburgh - Fraserburgh
Aberdeen - Ballater
Ballater - Aberdeen
Aberdeen - Aberdeen
Cupar - Dundee
Dundee - Cupar
Stirling - Dunfermline
Dunfermline - Stirling

Timetable Time Modelled Time

Figure E4: Bus Timetable v Modelled Time Comparison: Interpeak (1 of 3)

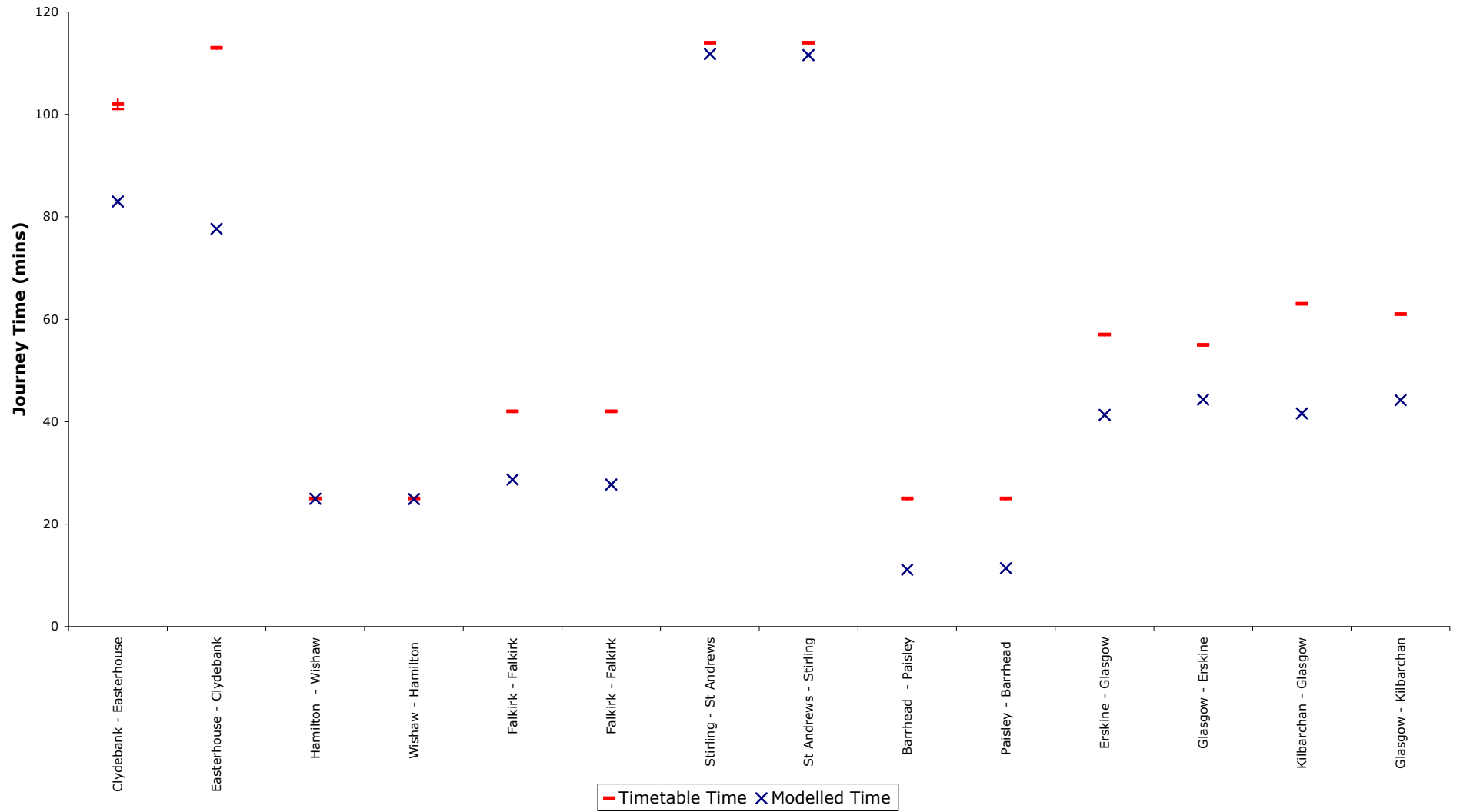**Figure E5: Bus Timetable v Modelled Time Comparison: Interpeak (2 of 3)**

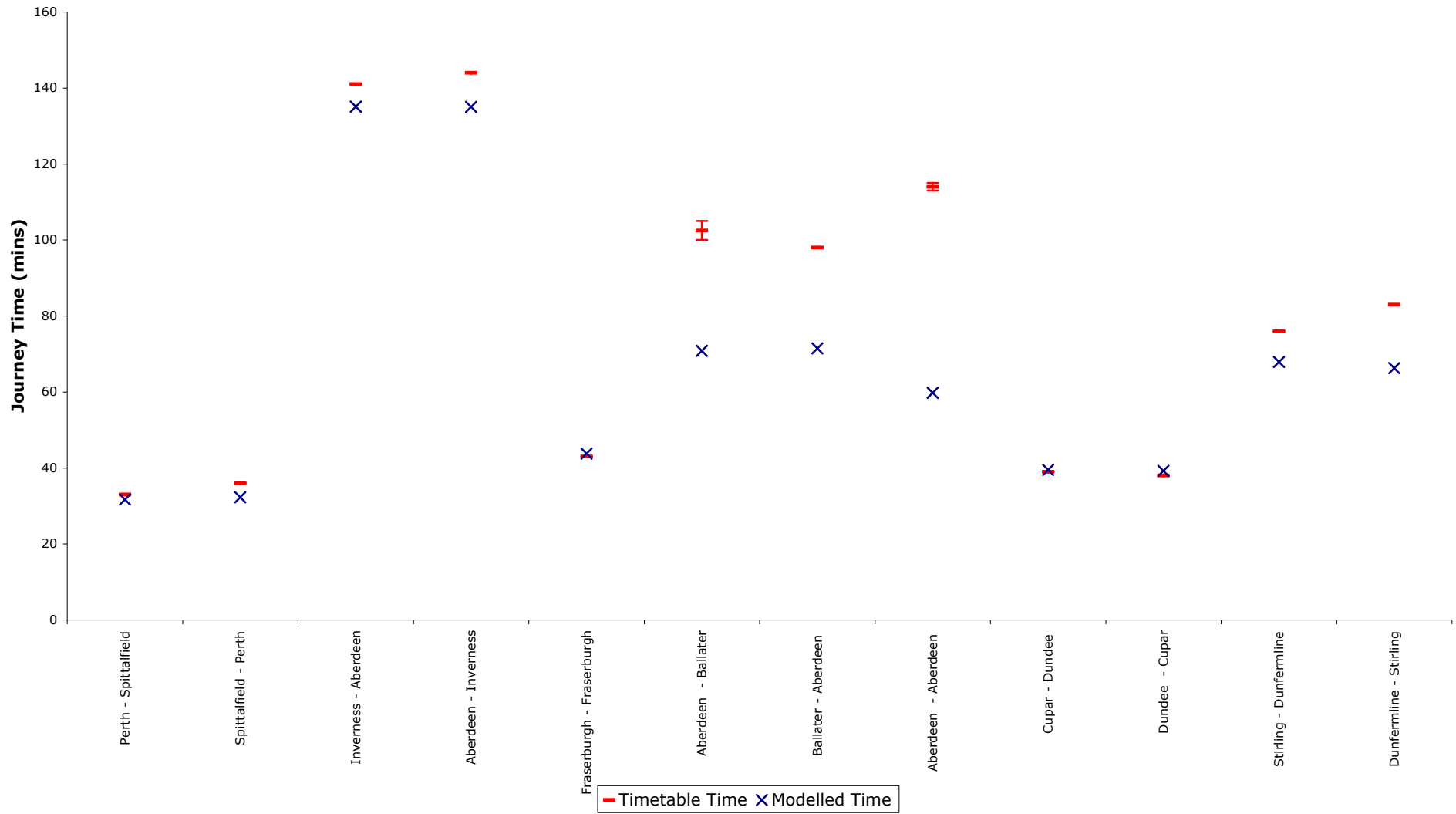**Figure E6: Bus Timetable v Modelled Time Comparison: Interpeak (3 of 3)**

Journey Time (mins)

Perth - Spittalfield
Spittalfield - Perth
Inverness - Aberdeen
Aberdeen - Inverness
Fraserburgh - Fraserburgh
Aberdeen - Ballater
Ballater - Aberdeen
Aberdeen - Aberdeen
Cupar - Dundee
Dundee - Cupar
Stirling - Dunfermline
Dunfermline - Stirling

▬ Timetable Time ✕ Modelled Time

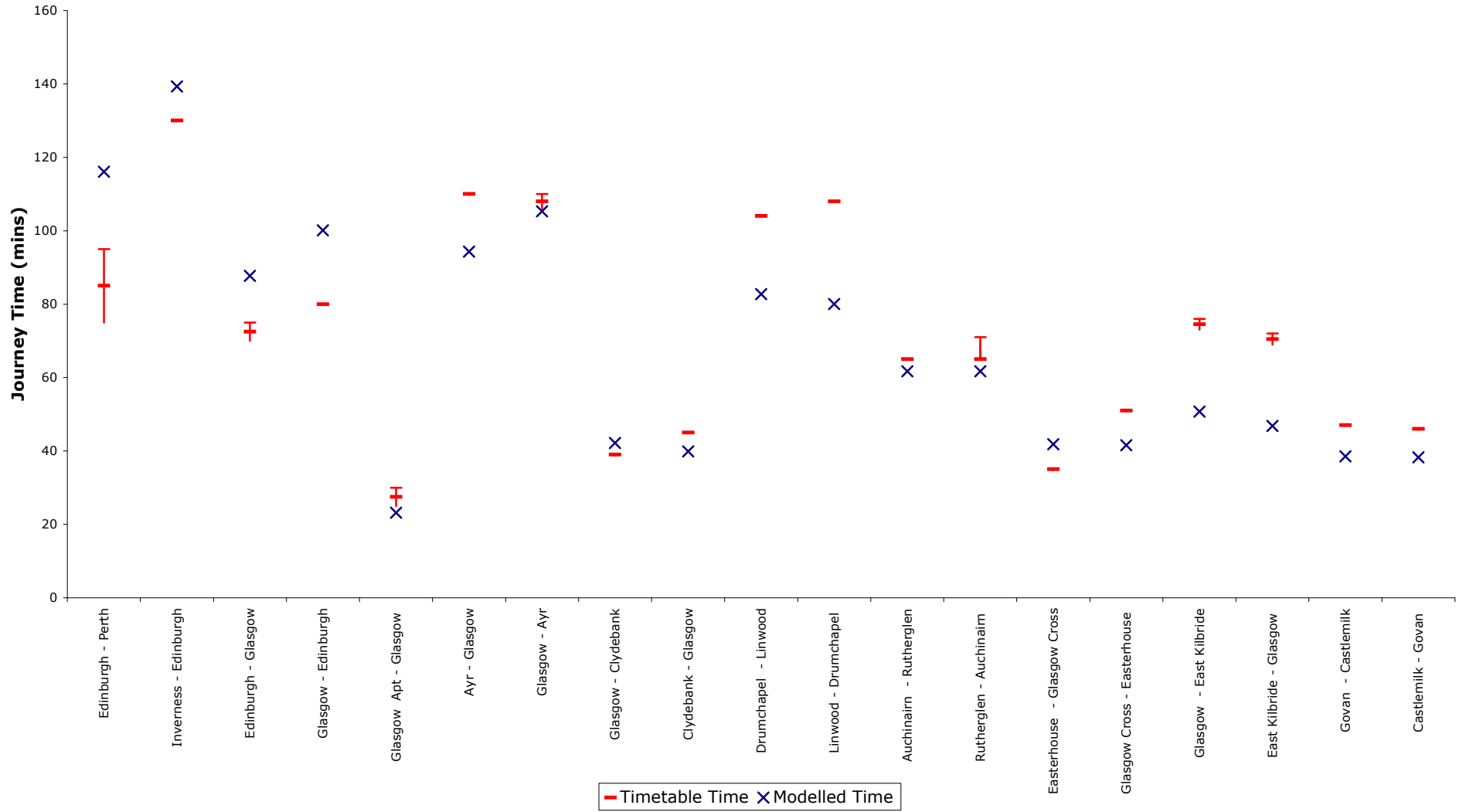**Figure E7: Bus Timetable v Modelled Time Comparison: PM Peak (1 of 3)**

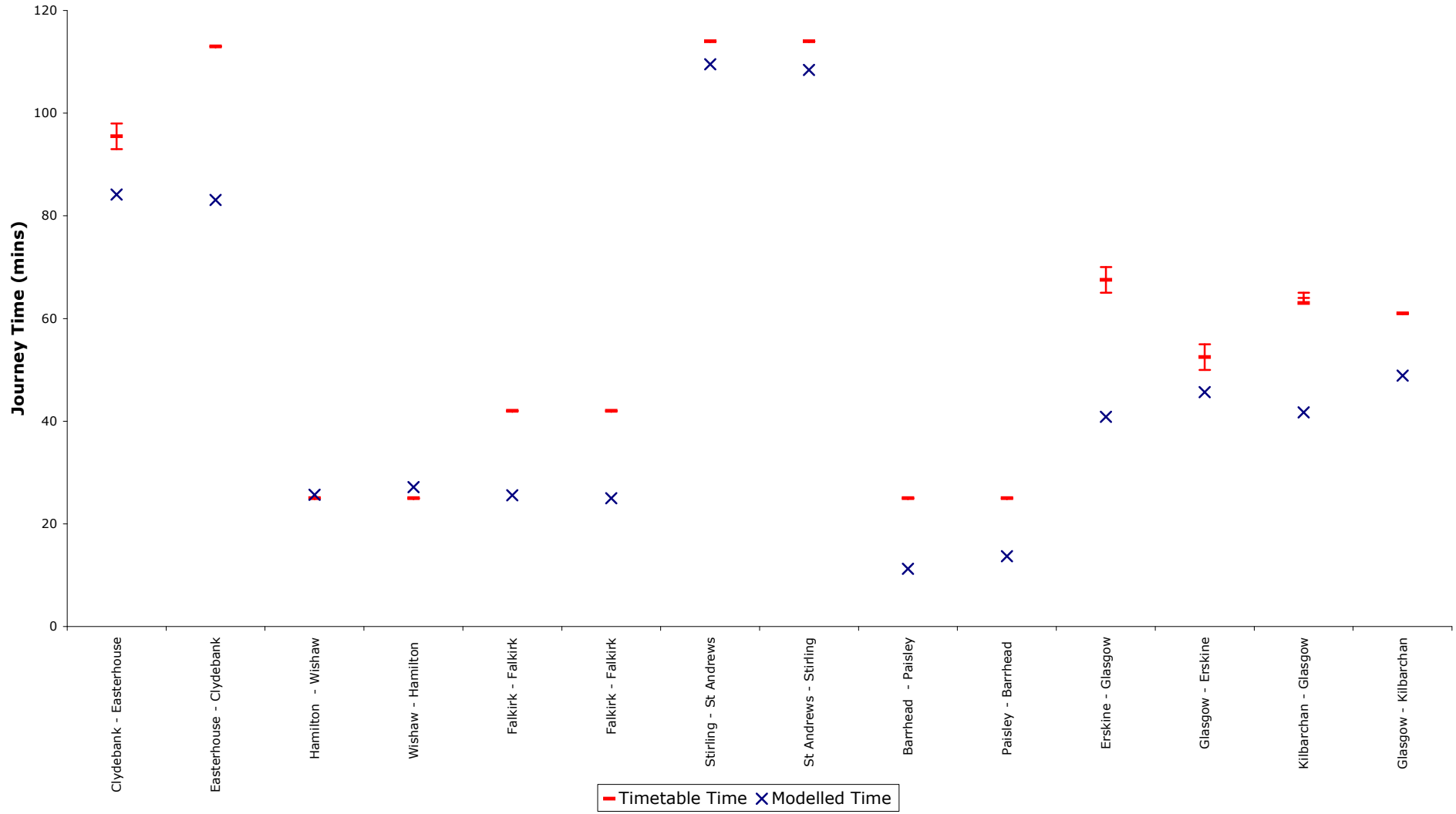**Figure E8: Bus Timetable v Modelled Time Comparison: PM Peak (2 of 3)**

Figure E9: Bus Timetable v Modelled Time Comparison: PM Peak (3 of 3)