

RAILSYS PERFORMANCE MODELLING REPORT

TAY ESTUARY

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Executive Summary

The Tayside and Central Scotland Transport Partnership (TACTRAN) has prepared a Regional Transport Strategy (RTS) setting out a vision and objectives for improving the Region's transport infrastructure, services and facilities over a 15 year period. This was approved by Scottish Ministers during June 2008.

A Delivery Plan that sets out a proposed programme of actions aimed at achieving the RTS vision and objectives is currently being developed. The Delivery Plan will concentrate on the first three years of the Strategy, but will also provide an investment programme for a 15 year time horizon.

RWA Rail has been commissioned by Steer Davies Gleave to undertake performance modelling to assess the impact of the proposed Tay Estuary Scheme using RailSys.

The RailSys model area includes lines from Glasgow Queen Street High Level to Greenhill Upper Junction and Haymarket, Greenhill Lower Junction to Stirling and Perth, Haymarket to Inverkeithing and Ladybank, Perth to Dundee, Ladybank to Dundee, Dundee to Arbroath, Aberdeen and Inverness.

Analysis of the proposed scheme has led to the following key predictions:

Analysis of the scheme has led to the following key conclusions:

- There is more reactionary delay in all three packages in general than in the base timetable. Delay for First ScotRail services increases by 25.0% for Package 0, 31.3% for Package 1 and 30.4% for Package 2
- The vast majority of the impact, in absolute terms, is to First Scotrail (SR) services.
- In terms of punctuality, Package 0 causes punctuality at Time-to-5 to fall from 95.9% to 95.1% for First ScotRail services. Package 1 then causes punctuality at TT5 to fall further, to 94.8%. Package 2 improves punctuality back to 95.1% (Package 2 performs better in punctuality terms as it splits longer distance services into shorter services, which inherently are more punctual).
- Although both Package 1 and Package 2 have a very significant performance impact compared to the Base, Dec 2008 timetable, the majority of this impact is down to the additional Glasgow-Perth services rather than the extension to Arbroath.

This report sets out RWA Rail's methodology, assumptions and findings in detail.

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1 Introduction

The Tayside and Central Scotland Transport Partnership (TACTRAN) has prepared a Regional Transport Strategy (RTS) setting out a vision and objectives for improving the Region's transport infrastructure, services and facilities over a 15 year period. This was approved by Scottish Ministers during June 2008.

A Delivery Plan that sets out a proposed programme of actions aimed at achieving the RTS vision and objectives is currently being developed. The Delivery Plan will concentrate on the first three years of the Strategy, but will also provide an investment programme for a 15 year time horizon.

RWA Rail has been commissioned by Steer Davies Gleave to undertake performance modelling to assess the impact of the proposed Tay Estuary Scheme using RailSys.

The following variants have been developed and simulated:

Base

Infrastructure: Current (December 2008) infrastructure
Timetable: December 2008 timetable

Package 0

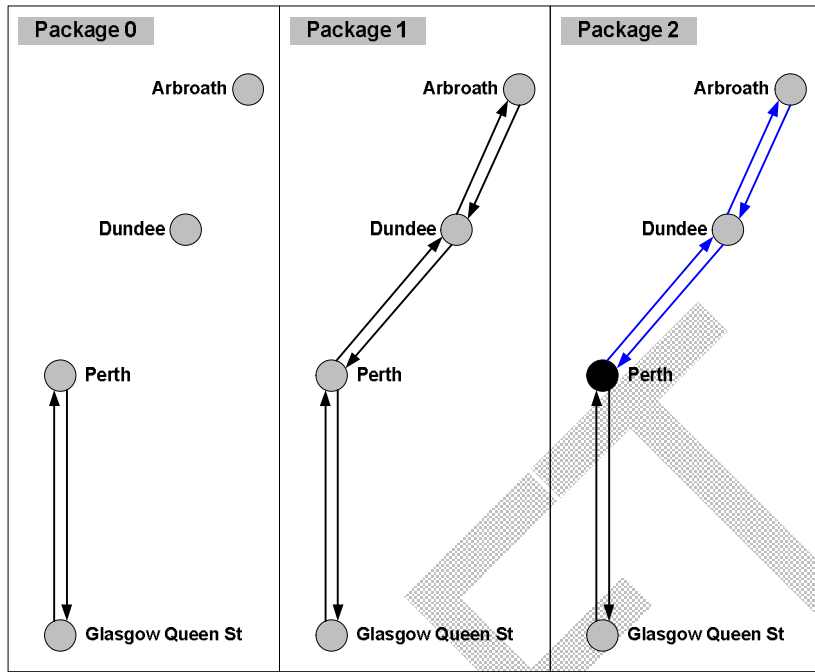
Infrastructure: Current (December 2008) infrastructure
Timetable: December 2008 timetable with additional trains from Glasgow to Perth

Package 1

Infrastructure: Current (December 2008) infrastructure
Timetable: December 2008 timetable with additional trains from Glasgow to Arbroath

Package 2

Infrastructure: Current (December 2008) infrastructure
Timetable: December 2008 timetable with additional trains from Glasgow to Perth and Perth to Arbroath



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2 Performance Modelling

2.1 Introduction to RailSys Performance Modelling

RWA Rail undertakes performance modelling using RailSys, a “signal berth” level timetable planning and simulation tool.

RailSys is a suite of planning and simulation software tools that allows rapid testing of the performance of an infrastructure and timetable combination (and comparative testing of multiple combinations) while retaining detailed system models of rolling stock performance and signalling (“signal berth” relates to the fact that RailSys knows the precise location of every signal rather than relying on planning or operational rules).

In addition to a powerful timetable editor (a unique capability amongst such detailed simulation tools), RailSys has two in-built simulation tools:

- Simulation of the ‘nominal’ timetable (running a simulation of the timetable without adding in any delays)
- Multiple stochastic simulations (where the model has delays incorporated for train-related failures, infrastructure problems and delays caused by passengers).

The methodology used to undertake a RailSys study is common to many projects, and is as follows:

2.2 Analysis of the Nominal Timetable

The nominal timetable simulator is used to highlight direct conflicts between trains as a result of inaccuracies or lack of precision in the scheduled timetable, for example when the ROTP are inadequate to describe the possible range of parallel moves at a particular location. RailSys will identify conflicts including headway conflicts, double occupation or crossing conflicts, as well as any incidence where a train driver will see and react to a restrictive aspect signal.

The nominal timetable simulator is used for:-

- Running time analyses for current and future infrastructure and rolling stock;
- Headway calculations and capacity analyses;
- Feasibility studies where performance prediction is not immediately required, for example timetable construction reflecting future infrastructure;
- Modelling and testing of current and future timetables for conflicts;

- Certain types of what-if-analyses, for example the impact on the timetable of possessions;
- Analysis of capacity utilisation according to the principles of the Capacity Utilisation Index (CUI).

2.3 Multiple Simulation

Delays on railways can be replicated reasonably reliably by using multiple simulation techniques. The modelling work starts by setting up delay distributions representing primary failure rates at locations in a study area, and lateness distributions representing the effects of delays outside the model area (both primary and secondary) at the entry points to the area. These distributions are then sampled using the Monte Carlo statistics principle. The multiple simulation tool within RailSys creates a number of timetables to be perturbed by overlaying these samples of lateness and delay. Simulating these timetables gives punctuality results for (in effect) a range of possible operating days with different external and primary delays, and hence different secondary delays.

The number of timetables required in a multiple simulation run, to provide a good level of likelihood that the overall average delay reflects reality, can vary between 100 and 300, depending on the nature of delays in the study area and the complexity of the network and timetable. Higher levels of congestion usually require higher numbers of runs as overall delay levels can be more sensitive to small changes in primary delay. This study was modelled over 300 simulation runs.

The Multiple Simulation tool can be used for:-

- Bottleneck analyses of infrastructure and/or timetables;
- Understanding the knock on impact of delays;
- Evaluating robustness and quality of the modelled system;
- Comparing and evaluating different infrastructure and timetable versions.

RailSys simulations require specific input data due to the detailed nature of the model. Typical data requirements are:-

- Infrastructure data, such as signalling plans and aspect sequence charts/route tables, for the infrastructure area to be modelled, including detail of any special signal controls (such as approach release) where these may have a significant effect of the operation of the timetable;
- Timetable data (usually in CIF file format) covering all passenger and freight movements in the model area;
- Details of train workings, ECS and shunt moves (e.g. platform "dockers") in the model area;
- TRUST data, covering the appropriate timetable period.

RailSys provides a wide variety of output statistics for evaluating timetable and infrastructure options. Typically, we evaluate simulation results using three key metrics:-

- Delay minutes (a measure of reactionary delay within the model area);
- Punctuality (the percentage of train arriving within specified lateness threshold). This is sometimes expressed in terms of the Public Performance Measure (PPM);
- Average minutes late at key locations.

When combined, these metrics provide sufficient data to evaluate changes in performance in terms of Train Operating Companies (TOC) and Network Rail (NR) performance and in terms of the passenger experience.

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3 Modelling Setup & Assumptions

3.1 RailSys Version

The modelling work has been undertaken using RailSys Version 6.3.5.

3.2 Compliance with Network Rail RailSys Modelling Standards

The model has been setup in compliance with Network Rail's RailSys Modelling Standards 2.0a for RailSys Version 6.

3.3 Infrastructure setup

The infrastructure model has been provided by Network Rail.

The boundaries of the RailSys model are:-

- Glasgow Queen Street High Level
- Haymarket
- Barnhill
- Ashfield
- Inverkeithing North Junction
- Grangemouth
- Inverness

A map of the model area can be found in Appendix A.

3.4 Traction data

Traction data was provided by Network Rail as part of the model. Freight traction data detail has been incorporated based on data used by RWA Rail for similar models. Accuracy levels are as follows:

- Length (to nearest metre) Unit diagrams were not be provided therefore standard train formations have been assumed.
- Mass (to nearest ton)
- Tractive effort curve (to nearest km/h and Newton)
- Resistance characteristics (to nearest km/h and Newton)
- Braking rate (to nearest 0.1 m/s)

Stock has been allocated based on timing codes provided in the CIF timetable file.

3.5 Passenger Timetable

The Principal 2009 timetable as provided by Network Rail has been used. This was reduced to the model area and Wednesday 21st January 2009 was chosen as a typical day to form the base timetable. All passenger trains and timetabled empty stock workings provided by Network Rail were input.

Dwell times were calculated from the arrival and departure times supplied by Network Rail and desired dwell times have been adhered to throughout the modelling process.

3.6 Freight Specification and Timetable

Freight services are very different, in terms of planned vs. actual operation, to passenger service and the level of service can differ dramatically from day to day. Also unlike passenger services, long term planned (LTP) services which are included in the working timetable do not always run, but are either replaced with short term planned (STP) or very short term planned services (VSTP) which run according to demand or are cancelled.

As the level of freight services can differ by season and by day it is important for simulation purposes that representative levels of freight services are modelled. Network Rail provided freight data for the period 13/10/2008 to 02/01/2009, excluding weekends. The percentage of the median value for each class that ran on each day was calculated and a representative day with the smallest error across all classes chosen. The following table shows the number of services that ran on the representative day:

Class	Class 0	Class 4	Class 6	Class 7	Class 8
Number of Trains	1	9	9	0	0

3.7 Routeing of freight services

Train schedules for the representative day were provided by Network Rail with both the scheduled time and the WTT lateness showing the actual time run on the day of operation.

Where these services could be matched to LTP services the route and timing data were extracted from the national timetable. For STP and VSTP services these were first routed to the scheduled time, if this highlighted a timetable conflict the services were routed on the actual time run on the day of operation.

3.8 Performance data preparation and input

Performance data has been input from a distribution supplied by NR, covering the entire modelling area, from several periods during the May 2008 timetable. In order

to give a fair comparison, all simulations have been based on identical delay data and perturbations.

Primary delays have been consolidated into delay distributions for TRUST recording points within the model area and 'presentation' delays at the model boundaries have also been set up. This information has been split by service code.

It is worth noting that TRUST delay data can potentially contain significant inaccuracies for the following reasons:

- Only delays of 3 minutes or over are recorded in the TRUST delay attribution system and therefore persistent delays of less than 3 minutes, e.g. TSRs, may lead to calibration problems
- TRUST truncates lateness data to a 1 minute accuracy (e.g. 4 minute 59 seconds is stored as 4 minutes in TRUST)
- The actual locations at which TRUST records lateness may differ from those that would logically be expected, e.g. TRUST may record lateness on entering a station platform, rather than when the train reaches the actual stopping location along the platform. TRUST therefore has a correction factor applied at certain locations in order to compensate for the geographical disparity - this is known as a "berth offset". The correction factor will generally be imprecise (especially when the effects of TPWS and long platforms are taken into account) and may cause inaccuracies in excess of 1 minute. In some cases it would be possible to model berth offsets, but the necessary data to do so is not available at the time of writing.

The effect of truncating delay to whole minutes and not recording sub 3 minutes delays result in these delays being excluded from the RailSys modelling. However the same delay has been applied to both the base and variant models and therefore should not unduly affect the difference in modelled performance between the base and variant models.

3.9 Calibration

Once the base timetable had been simulated, consistent with Network Rail standards, a comparison between the TRUST data and the RailSys model outputs was made to ensure the model was adequately reflecting reality in terms of secondary delays generated.

The majority of the calibration results are within 10% of values recorded by TRUST. Full results can be found in Appendix B.

3.10 Technical modelling assumptions

To ensure that driver and signaller behaviour is simulated in a satisfactory method the following assumptions are incorporated:

- A driver will not accelerate if the train has less than 800 metres to go before a speed decrease is required. If the train's current speed is less than the line speed further down the line then the train will accelerate towards the next line speed if possible.
- If a train is being delayed by more than 120 seconds then the following delayed train is permitted to overtake if possible to prevent further delay.
- If a train would be more than 300 seconds delayed on arriving at a station then it has been re-platformed if necessary and if possible.
- No account is taken of Sunday or 'special' days, such as sporting events where extra or reduced services may be run.

Minimum and desired dwell times are adhered to throughout the modelling process.

3.11 Defensive Driving

RailSys models defensive driving by the use of MP signalling which controls the maximum speed a train can operate at when controlled by a restrictive aspect signal.

The software reacts at the sighting distance for the signal and then using a constant braking curve will slow the train down to the speed allowed within the block section. It is not possible to differentiate by train type but the software does have different parameters based on line speed.

The parameters are defined in the stellwerke interlocking file which is supplied by Network Rail's PCAT department and are standard for all projects.

The following tabulation shows the maximum permissible speed at which a service can operate based on the interlocking and linespeed.

				MPH	KPH		MPH	KPH	
4 Aspect Panel (Over 100mph)	G	Linespeed	YY	80	130	Y	40	65	R
4 Aspect Panel (75mph - 100mph)	G	Linespeed	YY	60	97	Y	35	56	R
4 Aspect Panel (Below 75mph)	G	Linespeed	YY	55	89	Y	30	48	R
3 Aspect Panel (75mph - 100mph)	G	Linespeed	Y	60	97	R			
3 Aspect Panel (Below 75mph)	G	Linespeed	Y	45	72	R			
2 Aspect Panel (75mph - 100mph)	G	Linespeed	R						
2 Aspect Panel (75mph - 100mph)	G	Linespeed	R						
2 Aspect Panel (Below 75mph)	G	Linespeed	R						

3.12 Note on the Effect of Control Room Decisions

It should be noted that RailSys (in common with all other detailed railway network simulation tools) has some limitations compared to the prototypical railway, in particular:

- RailSys cannot cancel trains, skip station stops, or terminate short, and always ensures that all trains complete their scheduled run regardless of delay or lateness;
- RailSys cannot swap rolling stock between scheduled diagrams in service (although it can “break” turn-rounds when lateness exceeds a set threshold to ensure that lateness does not rise above a reasonable level);
- RailSys’ train regulation and platforming is inevitably a generalised algorithm which may not match the performance of an experienced signaller at a given location.

For these reasons, RailSys typically overstates lateness to a small extent, in particular when trains are running significantly late and might otherwise be “turned short”. However, this discrepancy will be present in both the Base and Option simulations and should not unduly affect the difference in modelled performance between the Base and Options.

It is also important to be aware that RailSys gives a level of performance for typical days – it cannot evaluate days with really poor performance and the input delay data for these days are excluded. This means that the total amount of delay and PPM are not comparable with published statistics.

3.13 RailSys modelling limitations - Deadlocking

During simulation a low percentage of deadlocks occurred. A deadlock is a situation where RailSys has made an inappropriate routing decision and cannot the situation.

This usually occurs because the software has not been able to look far enough ahead and has routed two trains towards each other on a piece of bidirectional track.

Simulation cycles where deadlocks occurred have been excluded from the performance analysis.

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4 Performance Modelling Results

Modelling results are presented in three forms:

4.1 Delay Minutes

The average (total) delay incurred each day (delay being an instance of an increase in lateness between two points for a given train). Negative delay is counted as zero, and RailSys counts every second of delay at every timing location, hence it is much more sensitive than industry systems such as TRUST and RailSys delay results are not necessarily directly comparable with the industry measure of "Delay Minutes". However, the percentage change in delay is a reasonable representation of the percentage change in Delay Minutes which would be likely to be observed using TRUST measured data.

Due to this additional sensitivity, delay should be interpreted as a measure of the level of interaction between train services, as opposed to a fundamental measure of rail network performance. Delay is, of course, linked to lateness and to punctuality, but a well-planned timetable should be capable of absorbing additional delay without severe degradation in lateness or punctuality, this being achieved by the incorporation of appropriate recovery allowances in the timetable.

4.2 Punctuality ("Time-To")

Punctuality is expressed as the percentage of trains arriving within a specific lateness threshold. As some trains leave the model area before terminating, punctuality for these trains is measured at their final station or timing point within the model. RailSys punctuality may not always be directly comparable with the industry Public Performance Measure (PPM), for the following reasons:

- Punctuality for some trains is not measured at their final destination, whereas in the industry measure it is. This can lead to either an understatement or overstatement compared to PPM, depending on network performance outside the modelling area.
- Severe primary delays are not included in the modelling, as these tend to require control room decisions which are outside the scope of a RailSys study.
- RailSys cannot cancel trains, turn trains around short, or swap units between diagrams in service.

4.3 Average Minutes Late (AML)

AML measures the average lateness of trains, measured at key locations. This metric is typically of interest when constructing business cases as it represents the passenger perception of punctuality and hence journey time attractiveness.

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5 Summary of Results

5.1 Variant descriptions

Base	December 2008 infrastructure
Package 0	Additional trains from Glasgow to Perth
Package 1	Additional trains from Glasgow to Arbroath
Package 2	Additional trains from Glasgow to Perth and from Perth to Arbroath

5.2 TOC codes

VT:	Virgin Trains
XC:	Arriva Cross Country
ZZ:	Long term planned freight services
NXEC:	National Express East Coast
SR:	First Scotrail

5.3 Delay Minutes Overview by TOC

The table below shows total delay minutes per day by operator:

TOC	Base	Package0	Package1	Package2	Package0 vs Base	Package1 vs Base	Package2 vs Base	Package0 vs Base	Package1 vs Base	Package2 vs Base
VT	00:00:02	00:00:02	00:00:02	00:00:02	+0:00:00	+0:00:00	+0:00:00	+0.0%	+0.0%	+0.0%
XC	00:09:23	00:09:23	00:09:20	00:09:16	+0:00:00	-0:00:03	-0:00:07	+0.0%	-0.5%	-1.2%
ZZ	00:21:17	00:45:03	00:44:11	00:45:15	+0:23:46	+0:22:54	+0:23:58	+111.7%	+107.6%	+112.6%
NXEC	00:20:36	00:20:34	00:20:49	00:22:53	-0:00:02	+0:00:13	+0:02:17	-0.2%	+1.1%	+11.1%
SR	10:02:16	12:36:40	13:11:04	13:05:04	+2:34:24	+3:08:48	+3:02:48	+25.6%	+31.3%	+30.4%
Total	10:53:34	13:51:42	14:25:26	14:22:30	+2:58:08	+3:31:52	+3:28:56	+27.3%	+32.4%	+32.0%

Values shown in hours:minutes:seconds

A small reduction in delay (3 to 7 seconds) can be seen on Arriva Cross Country in packages 1 and 2 which could be considered performance neutral, while delay minutes increased dramatically for First ScotRail services: by 25.6% for Package 0, 31.3% for Package 1 and 30.4% for Package 2. This is due to the additional services in the package timetables that are operated by First ScotRail.

Increased delay on Long Term Planned freight services can be seen in all three packages. Increased delay can also be seen on National Express East Coast in Package 2, which recorded 2 minutes 17 seconds or 11.1%. Total delay minutes increased by 27.3% (Package 0), 32.4% (Package 1) and 32% (Package 2) when compared with the base timetable.

5.3.1 Delay Minutes Overview by Line Section

The following table shows the average delay minutes per day by line section:

Route	Base	Package0	Package1	Package2	Package0 vs Base	Package1 vs Base	Package2 vs Base	Package0 vs Base	Package1 vs Base	Package2 vs Base
SC107 - Glasgow Queen Street High Level to Greenhill Upper & Lower Jn	01:03:58	01:16:10	01:17:10	01:14:41	+0:12:12	+0:13:12	+0:10:43	+19.1%	+20.6%	+16.8%
SC107 - Greenhill Upper & Lower Jn to Glasgow Queen Street High Level	01:14:21	02:19:26	02:29:01	02:19:08	+1:05:05	+1:14:40	+1:04:47	+87.5%	+100.4%	+87.1%
SC119 - Greenhill Lower Jn to Stirling	00:48:36	01:05:42	01:05:29	01:05:12	+0:17:06	+0:16:53	+0:16:36	+35.2%	+34.7%	+34.2%
SC119 - Stirling to Greenhill Lower Jn	00:40:59	01:06:20	01:06:46	01:06:12	+0:25:21	+0:25:47	+0:25:13	+61.9%	+62.9%	+61.5%
SC119 - Stirling to Perth	00:28:39	00:51:12	00:53:22	00:53:38	+0:22:33	+0:24:43	+0:24:59	+78.7%	+86.3%	+87.2%
SC119 - Perth to Stirling	00:12:06	00:15:48	00:14:55	00:15:41	+0:03:42	+0:02:49	+0:03:35	+30.6%	+23.3%	+29.6%
SC119 - Perth to Dundee	00:00:25	00:00:20	00:00:39	00:04:55	-0:00:05	+0:05:14	+0:04:30	-20.0%	+1256.0%	+1080.0%
SC119 - Dundee to Perth	00:00:21	00:00:19	00:01:44	00:05:08	-0:00:02	+0:01:23	+0:04:47	-9.5%	+395.2%	+1366.7%
SC191 - Dundee to Arbroath	00:06:17	00:05:21	00:12:55	00:19:11	-0:00:56	+0:06:38	+0:12:54	-14.9%	+105.6%	+205.3%
SC191 - Arbroath to Dundee	00:01:07	00:01:04	00:01:32	00:03:00	-0:00:03	+0:00:25	+0:01:53	-4.5%	+37.3%	+168.7%
SC191 - Arbroath to Aberdeen	00:18:44	00:19:27	00:17:10	00:17:30	+0:00:43	-0:01:34	-0:01:14	+3.8%	-8.4%	-6.6%
SC191 - Aberdeen to Arbroath	00:09:08	00:08:59	00:09:48	00:09:56	-0:00:09	+0:00:40	+0:00:48	-1.6%	+7.3%	+8.8%
SC195 - Aberdeen to Inverness	00:07:46	00:07:49	00:08:53	00:10:17	+0:00:03	+0:01:07	+0:02:31	+0.6%	+14.4%	+32.4%
SC195 - Inverness to Aberdeen	00:13:13	00:13:17	00:14:17	00:14:59	+0:00:04	+0:01:04	+0:01:46	+0.5%	+8.1%	+13.4%
SC107 - Greenhill Upper Jn to Haymarket West Jn	00:41:17	00:46:45	00:47:49	00:46:22	+0:05:28	+0:06:32	+0:05:05	+13.2%	+15.8%	+12.3%
SC107 - Haymarket West Jn to Greenhill Upper Jn	00:36:05	00:42:11	00:42:19	00:42:13	+0:06:06	+0:06:14	+0:06:08	+16.9%	+17.3%	+17.0%
SC109 - Polmont Jn to Carmuir Jn & Larbert Jn	00:05:24	00:09:47	00:10:40	00:09:23	+0:04:23	+0:05:16	+0:03:59	+81.2%	+97.5%	+73.8%
SC109 - Carmuir Jn & Larbert Jn to Polmont Jn	00:09:42	00:32:16	00:33:13	00:32:12	+0:22:34	+0:23:31	+0:22:30	+232.6%	+242.4%	+232.0%
SC171 - Haymarket West Jn to Inverkeithing	00:36:27	00:36:16	00:36:17	00:36:13	-0:00:11	-0:00:10	-0:00:14	-0.5%	-0.5%	-0.6%
SC171 - Inverkeithing to Haymarket West Jn	01:08:13	01:08:09	01:08:18	01:08:38	-0:00:04	+0:00:05	+0:00:25	-0.1%	+0.1%	+0.6%
SC171 - Inverkeithing to Ladybank	00:49:12	00:47:45	00:47:45	00:47:33	-0:01:27	-0:01:27	-0:01:39	-2.9%	-2.9%	-3.4%
SC171 - Ladybank to Inverkeithing	00:28:51	00:28:20	00:28:40	00:28:54	-0:00:31	-0:00:11	+0:00:03	-1.8%	-0.6%	+0.2%
SC181 - Ladybank to Perth	00:09:10	00:06:47	00:07:39	00:06:48	-0:02:23	-0:01:31	-0:02:22	-26.0%	-16.5%	-25.8%
SC181 - Perth to Ladybank	00:05:27	00:05:04	00:05:36	00:05:05	-0:00:23	+0:00:09	-0:00:22	-7.0%	+2.8%	-6.7%
SC171 - Ladybank to Dundee	00:17:13	00:13:23	00:13:47	00:15:13	-0:03:50	-0:03:26	-0:02:00	-22.3%	-19.9%	-11.6%
SC171 - Dundee to Ladybank	00:03:45	00:03:34	00:04:03	00:04:11	-0:00:11	+0:00:18	+0:00:26	-4.9%	+8.0%	+11.6%
Other Main Lines	00:17:08	00:20:11	00:20:39	00:20:17	+0:03:03	+0:03:31	+0:03:09	+17.8%	+20.5%	+18.4%
Grand Total	10:53:34	13:51:42	14:25:26	14:22:30	+2:58:08	+3:31:52	+3:28:56	+27.3%	+32.4%	+32.0%

Values shown in hours:minutes:seconds

Remark: Cells in grey background indicate the line sections with proposed extra services

In summary there is more delay in the variant timetable packages compared to the December 2008 timetable. Delay increases on several route sections with the largest increase being between Greenhill Upper/Lower Junction and Glasgow Queen Street High Level, where delay increased by 65 minutes 5 seconds (87.5%) in Package 0, by 74 minutes 40 seconds (100.4%) in Package 1 and by 64 minutes 47 seconds (87.1%) in Package 2.

5.3.2 SC107 Glasgow Queen Street High Level to Greenhill Upper and Lower Junction

Increased delay was recorded in all packages in the northbound direction between Glasgow Queen Street High level and Greenhill Upper and Lower Junction. On this route section delay increased by 12 minutes 12 seconds (19.1%) in Package 0, 13 minutes 12 seconds (20.6%) in Package 1 and 10 minutes 43 seconds (16.8%) in Package 2. The additional train service operates fast from Glasgow Queen Street High Level to Greenhill Upper Junction at xx:11 every hour, and runs in front of another fast train, departing at xx:15 every hour. With punctual departure the new service should have little impact on the following path. Hence less delay has been recorded in the northbound direction than in the southbound.

5.3.3 SC107 Greenhill Upper and Lower Junction to Glasgow Queen Street High Level

Increased delay was recorded in all timetable packages on southbound services between Greenhill Lower Junction and Glasgow Queen Street High level. The largest increase was recorded in package 1 where delay increased by 74 minutes 40 seconds (100.4%).

The additional service is operated in a slow path from Stirling to Greenhill Junctions as it is the only path available. The service is timetabled to pass Greenhill Junction in front of the xx:49 arrival at Glasgow Queen Street as this service has stops at both Croy and Lenzie. There is only one available path into Glasgow Queen Street at xx:45 and therefore the proposed service has been 'slackly' timed to arrive in this booked path. This has effectively removed approximately six minutes of "white space" from the timetable or two theoretical paths. Removing "white space" has removed the potential recovery time from the timetable.

5.3.4 SC119 Greenhill Lower Junction to Stirling

Increased delay can be seen in all packages in northbound services between Greenhill Lower Junction and Stirling. The largest increase was recorded in Package 0 where delay increased by 17 minutes 6 seconds (35.2%). The increase in delay on this route section was due to the increase in number of services operating on this section of line.

5.3.5 SC119 Stirling to Greenhill Lower Junction

Increased delay can be seen in all packages in southbound services between Stirling and Greenhill Lower Junction. All three timetable packages recorded a similar increase in delay. Delay increased on this route section as the proposed service

operates in a slow path, as it uses the only path available; there is limited recovery in the timetable and primary delay impacts on other services on the route.

5.3.6 SC119 Stirling to Perth

Delay on this route section increased dramatically in all packages. The largest increase was recorded in package 2 where delay increased by 24 minutes 59 seconds (87.2%). This is due to the increase in the number of services operating on this section of route. The number of trains on this route section increased from 3 to 4 trains per hour. In order to accommodate these train alterations to turnaround related ECS workings at Dunblane have been undertaken, resulting in a tighter time window to "shunt", thus affecting robustness.

5.3.7 SC119 Perth to Stirling

An increase in delay can be seen in all packages between Perth and Stirling although a lower level was recorded than the northbound direction. Delay increased for the same reasons as section 5.1.2.5.

5.3.8 SC119 Perth to Dundee

Increased delay was recorded in both Packages 1 and 2, which recorded 5 minute 14 seconds (1256%) and 4 minutes 30 seconds (1080%) respectively. Slight improvement can be found in Package 0 with a reduction of 5 seconds (20%). The implementation of the service in Package 1 & 2 doubles the number of trains on the route from 1 to 2 per hour. In addition the two services are at "minimum headway" (10 minutes) between Barnhill and Errol, (a line section with Absolute Block Signalling), which is a performance risk. The trains do not exist in Package 0 hence negative effect is not recorded.

5.3.9 SC119 Dundee to Perth

Increased delay can be seen in Packages 1 and 2 in southbound services between Dundee and Perth, which recorded 1 minute 23 seconds (395.2%) and 4 minutes 47 seconds (1366.7%), respectively. Slight improvement can be found in Package 0 with a reduction of 2 seconds (9.5%). In package 1 the two trains per hour have been evenly spaced, whereas in Package 2 they have been timetabled closer together. Under perturbation this results in conflict on the short single track section from Barnhill to Perth. This explains the higher level of delay in Package 2 compared with Package 1. As in the northbound direction (5.1.2.7) Package 0 has no additional services so there is no negative effect.

5.3.10 SC191 Dundee to Arbroath

Delay increased on this route section in both packages 1 and 2 between Dundee and Arbroath, which recorded an increase of 6 minutes 38 seconds (105.6%) and 12 minutes 54 seconds (205.3%) respectively. Improvement can be found in Package 0 with a reduction of 56 seconds (14.9%). Delay increased due to the large increase in the number of trains with a stopping service pattern. The number of hourly services has increased by 50%, (from 2 to 3 trains per hour)

5.3.11 SC191 Arbroath to Dundee

A small increase in delay was recorded in Packages 1 and 2 between Arbroath and Dundee, which recorded 25 seconds (37.3%) and 1 minute 53 seconds (168.7%) respectively. A small improvement of 3 seconds (4.5%) was recorded in Package 0. Delay increased for the same reason as 5.1.2.9.

5.3.12 Peripheral line sections

The line sections described above are those on which the new Glasgow – Perth – Dundee – Arbroath services travel. Peripheral line sections generally see a slight increase in delay. This would be expected due to situations where delayed trains are being held back at junctions for the new trains to pass, where as previously there would have been an available path.

An example of this principle is one of the new services from Perth to Glasgow Queen Street which departs from Perth at 9:37. This is timed to pass through Greenhill Upper Junction at 10:26:30. There is an Edinburgh to Glasgow Queen Street service, timed to pass through Greenhill Upper Junction at 10:19:30. With no Perth to Glasgow service running it has a good window across the junction and should maintain a fast path right through to Glasgow. It would not, therefore, be expected to lose any further time, and indeed could possibly make some up. If, however, it was held behind the relatively slow Perth to Glasgow train it would lose significantly more time than it previously would. Part of this delay would involve the train being held back at Greenhill Upper Junction, thus increasing delay on the line section between Haymarket West Junction and Greenhill Upper Junction, where no extra service is planned.

The line sections from Carmuir's Triangle to Polmont Junction are especially affected, particularly in the Glasgow direction. This is because the path the new train takes in this area is comparatively slow, effectively taking two existing paths across the junctions, and removing recovery slots from the timetable. It may be possible with detailed analysis of the pathing time to improve this situation.

5.4 Time-to (Punctuality)

The added delay caused by train interaction does not directly lead to proportionate lateness (AML) and time-to punctuality. This can have several reasons:

- Time-to and lateness are average (mean) values per train for a group of trains. Delay is the total delay of all trains. This can mean that small delays affecting many trains lead to lower Time-to values while a large individual delays only affecting a small number of trains result in better Time-to.
- Delay can only be recovered where run time allowances are available. If areas with large delays precede areas with large run time allowances then these can be recovered and lead to a steady decrease of delay. However if the same amount of delay is incurred in areas without run time allowances or the delay

location moves from the beginning of a route section with an allowance to its end, then this is more likely to cause significant lateness and can eventually lead lower "Time-to" results.

- Particularly Time-to results can be subject to irregular distributions or arrival times. If trains have a regular delay of a fraction of a minute in one variant, then this can lead to a significant reduction in the percentage of train running on time or just 'nudge' a number of trains over a threshold where it is common for trains to arrive just below a certain value.

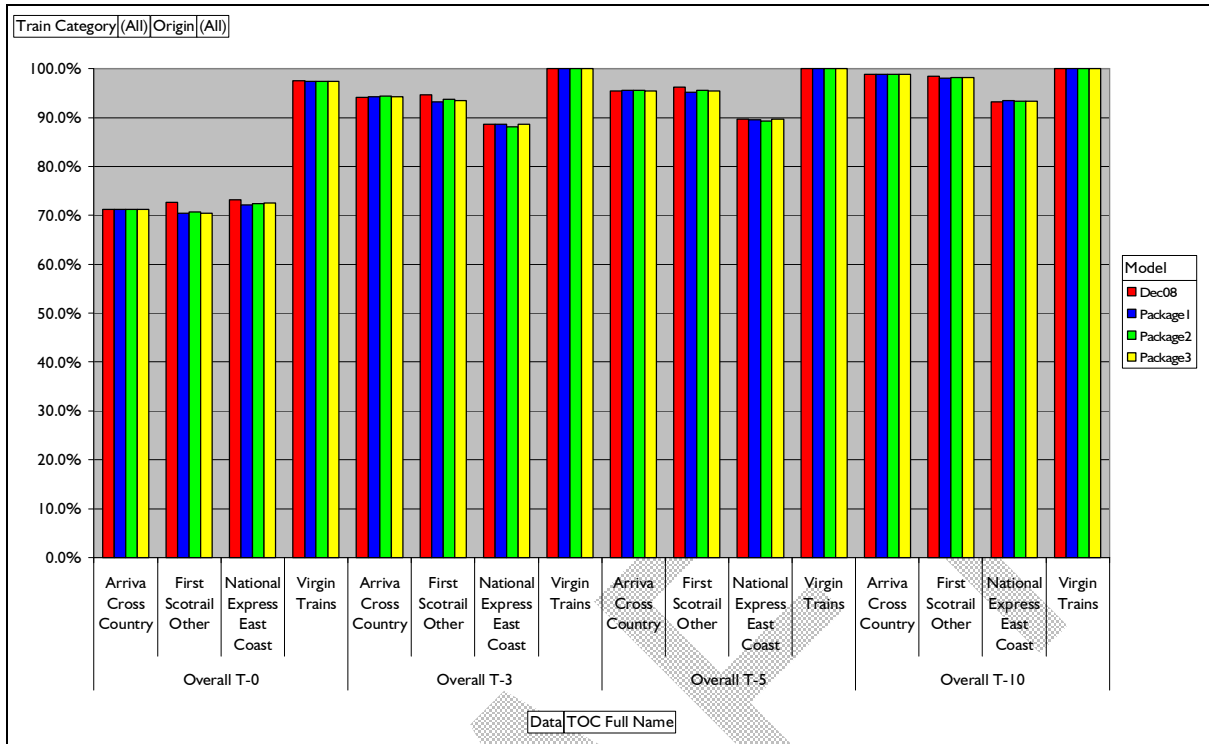
The table below shows the average time-to figures for on time running, 3, 5 and 10 minutes lateness by operator.

	TOC Name	Base Dec 2008	Package 0	Package 1	Package 2
TT0	Arriva Cross Country	57.4%	57.5%	57.5%	57.6%
	First Scotrail Other	69.1%	66.6%	66.4%	65.9%
	National Express East Coast	63.1%	62.1%	61.5%	62.1%
TT3	Arriva Cross Country	91.0%	91.1%	91.2%	91.2%
	First Scotrail Other	94.2%	92.9%	92.6%	93.0%
	National Express East Coast	85.9%	85.6%	85.6%	85.3%
TT5	Arriva Cross Country	93.0%	93.0%	93.1%	93.2%
	First Scotrail Other	95.9%	95.1%	94.8%	95.1%
	National Express East Coast	87.0%	87.0%	86.7%	86.3%
TT10	Arriva Cross Country	98.3%	98.3%	98.3%	98.3%
	First Scotrail Other	98.4%	98.2%	98.0%	98.1%
	National Express East Coast	91.9%	92.1%	92.1%	91.9%
Total Overall T-0		68.9%	66.4%	66.2%	65.8%
Total Overall T-3		94.1%	92.8%	92.5%	92.9%
Total Overall T-5		95.7%	95.0%	94.7%	95.0%
Total Overall T-10		98.3%	98.1%	98.0%	98.1%

Freight and ECS services are excluded from the results

- Overall punctuality worsened in all packages when compared with the base timetable.
- Improvement in punctuality can be seen on Arriva Cross Country in the threshold at TT3, TT5 and TT10.

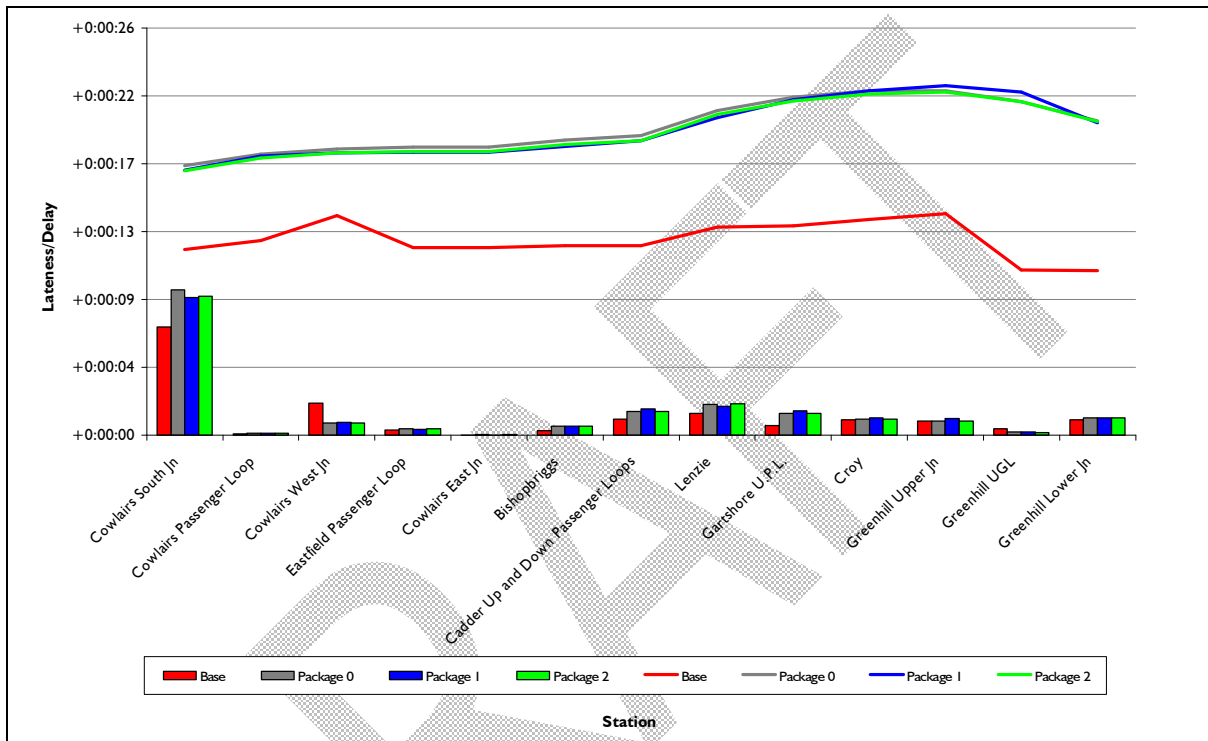
The chart below shows the "time-to" punctuality values at exit location grouped by TOC with the percentage of services achieving the performance margins.



5.5 Average Minute Lateness (AML)

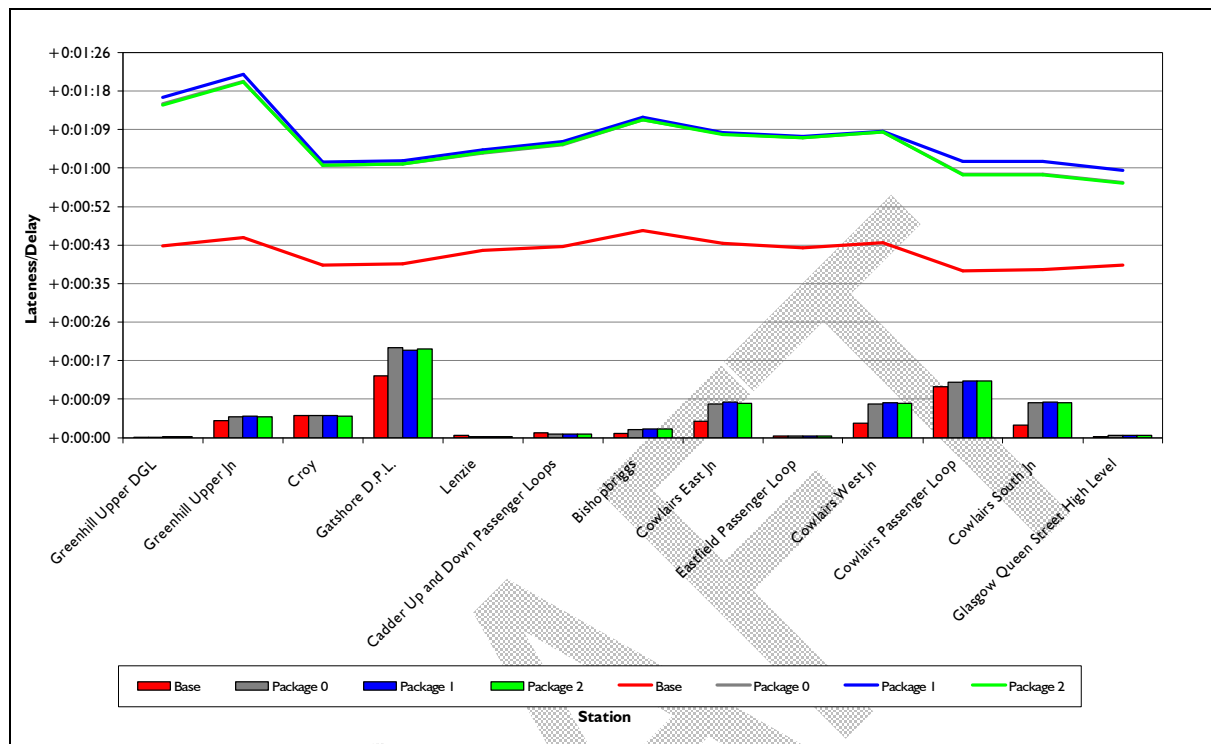
The following graphs show the average lateness of trains as they progress on route. AML data for all routes has been tabulated in Appendix C.

Glasgow Queen Street High Level – Greenhill Lower Junction



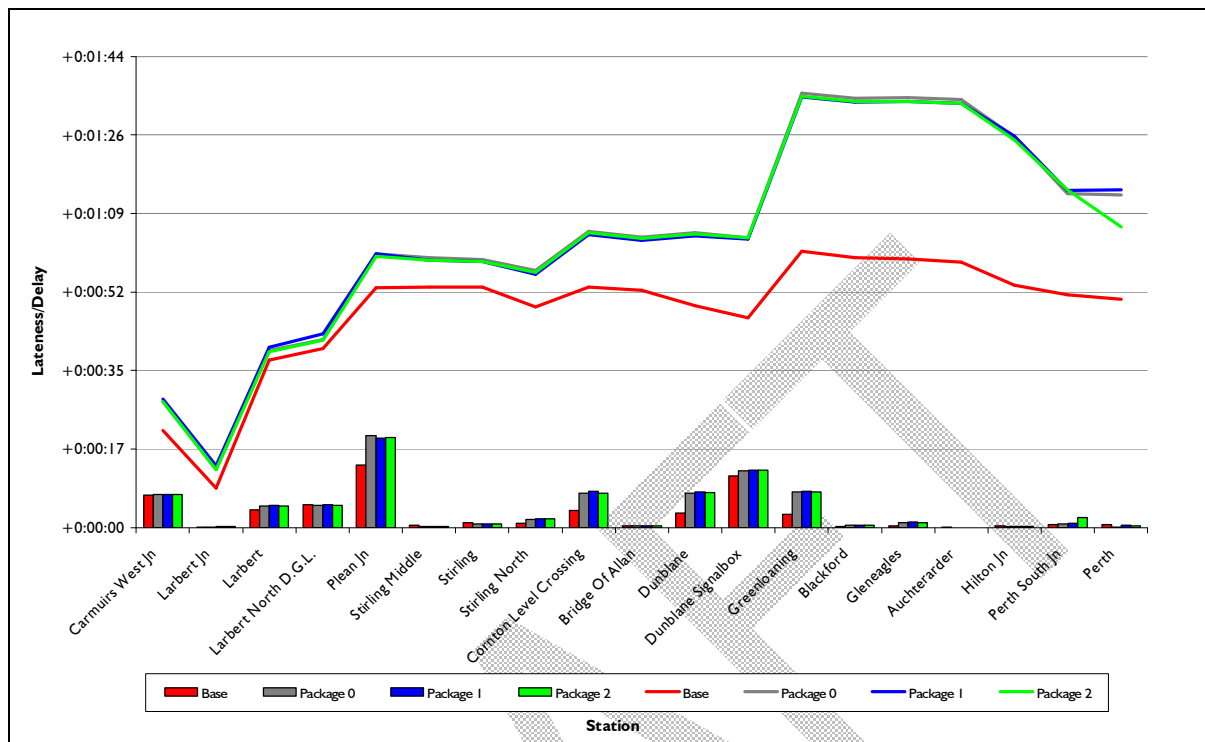
The graph shows that December 2008 Base timetable has the smallest average lateness when compared with all three timetable packages. Average lateness in all three timetable packages remains constant and this is due to the standard path they have on this line section.

Green Hill Lower Junction – Glasgow Queen Street High Level



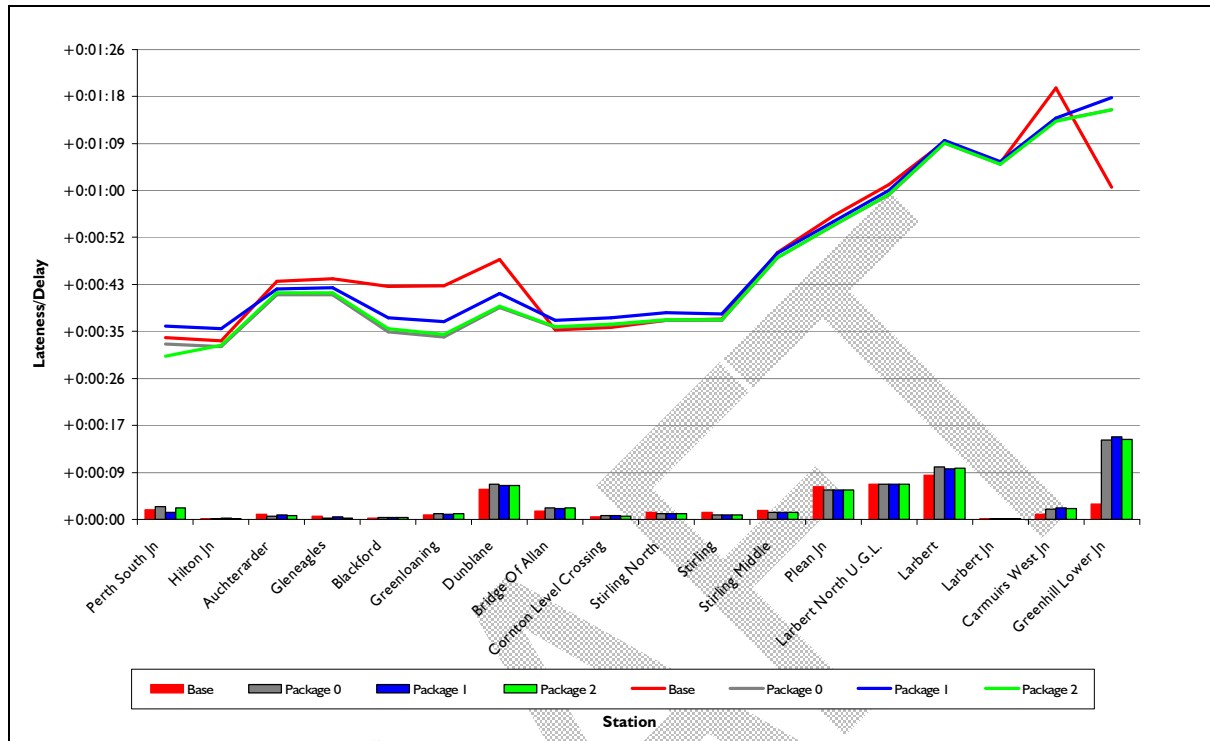
The graph shows that December 2008 Base timetable has the smallest average lateness when compared with all three timetable packages. This is consistent with the inclusion of the additional services, which are comparatively long distance and therefore more prone to delay. Consequently they enter the route section with a greater level of lateness compared to the base timetable. Additional services use the previous spare capacity and reduce the available recovery time in the timetable. The difference narrows on approach to Glasgow Queen Street, this is because each of the additional trains has approximately 6 minutes pathing allowance between Greenhill Upper and Glasgow Queen Street, allowing lost time to be made up.

Green Hill Lower Junction – Perth



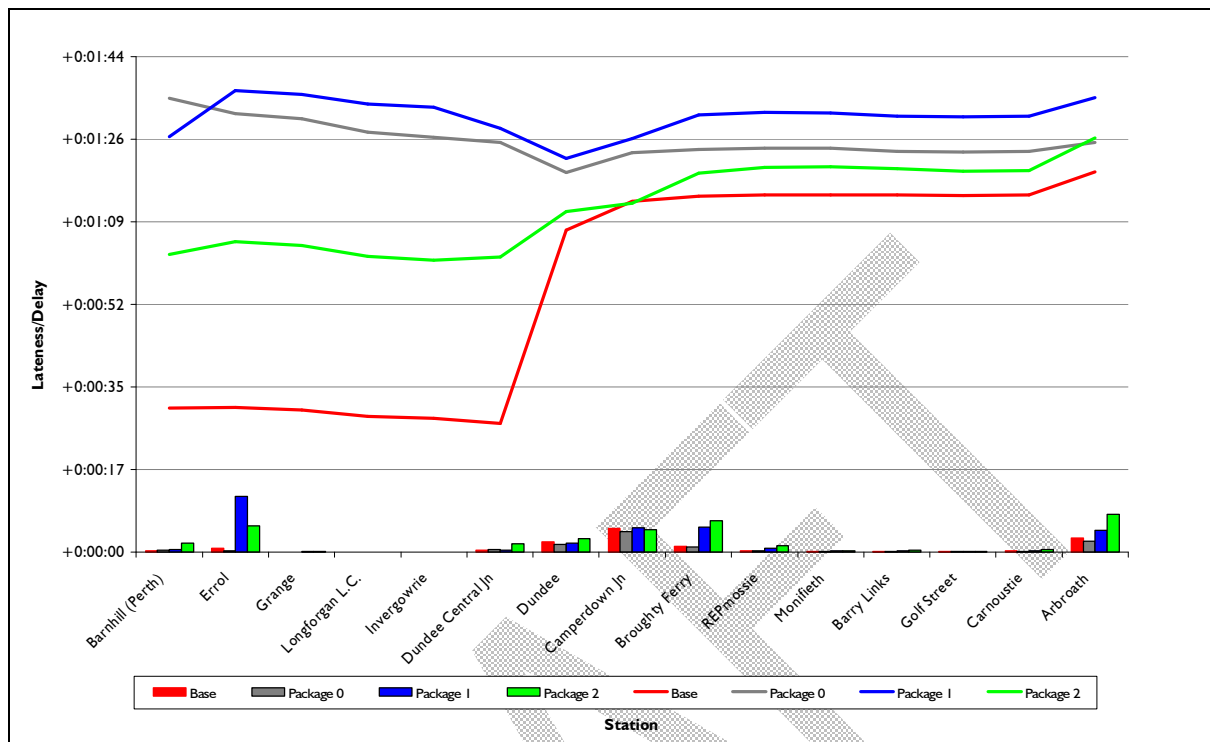
The graph shows that December 2008 Base timetable has the smallest average lateness when compared with all three timetable packages. This is to be expected due to the greater number of overall trains running. A location where particular issue is seen is Dunblane. This is for two reasons; firstly in all packages significant tightening and retiming of empty stock shunting at Dunblane is required to fit the proposed service into the timetable. Previously this slackly timed shunt move gave good service recovery potential. Secondly it would appear trains will far more often have to wait at Greenloaning to obtain the section token to Blackford under absolute block. This is again related to the larger number of trains operating, and therefore trains running at close to minimum headway being required more often.

Perth – Greenhill Lower Junction



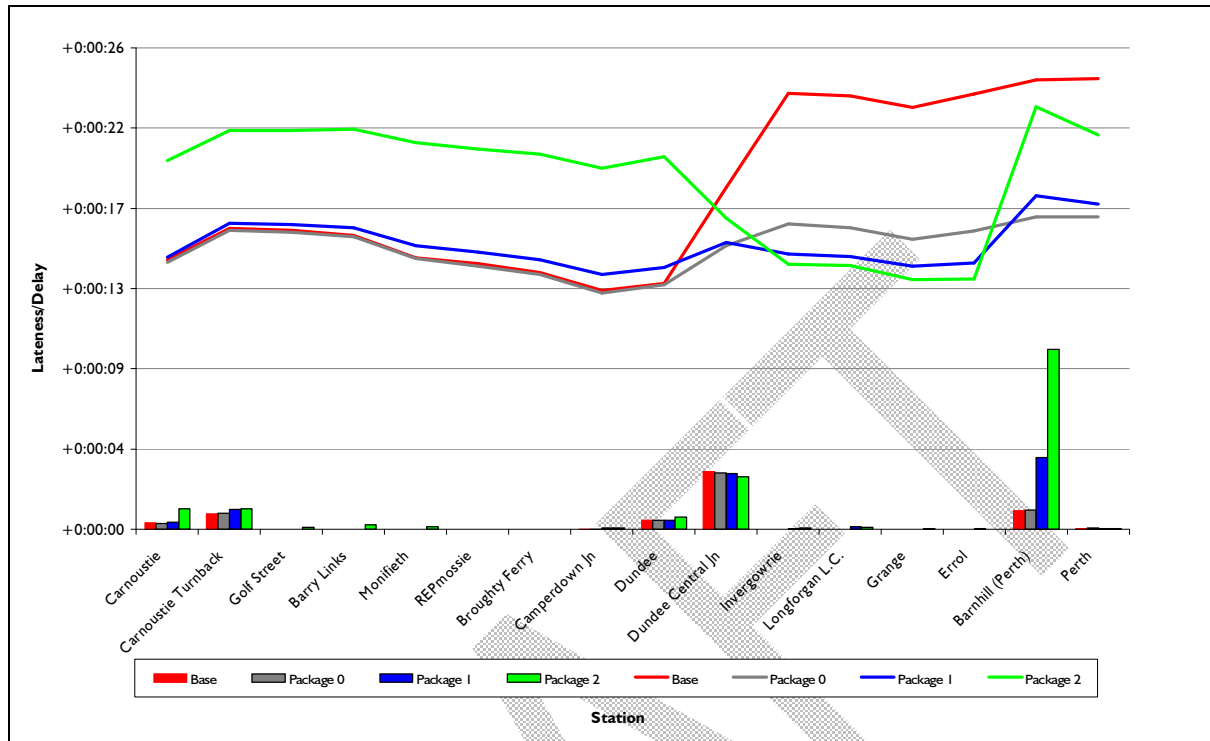
Delay increases across all timetables between Stirling and Carmuir West Junction. The base timetable sees an improvement between Carmuir West Junction and Greenhills Lower Junction.

Perth – Arbroath



The graph shows that December 2008 Base timetable has the smallest average lateness when compared with all three timetable packages. The large increase in lateness between Dundee Central Junction and Dundee in the Base timetable is due to an insufficient running time for approximately 30 seconds, where insufficient running time for the additional services in Packages 1 and 2 is approximately 10 seconds.

Arbroath – Perth



The graph shows Package 2 has the largest average lateness on the section between Arbroath and Dundee Central Junction. This is due to the tight turnaround time at Arbroath in Package 2. (Note that turnaround operation in Package 1 is more robust. No services turnaround at Arbroath in the Base and Package 0). In addition, the large increase in average lateness at Dundee Central Junction in the Base is due to insufficient running time, where the additional services in Packages 1 and 2 gain approximately 30 seconds in running time.

6 Conclusions and Issues Arising

Analysis of the scheme has led to the following key predictions:

- There are more delays in all three packages in general when compared with the base timetable.
- Punctuality decreased in all three packages in all thresholds.

Glasgow Queen Street to Greenhill Junction, Stirling, Perth, Dundee and Arbroath
Increased delay can be seen in all packages in northbound services from Glasgow Queen Street to Perth, whilst delay decreased slightly in Package 0 (extra services terminate at Perth) between Perth and Arbroath. Increased delay is mainly due to the increase in the number of trains in the variant timetables.

The worst case of added delay recorded for northbound services was approximately 25 minutes in Package 2 on the line section between Stirling and Perth. This is due to the increase in the number of services operating on this section of route. In order to accommodate these trains, alterations to turnaround related ECS workings at Dunblane have been undertaken, resulting in a tighter time window to “shunt”, thus affecting robustness.

Increased delay was recorded in both Packages 1 and 2 between Perth and Dundee, which recorded 5 minute 14 seconds (1256%) and 4 minutes 30 seconds (1080%) respectively. Slight improvement can be found in Package 0 with a reduction of 5 seconds (20%). The implementation of the service in Package 1 & 2 doubles the number of trains on the route from 1 to 2 per hour. In addition the two services are at “minimum headway” (10 minutes) between Barnhill and Errol, (a line section with Absolute Block Signalling), which is a performance risk. The trains do not exist in Package 0 hence negative effect is not recorded.

Delay increased on the route section from Dundee to Arbroath in both packages 1 and 2 which recorded an increase of 6 minutes 38 seconds (105.6%) and 12 minutes 54 seconds (205.3%) respectively. Improvement can be found in Package 0 with a reduction of 56 seconds (14.9%). Delay increased due to the large increase in the number of trains with a stopping service pattern. The number of hourly services has increased by 50%, (from 2 to 3 trains per hour)

Arbroath to Dundee, Perth, Stirling, Greenhill Junction and Glasgow Queen Street
Similar to northbound services, increased delay can be seen in all packages in southbound services from Perth to Glasgow Queen Street, while delay decreased slightly in Package 0 between Arbroath and Perth. Increased delay is mainly due to the total amount of trains increased in the variant timetables as mentioned above in northbound services.

The largest increase was recorded in package 1 between Greenhill Junctions and Glasgow Queen Street, where delay increased by 74 minutes 40 seconds (100.4%). The additional service is operated in a slow path from Stirling to Greenhill Junctions as it is the only path available. The service is timetabled to pass Greenhill Junction in front of the xx:49 arrival at Glasgow Queen Street as this service has stops at both Croy and Lenzie. There is only one available path into Glasgow Queen Street at xx:45 and therefore the proposed service has been 'slackly' timed to arrive in this booked path. This has effectively removed approximately six minutes of "white space" from the timetable or two theoretical paths. Removing "white space" has removed the potential recovery time from the timetable.

Other line sections

The line sections described above are those on which the new Glasgow – Perth – Dundee – Arbroath services travel. Peripheral line sections generally see a slight increase in delay; this would be expected due to situations where delayed trains are being held back at junctions for the new trains to pass, where as previously there would have been an available path.

The line sections from Carmuir's Triangle to Polmont Junction are especially affected, particularly in the Glasgow direction. This is because the path of the new train in this area is comparatively slow, effectively taking two existing paths across the junctions, and removing recovery slots from the timetable. It may be possible with detailed analysis of placement of the pathing time to improve this situation.

Punctuality

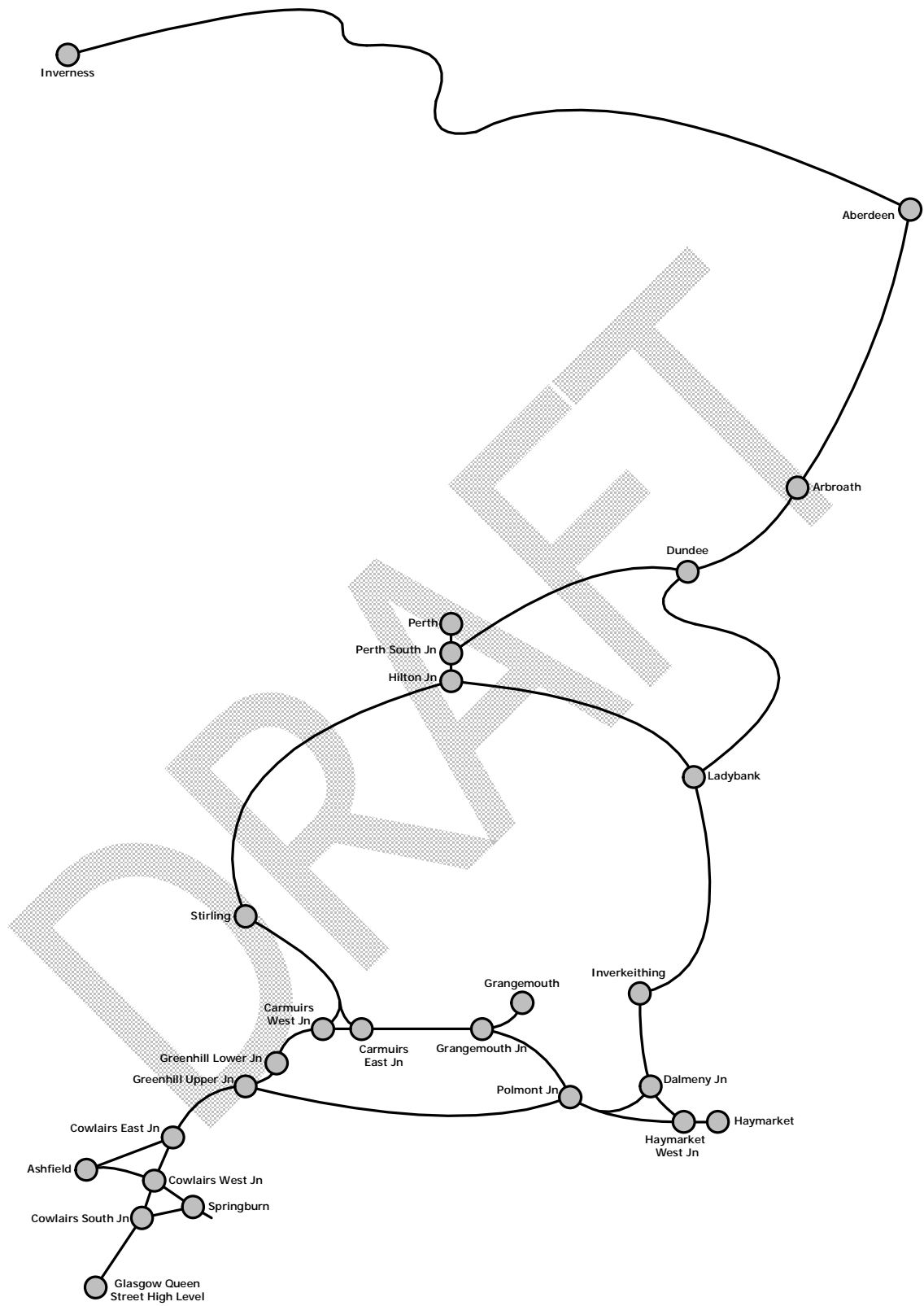
Overall punctuality worsened in all timetable packages when compared with the base timetable. By TT10 punctuality for Packages 0 and 2 are comparable but still 0.2% worse than the base timetable. Package 1 is the worst performing timetable at the TT10 threshold recording a 98.0% punctuality compared to 98.3% for the base.

Average Minute Lateness (AML)

The December 2008 Base timetable leads to the smallest overall lateness in the northbound direction between Glasgow Queen Street and Perth when compared with all three timetable packages.

Appendix A – RailSys Model Area

DRAFT



Appendix B – Calibration Data

				RailSys Recorded Values			TRUST Recorded Values			Difference		
Location	SC	Origin	Trains	T-3	T-5	T-10	T-3	T-5	T-10	T-3	T-5	T-10
CWLRSSJ	13561015	CMBRNLD	18	95.4%	96.7%	98.8%	93.9%	96.5%	99.0%	1.5%	0.3%	-0.2%
GLGOHL	13561015	CMBRNLD	18	94.8%	96.3%	97.5%	92.1%	95.8%	99.0%	2.6%	0.5%	-1.5%
SPRNGBN	13561015	CMBRNLD	19	94.5%	96.1%	98.2%	93.4%	96.4%	99.2%	1.1%	-0.3%	-0.9%
CRMRSWJ	13561015	GLGOHL	17	98.5%	99.1%	99.7%	97.7%	98.8%	99.5%	0.8%	0.4%	0.2%
CWLRSSJ	13561015	GLGOHL	37	99.5%	99.5%	99.8%	96.8%	98.8%	99.6%	2.7%	0.8%	0.2%
FALKRKG	13561015	GLGOHL	17	97.8%	98.7%	99.7%	95.4%	97.5%	98.9%	2.5%	1.1%	0.8%
GLGOHL	13561015	GLGOHL	37	99.5%	99.6%	99.8%	97.7%	99.0%	99.7%	1.9%	0.6%	0.1%
GNHLLJN	13561015	GLGOHL	17	97.4%	98.5%	99.7%	98.6%	99.1%	99.5%	-1.2%	-0.6%	0.2%
SPRNGBN	13561015	GLGOHL	37	93.3%	97.7%	99.3%	95.5%	98.5%	99.6%	-2.1%	-0.8%	-0.3%
CWLRSPJ	13574515	ANSL	36	93.0%	97.2%	99.3%	97.7%	99.0%	99.9%	-4.7%	-1.8%	-0.6%
CWLRSSJ	13574515	ANSL	36	93.0%	97.2%	99.3%	95.4%	97.9%	99.8%	-2.4%	-0.7%	-0.5%
CWLRSWJ	13574515	ANSL	36	93.0%	97.1%	99.3%	97.7%	99.0%	99.9%	-4.7%	-1.9%	-0.6%
GLGOHL	13574515	ANSL	36	92.7%	97.0%	99.1%	93.5%	97.1%	99.6%	-0.8%	-0.1%	-0.4%
CWLRSPJ	13574515	GLGOHL	37	97.1%	98.0%	99.3%	97.3%	99.1%	99.9%	-0.2%	-1.0%	-0.6%
CWLRSSJ	13574515	GLGOHL	37	97.0%	97.9%	99.3%	97.1%	99.0%	99.7%	-0.2%	-1.0%	-0.4%
CWLRSWJ	13574515	GLGOHL	38	97.4%	98.3%	99.3%	97.3%	99.1%	99.9%	0.1%	-0.8%	-0.5%
GLGOHL	13574515	GLGOHL	37	99.3%	99.5%	99.8%	97.0%	99.0%	99.7%	2.3%	0.5%	0.1%
BSHB	13575825	GLGOHL	38	99.2%	99.7%	99.9%	96.4%	98.5%	99.7%	2.9%	1.2%	0.2%
CRMRSWJ	13575825	GLGOHL	37	98.9%	99.8%	99.8%	96.6%	98.2%	99.6%	2.3%	0.7%	0.2%
CROY	13575825	GLGOHL	37	98.6%	98.9%	99.8%	95.7%	98.2%	99.6%	2.9%	0.7%	0.2%
CWLRSSJ	13575825	GLGOHL	40	99.1%	99.3%	99.9%	97.2%	98.8%	99.7%	1.9%	0.5%	0.2%
CWLRSPJ	13575825	GLGOHL	40	99.1%	99.3%	99.9%	97.3%	98.9%	99.8%	1.8%	0.4%	0.1%
CWLRSSJ	13575825	GLGOHL	40	99.1%	99.3%	99.9%	97.2%	98.8%	99.7%	1.9%	0.5%	0.2%
DUNANE	13575825	GLGOHL	17	94.9%	96.9%	99.5%	94.0%	97.1%	99.0%	0.9%	-0.2%	0.5%
GLGOHL	13575825	GLGOHL	40	99.2%	99.6%	99.9%	97.2%	98.8%	99.8%	2.1%	0.8%	0.1%
GNHLLJN	13575825	GLGOHL	37	98.8%	98.9%	99.8%	95.9%	98.1%	99.5%	3.0%	0.8%	0.3%
GNHLUGL	13575825	GLGOHL	37	98.7%	98.9%	99.8%	95.9%	98.4%	99.6%	2.9%	0.5%	0.2%
GNHLUJN	13575825	GLGOHL	37	98.7%	98.9%	99.8%	95.9%	98.4%	99.6%	2.9%	0.5%	0.2%
LARBETH	13575825	GLGOHL	35	98.1%	99.0%	99.8%	100.0%	100.0%	100.0%	-1.9%	-1.0%	-0.2%
LENZIE	13575825	GLGOHL	38	98.7%	99.4%	99.7%	95.8%	98.1%	99.4%	2.9%	1.2%	0.3%
STIRLING	13575825	GLGOHL	35	94.7%	95.9%	98.5%	93.1%	96.0%	98.7%	1.6%	-0.1%	-0.1%
ABRDEEN	23540003	ABRDEEN	16	98.7%	98.9%	99.5%	96.6%	97.4%	98.6%	2.1%	1.6%	0.9%
ARBROTH	23540003	ABRDEEN	15	98.5%	99.0%	99.6%	93.0%	95.4%	98.1%	5.6%	3.5%	1.5%
BHLP	23540003	ABRDEEN	15	98.5%	99.3%	99.6%	99.7%	99.7%	99.8%	-1.2%	-0.4%	-0.2%
BLFD	23540003	ABRDEEN	14	98.0%	99.0%	99.6%	88.9%	92.3%	96.8%	9.1%	6.7%	2.8%
BSHB	23540003	ABRDEEN	14	90.7%	94.3%	97.0%	83.1%	87.6%	93.8%	7.6%	6.7%	3.2%
CAARMNT	23540003	ABRDEEN	16	98.3%	98.8%	99.6%	94.9%	96.6%	98.7%	3.4%	2.2%	0.9%
CNST	23540003	ABRDEEN	15	98.5%	99.0%	99.6%	90.2%	92.6%	97.4%	8.4%	6.3%	2.2%
CRMRSWJ	23540003	ABRDEEN	14	93.2%	96.0%	97.8%	85.7%	90.2%	95.5%	7.5%	5.8%	2.3%
CROY	23540003	ABRDEEN	14	91.3%	95.0%	97.6%	85.7%	88.9%	95.7%	5.6%	6.1%	1.9%
CWLRSPJ	23540003	ABRDEEN	14	92.0%	95.3%	97.8%	87.6%	91.5%	95.7%	4.4%	3.8%	2.1%
CWLRSSJ	23540003	ABRDEEN	14	92.1%	95.3%	97.8%	86.8%	90.2%	95.5%	5.2%	5.1%	2.3%
CWLRSWJ	23540003	ABRDEEN	14	91.8%	95.1%	97.4%	87.6%	91.5%	95.7%	4.2%	3.6%	1.7%
DUNANE	23540003	ABRDEEN	14	96.2%	98.7%	99.6%	88.0%	91.7%	96.2%	8.2%	7.0%	3.3%
DUNDETB	23540003	ABRDEEN	15	98.7%	99.4%	99.6%	93.5%	95.1%	98.3%	5.2%	4.3%	1.4%
ERROLLC	23540003	ABRDEEN	15	98.8%	99.4%	99.6%	99.1%	99.3%	99.8%	-0.3%	0.1%	-0.2%
GLGOHL	23540003	ABRDEEN	14	92.3%	95.3%	97.5%	83.3%	88.2%	94.6%	9.0%	7.1%	2.9%
GNHLDGL	23540003	ABRDEEN	14	91.6%	94.9%	97.7%	85.3%	89.3%	95.5%	6.3%	5.6%	2.2%
GNHLLJN	23540003	ABRDEEN	14	92.0%	94.7%	97.8%	86.3%	90.0%	96.1%	5.7%	4.7%	1.7%
GNHLUJN	23540003	ABRDEEN	14	91.7%	94.4%	97.7%	85.3%	89.3%	95.5%	6.4%	5.1%	2.2%
LENZIE	23540003	ABRDEEN	14	91.1%	95.1%	97.0%	83.5%	87.6%	94.7%	7.6%	7.5%	2.2%
LRNCKRK	23540003	ABRDEEN	16	98.4%	98.8%	99.6%	94.4%	96.4%	98.5%	4.0%	2.5%	1.1%
MONTRSE	23540003	ABRDEEN	17	98.6%	99.2%	99.5%	100.0%	100.0%	100.0%	-1.4%	-0.8%	-0.5%
PERTH	23540003	ABRDEEN	15	98.5%	99.3%	99.6%	92.1%	94.0%	97.7%	6.3%	5.2%	1.9%
SHVN	23540003	ABRDEEN	16	98.3%	98.8%	99.5%	97.2%	98.0%	99.0%	1.1%	0.7%	0.5%
STIRLING	23540003	ABRDEEN	14	95.7%	97.5%	99.3%	86.8%	90.6%	96.4%	8.9%	6.9%	2.9%
USAN	23540003	ABRDEEN	15	98.7%	99.3%	99.6%	92.1%	94.6%	98.1%	6.5%	4.7%	1.5%
ABRDEEN	23540003	GLGOHL	16	93.3%	94.8%	98.8%	81.6%	86.5%	93.4%	11.7%	8.3%	5.4%
ARBROTH	23540003	GLGOHL	16	93.6%	95.5%	98.2%	81.1%	84.9%	93.9%	12.5%	10.6%	4.3%
BLFD	23540003	GLGOHL	16	92.3%	95.3%	97.6%	84.9%	88.7%	94.9%	7.4%	6.7%	2.7%
BSHB	23540003	GLGOHL	16	99.7%	99.7%	99.8%	95.2%	96.7%	97.9%	4.4%	3.0%	2.0%
CAARMNT	23540003	GLGOHL	16	92.5%	95.3%	98.4%	77.5%	81.7%	91.3%	15.0%	13.5%	7.1%
CNST	23540003	GLGOHL	16	94.2%	95.6%	98.3%	81.4%	86.5%	94.4%	12.8%	9.1%	3.8%
CRMRSWJ	23540003	GLGOHL	16	98.4%	98.7%	99.7%	93.9%	96.4%	97.4%	4.5%	2.3%	2.3%
CROY	23540003	GLGOHL	16	99.4%	99.7%	99.8%	95.6%	96.7%	97.9%	3.9%	2.9%	2.0%
CWLRSPJ	23540003	GLGOHL	22	99.3%	99.5%	99.7%	96.8%	97.7%	98.8%	2.4%	1.8%	0.9%
CWLRSSJ	23540003	GLGOHL	22	99.3%	99.5%	99.7%	95.2%	96.2%	98.4%	4.1%	3.3%	1.3%
CWLRSWJ	23540003	GLGOHL	22	95.2%	99.5%	99.7%	96.8%	97.7%	98.8%	-1.7%	-1.9%	-1.0%
DUNANE	23540003	GLGOHL	16	93.2%	95.6%	98.7%	85.4%	89.1%	95.6%	7.9%	6.5%	3.1%
DUNDETB	23540003	GLGOHL	16	94.3%	95.9%	98.1%	85.2%	89.1%	95.2%	9.1%	6.8%	2.9%

Location	SC	Origin	Trains	RailSys Recorded Values			TRUST Recorded Values			Difference		
				T-3	T-5	T-10	T-3	T-5	T-10	T-3	T-5	T-10
ERROLLC	23540003	GLGOHL	16	94.4%	96.1%	98.1%	99.5%	99.7%	99.8%	-5.1%	-3.6%	-1.7%
GLGOHL	23540003	GLGOHL	22	99.3%	99.6%	99.7%	94.8%	96.0%	98.4%	4.5%	3.6%	1.3%
GNHLJN	23540003	GLGOHL	16	98.4%	98.7%	99.8%	95.2%	96.2%	97.7%	3.2%	2.4%	2.1%
GNHLUGL	23540003	GLGOHL	16	98.4%	99.4%	99.8%	95.4%	96.6%	97.9%	3.0%	2.9%	2.0%
GNHLUJN	23540003	GLGOHL	16	98.4%	99.4%	99.8%	95.4%	96.6%	97.9%	3.0%	2.9%	2.0%
LENZIE	23540003	GLGOHL	16	99.7%	99.7%	99.8%	95.7%	96.7%	97.9%	3.9%	3.0%	2.0%
LRNCKRK	23540003	GLGOHL	16	94.1%	95.8%	98.4%	76.8%	81.6%	91.8%	17.3%	14.2%	6.7%
MONTRSE	23540003	GLGOHL	16	94.0%	95.7%	98.4%	99.3%	99.5%	99.8%	-5.3%	-3.8%	-1.4%
PERTH	23540003	GLGOHL	16	93.7%	95.9%	97.9%	87.0%	90.0%	96.2%	6.7%	6.0%	1.7%
SHVN	23540003	GLGOHL	16	92.3%	94.8%	98.4%	86.5%	88.7%	95.6%	5.8%	6.1%	2.8%
STIRLNG	23540003	GLGOHL	16	94.6%	95.6%	98.8%	87.5%	90.6%	95.9%	7.1%	5.0%	2.9%
USAN	23540003	GLGOHL	16	94.0%	95.7%	98.5%	78.5%	83.2%	93.3%	15.6%	12.5%	5.3%
BISLND	23541003	DUNDETB	13	97.5%	97.8%	99.0%	90.4%	93.0%	97.4%	7.1%	4.8%	1.6%
DALGETY	23541003	DUNDETB	13	97.3%	97.8%	99.0%	90.8%	90.8%	96.1%	6.5%	7.0%	3.0%
DLMYJN	23541003	DUNDETB	13	93.9%	95.6%	98.5%	87.7%	90.4%	93.9%	6.2%	5.3%	4.6%
DUNDETB	23541003	DUNDETB	17	97.4%	97.9%	98.9%	97.3%	97.3%	98.6%	0.1%	0.7%	0.2%
HAYMRWJ	23541003	DUNDETB	13	95.4%	96.1%	99.2%	87.7%	89.5%	93.9%	7.7%	6.6%	5.3%
HAYMRWJ	23541003	DUNDETB	13	95.4%	96.1%	99.1%	89.5%	90.4%	93.9%	6.0%	5.8%	5.2%
IVRKTGH	23541003	DUNDETB	13	96.9%	97.4%	98.9%	87.7%	91.2%	93.9%	9.2%	6.2%	5.0%
KCLD	23541003	DUNDETB	13	97.4%	97.9%	99.0%	91.2%	93.9%	97.4%	6.2%	4.0%	1.6%
LADYBNK	23541003	DUNDETB	13	97.6%	97.9%	98.9%	93.0%	95.6%	98.3%	4.6%	2.3%	0.6%
LEUCHRS	23541003	DUNDETB	13	97.3%	97.7%	98.8%	100.0%	100.0%	100.0%	-2.7%	-2.3%	-1.2%
MKIN	23541003	DUNDETB	13	97.6%	97.9%	98.9%	90.4%	94.7%	96.5%	7.3%	3.2%	2.4%
STHGYLE	23541003	DUNDETB	13	94.7%	95.9%	98.1%	90.8%	90.8%	93.4%	3.9%	5.1%	4.7%
THRNTSJ	23541003	DUNDETB	13	97.6%	97.8%	98.9%	91.2%	93.9%	96.5%	6.4%	3.9%	2.4%
ABRDEEN	23541003	EDINBUR	13	93.3%	93.9%	96.5%	82.5%	86.4%	92.5%	10.8%	7.5%	3.9%
ARBROTH	23541003	EDINBUR	13	91.2%	92.5%	95.5%	84.4%	88.6%	93.6%	6.8%	3.9%	1.9%
BISLND	23541003	EDINBUR	30	92.3%	94.3%	97.5%	92.8%	94.6%	98.3%	-0.5%	-0.3%	-0.8%
CAARMNT	23541003	EDINBUR	13	92.1%	93.1%	95.7%	79.0%	81.6%	90.4%	13.1%	11.6%	5.4%
CNST	23541003	EDINBUR	14	91.5%	92.7%	95.8%	85.2%	89.3%	94.9%	6.2%	3.4%	0.9%
DALGETY	23541003	EDINBUR	30	91.7%	94.2%	97.4%	92.1%	93.7%	97.4%	-0.5%	0.5%	0.1%
DLMYJN	23541003	EDINBUR	30	93.6%	95.4%	97.2%	93.7%	95.5%	98.1%	-0.1%	-0.1%	-0.9%
DUNDETB	23541003	EDINBUR	30	92.1%	93.6%	96.8%	86.6%	90.1%	95.9%	5.5%	3.5%	0.9%
DYCE	23541003	EDINBUR	7	93.3%	95.2%	96.7%	86.4%	90.4%	96.9%	6.9%	4.9%	-0.2%
HAYMRKT	23541003	EDINBUR	30	93.6%	95.3%	97.7%	94.3%	96.5%	98.5%	-0.7%	-1.3%	-0.8%
HAYMRWJ	23541003	EDINBUR	30	93.7%	95.3%	97.7%	94.3%	96.1%	98.5%	-0.6%	-0.7%	-0.8%
INVURIE	23541003	EDINBUR	7	95.1%	95.3%	98.8%	79.0%	81.6%	97.4%	16.2%	13.8%	1.4%
IVRKTGH	23541003	EDINBUR	30	91.7%	94.2%	97.4%	93.1%	95.3%	98.3%	-1.5%	-1.1%	-0.9%
KCLD	23541003	EDINBUR	30	91.8%	93.9%	96.8%	91.2%	93.6%	97.7%	0.6%	0.3%	-0.8%
LADYBNK	23541003	EDINBUR	30	91.2%	93.8%	96.8%	90.1%	93.6%	97.5%	1.2%	0.2%	-0.7%
LEUCHRS	23541003	EDINBUR	29	90.4%	92.8%	96.2%	99.1%	99.4%	99.9%	-8.6%	-6.6%	-3.6%
LRNCKRK	23541003	EDINBUR	13	92.0%	93.1%	95.5%	79.6%	83.6%	91.2%	12.4%	9.6%	4.3%
MKIN	23541003	EDINBUR	30	91.9%	94.1%	96.6%	91.6%	94.0%	98.0%	0.3%	0.1%	-1.4%
MONTRSE	23541003	EDINBUR	13	91.6%	92.9%	95.5%	99.1%	99.3%	99.6%	-7.6%	-6.4%	-4.0%
SHVN	23541003	EDINBUR	13	92.3%	93.2%	95.7%	87.7%	89.5%	94.3%	4.5%	3.7%	1.4%
STHGYLE	23541003	EDINBUR	30	93.8%	95.4%	97.5%	94.1%	96.7%	98.0%	-0.3%	-1.4%	-0.5%
THRNTSJ	23541003	EDINBUR	30	91.6%	93.8%	96.5%	91.2%	93.3%	97.5%	0.4%	0.6%	-1.0%
USAN	23541003	EDINBUR	13	91.7%	92.9%	95.8%	80.3%	84.2%	91.9%	11.4%	8.7%	4.0%
ABRDEEN	23547003	ABRDEEN	13	98.8%	99.1%	99.6%	95.8%	98.3%	99.0%	3.0%	0.9%	0.7%
DYCE	23547003	ABRDEEN	13	98.6%	99.1%	99.5%	96.8%	98.3%	99.0%	1.7%	0.8%	0.6%
ELGIN	23547003	ABRDEEN	9	99.1%	99.3%	99.6%	86.1%	90.3%	97.1%	13.0%	9.1%	2.5%
FORRES	23547003	ABRDEEN	9	99.0%	99.3%	99.7%	87.4%	90.3%	97.4%	11.6%	9.1%	2.3%
FORRESL	23547003	ABRDEEN	9	99.1%	99.3%	99.6%	99.5%	99.5%	100.0%	-0.3%	-0.1%	-0.4%
HNTL	23547003	ABRDEEN	9	98.5%	99.0%	99.5%	88.0%	92.1%	97.1%	10.4%	6.9%	2.3%
INNSCH	23547003	ABRDEEN	9	98.3%	99.0%	99.5%	90.2%	93.8%	97.9%	8.1%	5.2%	1.7%
INVURIE	23547003	ABRDEEN	12	98.3%	98.9%	99.4%	94.4%	96.3%	98.4%	3.9%	2.6%	1.0%
IVRNALC	23547003	ABRDEEN	9	99.1%	99.4%	99.8%	93.5%	95.5%	98.3%	5.6%	4.0%	1.4%
IVRNESS	23547003	ABRDEEN	9	99.4%	99.5%	99.8%	93.5%	95.5%	98.3%	5.8%	4.0%	1.4%
KEITH	23547003	ABRDEEN	9	98.7%	99.1%	99.4%	81.6%	87.1%	96.4%	17.1%	12.0%	3.0%
KEITHLP	23547003	ABRDEEN	9	98.8%	99.1%	99.5%	98.6%	99.3%	99.8%	0.2%	-0.1%	-0.3%
KNMTSB	23547003	ABRDEEN	9	98.5%	99.0%	99.5%	86.6%	91.2%	96.2%	11.9%	7.9%	3.3%
NAIRN	23547003	ABRDEEN	9	99.1%	99.4%	99.7%	86.6%	90.0%	97.1%	12.5%	9.4%	2.6%
ABRDEEN	23547003	IVRNESS	11	98.0%	98.7%	99.4%	97.4%	97.4%	98.4%	0.6%	1.3%	1.0%
DYCE	23547003	IVRNESS	11	98.1%	98.6%	99.5%	96.3%	96.8%	99.0%	1.8%	1.7%	0.5%
INVURIE	23547003	IVRNESS	11	98.6%	98.7%	99.5%	97.4%	97.9%	99.0%	1.3%	0.8%	0.5%
ABRDEEN	23547003	IVRNESS	11	98.6%	98.8%	99.5%	87.9%	90.3%	95.5%	10.7%	8.5%	4.0%
DYCE	23547003	IVRNESS	11	98.6%	98.8%	99.5%	84.7%	89.0%	95.0%	13.8%	9.8%	4.5%
ELGIN	23547003	IVRNESS	11	88.6%	99.2%	99.6%	89.5%	92.6%	97.9%	-0.9%	6.6%	1.8%
FORRES	23547003	IVRNESS	11	98.6%	99.0%	99.5%	93.5%	95.5%	98.3%	5.1%	3.5%	1.2%
FORRESL	23547003	IVRNESS	11	98.8%	99.1%	99.5%	99.0%	99.3%	99.8%	-0.2%	-0.2%	-0.2%
HNTL	23547003	IVRNESS	11	98.6%	99.4%	99.7%	83.2%	88.7%	95.0%	15.5%	10.7%	4.7%
INNSCH	23547003	IVRNESS	11	99.2%	99.3%	99.7%	87.4%	91.6%	96.3%	11.8%	7.8%	3.4%
INVURIE	23547003	IVRNESS	11	98.8%	99.1%	99.6%	85.5%	90.0%	95.8%	13.3%	9.1%	3.8%
IVRNALC	23547003	IVRNESS	11	97.9%	98.6%	99.3%	96.8%	97.8%	98.7%	1.1%	0.8%	0.6%
IVRNESS	23547003	IVRNESS	11	97.7%	98.1%	99.0%	96.8%	97.8%	98.7%	0.9%	0.3%	0.3%
KEITH	23547003	IVRNESS	11	98.9%	99.2%	99.6%	90.0%	94.0%	97.1%	8.9%	5.2%	2.5%
KEITHLP	23547003	IVRNESS	11	98.6%	99.3%	99.6%	96.8%	97.9%	99.2%	1.7%	1.4%	0.4%
KNMTSB	23547003	IVRNESS	11	99.0%	99.3%	99.7%	82.6%	90.0%	96.1%	16.3%	9.3%	3.6%
NAIRN	23547003	IVRNESS	11	98.4%	98.7%	99.4%	96.2%	97.6%	98.6%	2.3%	1.1%	0.9%

DUNANE	23575903	DUNANE	48	98.9%	99.1%	99.9%	99.8%	99.9%	100.0%	-0.9%	-0.8%	-0.1%
GLGOHL	23575903	DUNANE	14	97.7%	99.0%	99.8%	89.5%	94.7%	98.6%	8.2%	4.2%	-1.2%
GNHLDLG	23575903	DUNANE	14	98.7%	99.1%	99.8%	97.4%	98.6%	99.3%	1.3%	0.5%	0.5%
GNHLLJN	23575903	DUNANE	14	98.6%	99.1%	99.8%	97.9%	99.1%	99.5%	0.7%	0.0%	0.3%
GNHLUJN	23575903	DUNANE	14	98.4%	99.0%	99.8%	97.4%	98.6%	99.3%	1.1%	0.4%	0.5%
LENZIE	23575903	DUNANE	14	97.6%	98.5%	99.8%	96.1%	97.7%	99.3%	1.5%	0.8%	0.5%
STIRLNG	23575903	DUNANE	17	98.6%	99.0%	100.0%	99.1%	99.7%	99.8%	-0.5%	-0.7%	0.2%
STIRLNG	23575903	STIRLNG	11	94.7%	95.5%	97.1%	92.9%	93.8%	96.9%	1.8%	1.8%	0.2%
DUNANE	23576003	DUNANE	96	95.0%	96.0%	97.7%	98.6%	99.3%	99.8%	-3.6%	-3.3%	-2.1%
FALKRKG	23576003	DUNANE	32	94.8%	95.5%	97.3%	96.5%	97.9%	99.0%	-1.7%	-2.4%	-1.6%
HAYMRKT	23576003	DUNANE	32	91.7%	92.6%	95.5%	93.0%	96.4%	98.4%	-1.3%	-3.9%	-2.9%
HAYMRWJ	23576003	DUNANE	32	91.8%	92.5%	95.4%	95.3%	97.5%	98.5%	-3.6%	-5.0%	-3.0%
LNLTGW	23576003	DUNANE	32	94.1%	94.7%	96.7%	94.7%	97.2%	98.6%	-0.6%	-2.5%	-1.9%
			RailSys Recorded Values				TRUST Recorded Values			Difference		
Location	SC	Origin	Trains	T-3	T-5	T-10	T-3	T-5	T-10	T-3	T-5	T-10
NWBG	23576003	DUNANE	32	93.2%	94.0%	95.5%	95.3%	97.2%	98.5%	-2.0%	-3.2%	-3.0%
POLMNTJ	23576003	DUNANE	32	95.1%	95.7%	97.0%	94.6%	96.9%	98.6%	0.5%	-1.3%	-1.6%
STIRLNG	23576003	DUNANE	38	96.5%	97.3%	98.2%	96.7%	97.9%	98.7%	-0.2%	-0.6%	-0.5%
WNCBROJ	23576003	DUNANE	32	93.5%	94.2%	95.3%	96.1%	97.6%	98.7%	-2.6%	-3.4%	-3.4%
DUNANE	23576003	EDINBUR	34	91.3%	92.3%	96.4%	89.5%	93.2%	97.9%	1.9%	-0.9%	-1.5%
FALKRKG	23576003	EDINBUR	34	89.5%	91.3%	94.4%	91.5%	93.4%	98.0%	-2.0%	-2.1%	-3.6%
GRNGMTJ	23576003	EDINBUR	34	89.5%	91.3%	94.5%	100.0%	100.0%	100.0%	-10.5%	-8.7%	-5.5%
HAYMRKT	23576003	EDINBUR	34	92.0%	93.9%	96.5%	93.0%	95.0%	96.8%	-1.0%	-1.1%	-0.3%
HAYMRWJ	23576003	EDINBUR	34	92.0%	94.0%	96.5%	95.3%	96.8%	98.4%	-3.2%	-2.8%	-1.9%
LNLTGW	23576003	EDINBUR	34	90.4%	92.2%	95.2%	93.2%	95.3%	97.9%	-2.8%	-3.1%	-2.7%
NWBG	23576003	EDINBUR	34	92.0%	93.8%	96.5%	92.6%	95.3%	97.9%	-0.7%	-1.5%	-1.3%
POLMNTJ	23576003	EDINBUR	34	89.6%	91.4%	94.5%	90.5%	93.7%	97.9%	-1.0%	-2.3%	-3.4%
STIRLNG	23576003	EDINBUR	34	90.9%	91.7%	95.0%	89.0%	94.2%	97.9%	1.9%	-2.5%	-2.9%
WNCBROJ	23576003	EDINBUR	34	90.4%	92.2%	95.4%	93.7%	95.3%	97.9%	-3.2%	-3.1%	-2.5%
CWLRSPJ	23578903	EFLDTMD	6	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
CWLRSSJ	23578903	EFLDTMD	6	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
CWLRSWJ	23578903	EFLDTMD	6	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
CRMRSWJ	23578903	FALKRKG	18	98.9%	99.8%	99.9%	95.5%	97.8%	99.3%	3.4%	2.0%	0.6%
CWLRSSJ	23578903	FALKRKG	19	92.7%	95.0%	97.6%	92.0%	95.9%	98.7%	0.7%	-0.9%	-1.1%
FALKRKG	23578903	FALKRKG	49	98.0%	99.2%	99.9%	95.2%	98.6%	99.6%	2.8%	0.6%	0.3%
GLGOHL	23578903	FALKRKG	19	91.0%	93.0%	95.9%	90.4%	95.6%	98.4%	0.6%	-2.6%	-2.4%
GNHLLJN	23578903	FALKRKG	18	99.3%	99.9%	99.9%	95.0%	97.7%	99.1%	4.3%	2.2%	0.8%
SPRNGBN	23578903	FALKRKG	18	90.9%	94.4%	97.7%	90.6%	94.9%	98.7%	0.3%	-0.5%	-1.0%
HAYMTMD	23578903	HAYMTMD	20	95.4%	97.0%	100.0%	94.7%	97.4%	100.0%	0.7%	-0.4%	0.0%
HAYMRKT	23585003	BTHGATE	31	91.9%	95.0%	98.5%	91.4%	94.8%	98.9%	0.5%	0.2%	-0.4%
HAYMRWJ	23585003	BTHGATE	31	91.4%	94.5%	98.5%	92.4%	95.6%	99.0%	-0.9%	-1.0%	-0.5%
NWBG	23585003	BTHGATE	31	93.4%	95.8%	98.4%	93.6%	96.7%	99.2%	-0.2%	-0.9%	-0.7%
HAYMRKT	23585003	EDINBUR	31	96.2%	97.7%	99.3%	96.7%	98.5%	99.4%	-0.5%	-0.8%	-0.2%
HAYMRWJ	23585003	EDINBUR	31	96.3%	97.8%	99.3%	96.1%	97.8%	99.3%	0.2%	-0.1%	-0.1%
NWBG	23585003	EDINBUR	31	96.1%	97.8%	99.3%	94.7%	97.1%	99.2%	1.4%	0.7%	0.1%
HAYMRKT	23586003	NCRAGHA	24	88.5%	90.0%	97.0%	96.4%	98.3%	99.4%	-7.9%	-8.3%	-2.4%
HAYMRWJ	23586003	NCRAGHA	24	87.4%	90.0%	97.4%	95.8%	97.9%	99.3%	-8.4%	-8.0%	-1.8%
HAYMRKT	23587003	EDINBUR	6	93.9%	95.7%	97.7%	93.5%	96.1%	98.4%	0.5%	-0.4%	-0.7%
KCLD	23587003	KCLD	12	93.2%	96.6%	98.4%	87.7%	93.0%	97.4%	5.5%	3.6%	1.0%
DLMYJN	23587103	CWDNBTH	9	91.5%	92.9%	94.9%	96.5%	97.1%	99.1%	-4.9%	-4.2%	-4.2%
HAYMRKT	23587103	CWDNBTH	10	93.2%	94.1%	96.9%	97.7%	98.8%	99.7%	-4.5%	-4.8%	-2.8%
HAYMRWJ	23587103	CWDNBTH	9	92.7%	94.0%	95.2%	98.3%	99.1%	99.7%	-5.6%	-5.2%	-4.6%
IVRKTGH	23587103	CWDNBTH	9	93.0%	93.5%	96.7%	96.2%	97.1%	98.8%	-3.2%	-3.5%	-2.1%
STHGYLE	23587103	CWDNBTH	9	91.4%	92.8%	95.0%	96.2%	96.6%	99.6%	-4.9%	-3.8%	-4.7%
BISLND	23587103	EDINBUR	25	92.8%	96.0%	98.4%	91.6%	95.1%	98.6%	1.3%	0.9%	-0.2%
DALGETY	23587103	EDINBUR	25	92.5%	95.1%	98.3%	92.9%	95.7%	98.7%	-0.5%	-0.5%	-0.5%
DLMYJN	23587103	EDINBUR	40	91.7%	94.4%	97.1%	92.7%	95.6%	98.4%	-1.0%	-1.3%	-1.3%
HAYMRKT	23587103	EDINBUR	40	94.1%	95.5%	97.6%	95.1%	97.1%	98.9%	-1.0%	-1.6%	-1.3%
HAYMRWJ	23587103	EDINBUR	40	94.1%	95.7%	97.5%	94.9%	96.8%	99.1%	-0.8%	-1.1%	-1.6%
IVRKTGH	23587103	EDINBUR	40	89.1%	93.0%	97.2%	91.9%	95.3%	98.3%	-2.8%	-2.3%	-1.2%
KCLD	23587103	EDINBUR	25	93.0%	96.3%	98.5%	91.9%	94.6%	98.4%	1.1%	1.7%	0.1%
STHGYLE	23587103	EDINBUR	40	92.2%	94.5%	97.1%	93.4%	95.9%	98.7%	-1.2%	-1.4%	-1.6%
THRNTSJ	23587103	EDINBUR	22	92.6%	95.3%	98.4%	91.3%	94.0%	98.3%	1.3%	1.3%	0.0%

It is a requirement of the Network Rail Standards 2.0a that punctuality values recorded in RailSys are calibrated against those recorded by TRUST. Values which are not within a +/- 10% tolerance must be investigated and documented.

Appendix C – Average Minutes Lateness (AML)

The following tabulations show the average lateness of services as they progress on route.

Average lateness

The average lateness of all trains at the location specified. The average includes all trains; early trains are counted as on time.

Average delay

Shows the added lateness the arrival at the location compared to the lateness at the previous station.

The average delay does not equate to the difference between stations in average lateness as added delay only accounts for lateness increases.

Base vs Packages 0, 1, and 2

Glasgow Queen Street High Level to Greenhill Lower Junction

	Average Lateness				Average Delay			
	Base	Package 0	Package 1	Package 2	Base	Package 0	Package 1	Package 2
Cowlairs South Jn	0:00:12	0:00:17	0:00:17	0:00:17	+0:00:07	+0:00:09	+0:00:09	+0:00:09
Cowlairs Passenger Loop	0:00:12	0:00:18	0:00:18	0:00:18	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Cowlairs West Jn	0:00:14	0:00:18	0:00:18	0:00:18	+0:00:02	+0:00:01	+0:00:01	+0:00:01
Eastfield Passenger Loop	0:00:12	0:00:18	0:00:18	0:00:18	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Cowlairs East Jn	0:00:12	0:00:18	0:00:18	0:00:18	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Bishopbriggs	0:00:12	0:00:19	0:00:18	0:00:18	+0:00:00	+0:00:01	+0:00:01	+0:00:01
Cadder Up and Down Passenger Loops	0:00:12	0:00:19	0:00:19	0:00:19	+0:00:01	+0:00:02	+0:00:02	+0:00:02
Lenzie	0:00:13	0:00:21	0:00:20	0:00:20	+0:00:01	+0:00:02	+0:00:02	+0:00:02
Gartshore U.P.L.	0:00:13	0:00:22	0:00:21	0:00:21	+0:00:01	+0:00:01	+0:00:02	+0:00:01
Croy	0:00:14	0:00:22	0:00:22	0:00:22	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Greenhill Upper Jn	0:00:14	0:00:22	0:00:22	0:00:22	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Greenhill UGL	0:00:11	0:00:21	0:00:22	0:00:21	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Greenhill Lower Jn	0:00:10	0:00:20	0:00:20	0:00:20	+0:00:01	+0:00:01	+0:00:01	+0:00:01

Greenhill Lower Junction to Glasgow Queen Street High Level

	Average Lateness				Average Delay			
	Base	Package 0	Package 1	Package 2	Base	Package 0	Package 1	Package 2
Greenhill Upper DGL	0:00:43	0:01:15	0:01:16	0:01:15	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Greenhill Upper Jn	0:00:45	0:01:20	0:01:21	0:01:20	+0:00:04	+0:00:05	+0:00:05	+0:00:05
Croy	0:00:39	0:01:01	0:01:02	0:01:01	+0:00:05	+0:00:05	+0:00:05	+0:00:05
Gatshore D.P.L.	0:00:39	0:01:01	0:01:02	0:01:01	+0:00:14	+0:00:20	+0:00:20	+0:00:20
Lenzie	0:00:42	0:01:04	0:01:05	0:01:04	+0:00:01	+0:00:00	+0:00:00	+0:00:00
Cadder Up and Down Passenger Loops	0:00:43	0:01:06	0:01:06	0:01:06	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Bishopbriggs	0:00:46	0:01:11	0:01:12	0:01:11	+0:00:01	+0:00:02	+0:00:02	+0:00:02
Cowlairs East Jn	0:00:44	0:01:08	0:01:08	0:01:08	+0:00:04	+0:00:08	+0:00:08	+0:00:08
Eastfield Passenger Loop	0:00:43	0:01:07	0:01:08	0:01:07	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Cowlairs West Jn	0:00:44	0:01:09	0:01:09	0:01:09	+0:00:03	+0:00:08	+0:00:08	+0:00:08
Cowlairs Passenger Loop	0:00:37	0:00:59	0:01:02	0:00:59	+0:00:11	+0:00:12	+0:00:13	+0:00:13
Cowlairs South Jn	0:00:38	0:00:59	0:01:02	0:00:59	+0:00:03	+0:00:08	+0:00:08	+0:00:08
Glasgow Queen Street High Level	0:00:39	0:00:57	0:01:00	0:00:57	+0:00:00	+0:00:01	+0:00:01	+0:00:01

Green Hill Lower Junction to Perth

	Average Lateness				Average Delay			
	Base	Package 0	Package 1	Package 2	Base	Package 0	Package 1	Package 2
Carmuir West Jn	0:00:21	0:00:28	0:00:28	0:00:28	+0:00:07	+0:00:07	+0:00:07	+0:00:07
Larbert Jn	0:00:09	0:00:13	0:00:14	0:00:13	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Larbert	0:00:37	0:00:39	0:00:40	0:00:39	+0:00:04	+0:00:05	+0:00:05	+0:00:05
Larbert North D.G.L.	0:00:39	0:00:41	0:00:43	0:00:41	+0:00:05	+0:00:05	+0:00:05	+0:00:05
Plean Jn	0:00:53	0:01:00	0:01:00	0:01:00	+0:00:14	+0:00:20	+0:00:20	+0:00:20
Stirling Middle	0:00:53	0:00:59	0:00:59	0:00:59	+0:00:01	+0:00:00	+0:00:00	+0:00:00
Stirling	0:00:53	0:00:59	0:00:59	0:00:59	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Stirling North	0:00:49	0:00:57	0:00:56	0:00:56	+0:00:01	+0:00:02	+0:00:02	+0:00:02
Cornton Level Crossing	0:00:53	0:01:05	0:01:05	0:01:05	+0:00:04	+0:00:08	+0:00:08	+0:00:08
Bridge Of Allan	0:00:52	0:01:04	0:01:03	0:01:04	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Dunblane	0:00:49	0:01:05	0:01:04	0:01:05	+0:00:03	+0:00:08	+0:00:08	+0:00:08
Dunblane Signalbox	0:00:46	0:01:04	0:01:04	0:01:04	+0:00:11	+0:00:12	+0:00:13	+0:00:13
Greenloaning	0:01:01	0:01:36	0:01:35	0:01:35	+0:00:03	+0:00:08	+0:00:08	+0:00:08
Blackford	0:00:59	0:01:35	0:01:34	0:01:34	+0:00:00	+0:00:01	+0:00:01	+0:00:01
Geneagles	0:00:59	0:01:35	0:01:34	0:01:34	+0:00:00	+0:00:00	+0:00:01	+0:00:01
Auchterarder	0:00:58	0:01:34	0:01:33	0:01:33	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Hilton Jn	0:00:53	0:01:26	0:01:26	0:01:25	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Perth South Jn	0:00:51	0:01:14	0:01:14	0:01:14	+0:00:01	+0:00:01	+0:00:01	+0:00:02
Perth	0:00:50	0:01:13	0:01:14	0:01:06	+0:00:01	+0:00:00	+0:00:00	+0:00:00

Perth to Green Hill Lower Junction

	Average Lateness				Average Delay			
	Base	Package 0	Package 1	Package 2	Base	Package 0	Package 1	Package 2
Perth South Jn	0:00:33	0:00:32	0:00:36	0:00:30	+0:00:02	+0:00:02	+0:00:01	+0:00:02
Hilton Jn	0:00:33	0:00:32	0:00:35	0:00:32	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Auchterarder	0:00:44	0:00:41	0:00:42	0:00:42	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Geneagles	0:00:44	0:00:41	0:00:43	0:00:42	+0:00:01	+0:00:00	+0:00:00	+0:00:00
Blackford	0:00:43	0:00:35	0:00:37	0:00:35	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Greenloaning	0:00:43	0:00:34	0:00:36	0:00:34	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Dunblane	0:00:48	0:00:39	0:00:42	0:00:39	+0:00:05	+0:00:06	+0:00:06	+0:00:06
Bridge Of Allan	0:00:35	0:00:35	0:00:37	0:00:35	+0:00:01	+0:00:02	+0:00:02	+0:00:02
Cornton Level Crossing	0:00:35	0:00:36	0:00:37	0:00:36	+0:00:00	+0:00:01	+0:00:01	+0:00:01
Stirling North	0:00:37	0:00:37	0:00:38	0:00:37	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Stirling	0:00:37	0:00:37	0:00:38	0:00:37	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Stirling Middle	0:00:49	0:00:48	0:00:49	0:00:48	+0:00:02	+0:00:01	+0:00:01	+0:00:01
Plean Jn	0:00:56	0:00:54	0:00:55	0:00:54	+0:00:06	+0:00:05	+0:00:05	+0:00:05
Larbert North U.G.L.	0:01:01	0:01:00	0:01:00	0:01:00	+0:00:07	+0:00:06	+0:00:06	+0:00:06
Larbert	0:01:09	0:01:09	0:01:10	0:01:09	+0:00:08	+0:00:10	+0:00:09	+0:00:09
Larbert Jn	0:01:06	0:01:05	0:01:06	0:01:05	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Carmuir West Jn	0:01:19	0:01:13	0:01:14	0:01:13	+0:00:01	+0:00:02	+0:00:02	+0:00:02
Greenhill Lower Jn	0:01:01	0:01:15	0:01:18	0:01:15	+0:00:03	+0:00:15	+0:00:15	+0:00:15

Perth to Arbroath

	Average Lateness				Average Delay			
	Base	Package 0	Package 1	Package 2	Base	Package 0	Package 1	Package 2
Barnhill (Perth)	0:00:30	0:01:35	0:01:27	0:01:02	+0:00:00	+0:00:00	+0:00:01	+0:00:02
Errol	0:00:30	0:01:32	0:01:37	0:01:05	+0:00:01	+0:00:00	+0:00:12	+0:00:06
Grange	0:00:30	0:01:31	0:01:36	0:01:04	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Longforgan L.C.	0:00:28	0:01:28	0:01:34	0:01:02	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Invergowrie	0:00:28	0:01:27	0:01:33	0:01:01	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Dundee Central Jn	0:00:27	0:01:26	0:01:29	0:01:02	+0:00:00	+0:00:00	+0:00:00	+0:00:02
Dundee	0:01:07	0:01:19	0:01:22	0:01:11	+0:00:02	+0:00:02	+0:00:02	+0:00:03
Camperdown Jn	0:01:13	0:01:24	0:01:27	0:01:13	+0:00:05	+0:00:04	+0:00:05	+0:00:05
Broughty Ferry	0:01:15	0:01:24	0:01:31	0:01:19	+0:00:01	+0:00:01	+0:00:05	+0:00:07
REPmossie	0:01:15	0:01:25	0:01:32	0:01:20	+0:00:00	+0:00:00	+0:00:01	+0:00:01
Monifieth	0:01:15	0:01:25	0:01:32	0:01:21	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Barry Links	0:01:15	0:01:24	0:01:31	0:01:20	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Golf Street	0:01:15	0:01:24	0:01:31	0:01:20	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Carnoustie	0:01:15	0:01:24	0:01:31	0:01:20	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Arbroath	0:01:20	0:01:26	0:01:35	0:01:27	+0:00:03	+0:00:02	+0:00:05	+0:00:08

Arbroath to Perth

	Average Lateness				Average Delay			
	Base	Package 0	Package 1	Package 2	Base	Package 0	Package 1	Package 2
Carnoustie	0:00:15	0:00:14	0:00:15	0:00:20	+0:00:00	+0:00:00	+0:00:00	+0:00:01
Carnoustie Turnback	0:00:16	0:00:16	0:00:16	0:00:21	+0:00:01	+0:00:01	+0:00:01	+0:00:01
Golf Street	0:00:16	0:00:16	0:00:16	0:00:21	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Barry Links	0:00:16	0:00:16	0:00:16	0:00:22	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Monifieth	0:00:15	0:00:15	0:00:15	0:00:21	+0:00:00	+0:00:00	+0:00:00	+0:00:00
REPmossie	0:00:14	0:00:14	0:00:15	0:00:20	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Broughty Ferry	0:00:14	0:00:14	0:00:15	0:00:20	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Camperdown Jn	0:00:13	0:00:13	0:00:14	0:00:19	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Dundee	0:00:13	0:00:13	0:00:14	0:00:20	+0:00:00	+0:00:00	+0:00:00	+0:00:01
Dundee Central Jn	0:00:18	0:00:15	0:00:15	0:00:17	+0:00:03	+0:00:03	+0:00:03	+0:00:03
Invergowrie	0:00:23	0:00:16	0:00:15	0:00:14	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Longforgan L.C.	0:00:23	0:00:16	0:00:15	0:00:14	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Grange	0:00:23	0:00:16	0:00:14	0:00:13	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Errol	0:00:23	0:00:16	0:00:14	0:00:13	+0:00:00	+0:00:00	+0:00:00	+0:00:00
Barnhill (Perth)	0:00:24	0:00:17	0:00:18	0:00:23	+0:00:01	+0:00:01	+0:00:04	+0:00:10
Perth	0:00:24	0:00:17	0:00:18	0:00:21	+0:00:00	+0:00:00	+0:00:00	+0:00:00

Appendix D – Timetable

Legend:

Black = FSR (First Scotrail)

Green = NXC/XC (National Express East Coast/Arriva Cross Country)

Red = Freight

Blue = Proposed extra services

December 2008 (Base): Glasgow Queen St – Aberdeen

Glasgow Queen St				05:55		07:06		06:48	07:41			07:48				08:41				08:48			09:41	
Stirling				06:24		07:32		07:38	08:07			08:15		08:30	08:36	08:43	09:07				09:19	09:30	09:41	10:07
Bridge of Allan								07:43					08:35											
Dunblane				06:31		07:39		07:51	08:14			08:28		08:43		08:51					09:26	09:43	09:50	
Blackford									08:21			08:39				09:10	09:21				09:38			10:21
Gleneagles				06:43												0								
Edinburgh Waverley			05:30		06:29		07:30		07:35			08:29					08:33	09:30						
Perth				06:59	07:47	08:03			08:40	08:52	08:56					09:47	09:37	09:50			10:00		10:17	10:37
Inverness						10:29												11:54						
Perth	06:00			07:00					08:41							09:49	09:38						10:17	10:38
Barnhill	06:03			07:03					08:44		08:59					09:53	09:41				10:07		10:21	10:41
Dundee West																								
Dundee	06:24		06:45	07:21	08:13		08:44		09:03		09:24	09:36				10:23	09:59		10:32	10:37		10:48	10:57	
Dundee		06:40	06:52	07:23		08:45		09:04		09:37						10:38	10:00		10:33	10:38		11:27	11:00	
Broughty Ferry																								
Monifieth																								
Carnoustie	06:41	06:56	07:04						09:16		09:37					10:55					10:55			11:11
Arbroath	06:57	07:11	07:11	07:39		09:02		09:23		09:43	09:53					11:03	10:17		10:50	11:03		11:48	11:18	
Aberdeen	07:44	07:53	08:14	08:39		09:57		10:16		10:xx	10:53					12:xx	11:17		11:xx	12:xx		12:xx	12:14	

Glasgow Queen St				09:48	10:11		10:41			10:48	11:41			11:48		12:41				12:48	13:41	
Stirling		10:15		10:30	10:42	10:49	11:07			11:30	12:07		12:19	12:30	12:49	13:07				13:18	13:30	14:07
Bridge of Allan				10:35						11:35				12:35							13:35	
Dunblane		10:28		10:43	10:51					11:43			12:26	12:43						13:27	13:43	
Blackford		10:39			11:00		11:21				12:21		12:38			13:21				13:38		14:21
Gleneagles					11:03																	
Edinburgh Waverley	09:35		10:27				10:34	11:30			11:35		12:30			12:35	13:30					
Perth	10:52	10:56			11:19		11:37	11:53			12:37	12:53	13:00			13:37	13:53			13:57		14:37
Inverness											15:06											
Perth							11:38				12:38					13:38				13:57		14:38
Barnhill		10:59					11:41				12:41		13:07			13:41				14:00		14:41
Dundee West																				0		
Dundee		11:24	11:43				11:59		12:36		12:59		13:31	13:36		13:59		14:36		14:42		14:59
Dundee		11:27	11:45				12:01		12:37		13:00			13:37		14:01		14:37				15:00
Broughty Ferry																						
Monifieth																						
Carnoustie											13:12		13:49							14:55		15:12
Arbroath		11:48	12:01				12:17		12:53		13:19		13:56	13:53		14:17		14:53		15:01		15:19
Aberdeen			13:05				13:14		13:46		14:14			14:46		15:14		15:46		16:xx		16:19

Glasgow Queen St			13:48			14:41				14:48		15:41				15:48	16:11	16:41					
Stirling			14:30		14:49	15:07				15:30	15:43	16:07				16:19	16:30	16:42		16:49			17:19
Bridge of Allan			14:35							15:35							16:35						
Dunblane			14:43							15:43	15:50					16:26	16:43	16:51					
Blackford						15:27					16:03	16:27				16:38		17:00	17:27				
Gleneagles																	17:03						17:40
Edinburgh Waverley	13:35	14:30				14:35	15:00	15:30					15:35	16:29								16:32	16:33
Perth	14:53					15:37	15:53					16:37	16:53		17:00		17:19	17:37				17:52	18:00
Inverness	17:05																						
Perth						15:38				17:44	16:38											17:38	
Barnhill						15:47				17:52	16:47				17:07							17:47	
Dundee West																							
Dundee		15:36				15:59	16:18	16:36		18:18	16:59		17:38	17:31								17:59	
Dundee		15:37				16:01	16:18	16:37			17:01		17:39									18:01	18:18
Broughty Ferry													17:47										
Monifieth																							
Carnoustie										18:33	17:13		17:55									18:13	18:36
Arbroath		15:53				16:17	16:36	16:53		18:40	17:20		18:02									18:20	18:43
Aberdeen		16:46				17:14	17:37	17:46		20:xx	18:15		19:00									19:13	20:xx

Glasgow Queen St			16:48	17:12	17:40		17:48	18:11			18:41				18:48	19:41			19:48	20:41		20:48
Stirling			17:30	17:45	18:15		18:30	18:41			19:07			19:20	19:30	20:07			20:30	21:07		21:30
Bridge of Allan			17:35				18:35								19:35				20:35			21:35
Dunblane			17:43	17:54	18:22		18:43	18:50			19:14				19:43				20:43	21:14		21:43
<i>Blackford</i>																						
Gleneagles				18:06	18:35			19:02			19:26										21:26	
Edinburgh Waverley	17:03	17:35				17:41			18:16	18:30		18:40	19:30			19:35	20:31				20:36	
Perth				18:23	18:52	18:58		19:19			19:42	20:02				20:36	20:53				21:42	22:00
Inverness						21:03											23:13					
Perth				18:25	18:53						19:43					20:36					21:43	
Barnhill				18:28																		
Dundee West				18:42							20:00										22:00	
Dundee	18:34	18:47		18:49	19:15				19:44	19:52	20:07		20:40			20:59	21:47				22:07	
Dundee	18:54	18:48		18:54	19:16				19:46	19:53	20:09		20:41			21:00	21:48				22:08	
Broughty Ferry				19:00																		
Monifieth	19:06			19:06																		
Carnoustie	19:17			19:17	19:28																	
Arbroath		19:04		19:24	19:35				20:02	20:10	20:25		20:58			21:17	22:05				22:25	
Aberdeen		20:06			20:32				20:46	21:12	21:18		21:53			22:13	23:07				23:20	

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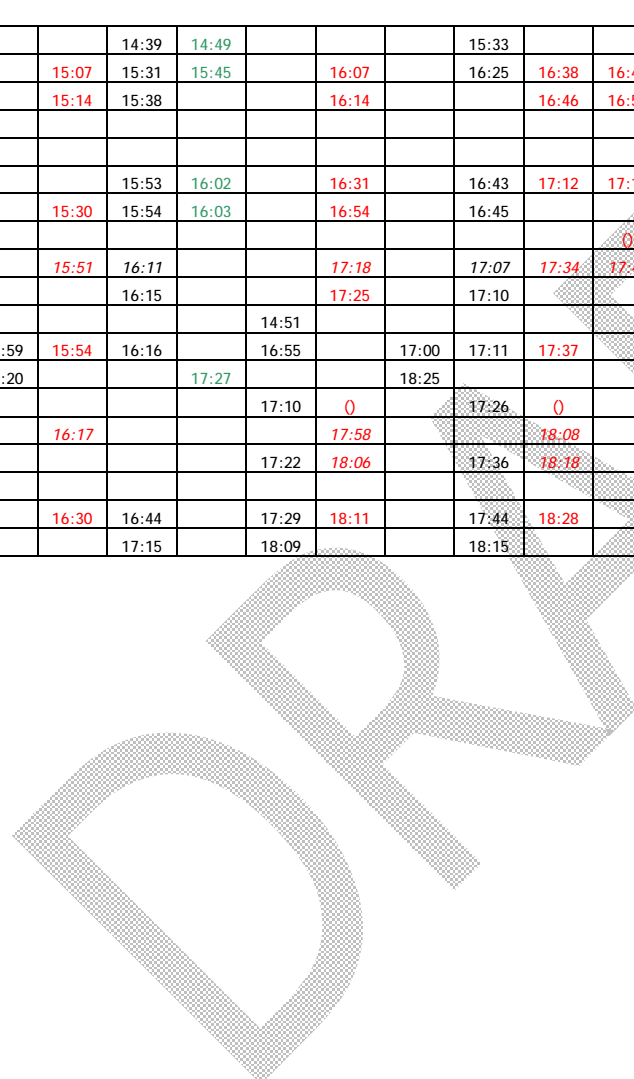
December 2008 (Base): Aberdeen – Glasgow Queen St

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Arbroath				06:31	06:50			07:28				08:08		08:32		08:48	09:15			09:32		10:00
Carnoustie		06:14			06:57			07:35				08:15		08:39						09:39		
Monifieth		06:23																				
Broughty Ferry		06:29																				
Dundee		06:36		06:51	07:08			07:50				08:26		08:53		09:05	09:31			09:52		10:15
Dundee				06:52	07:09			07:51				08:27		08:53		09:06	09:33			09:52		10:17
Dundee West										08:22												
<i>Barnhill</i>																						
Perth				07:14				08:12		08:40				09:15						10:14		
Inverness																			07:55			
Perth	06:09		07:03	07:15		07:59		08:12		08:41			08:47	09:15					09:55	09:51	10:14	
Edinburgh Waverley					08:26	09:25						09:40	10:01			10:27	11:01	11:14	11:26			11:29
Gleneagles	06:26		07:18	07:31				08:26		08:56								10:12				
<i>Blackford</i>																						
Dunblane	06:40		07:29	07:44			08:12		08:28	09:06	09:13				10:13							11:13
Bridge of Allan	06:43		07:32	07:48			08:16		08:31		09:16				10:16							11:16
Stirling	06:52		07:36	07:53			08:21	08:43	08:36	09:13	09:21				10:21			10:30		10:43		11:21
Glasgow Queen St	07:34		08:20	08:34			09:03	09:16	09:32	09:45	10:02			10:15	11:02					11:15		12:02

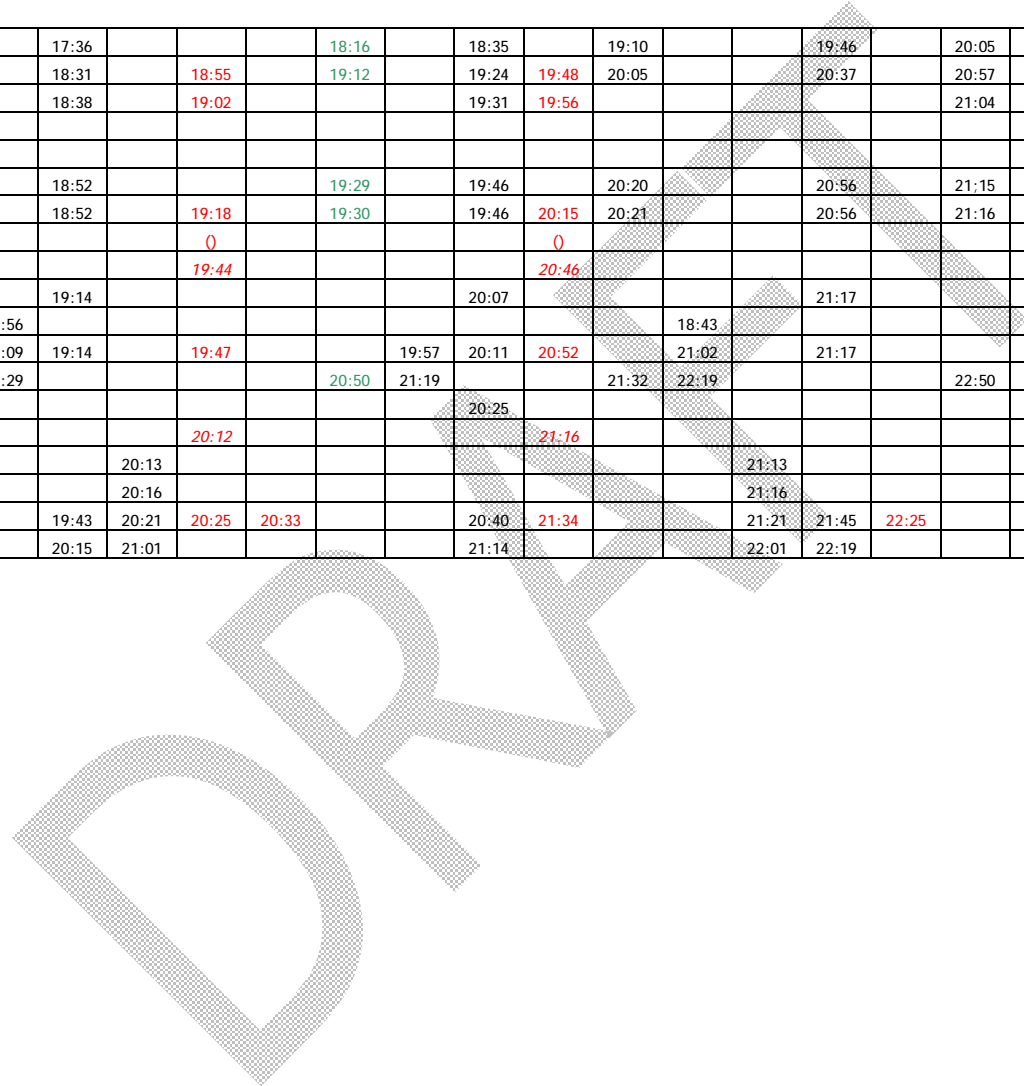
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Arbroath		10:29			10:49		11:28		12:00		12:31			13:00		13:35		14:00		14:31		14:49
Carnoustie		10:36									12:38									14:38		14:56
Monifieth																						
Broughty Ferry																						
Dundee		10:52			11:06		11:52		12:15		12:53			13:15		13:53		14:15		14:53		
Dundee		10:52			11:06		11:52		12:17		12:54			13:17		13:54		14:17		14:54		15:10
Dundee West																						0
Barnhill											13:11					14:11				15:11		15:42
Perth		11:14					12:14				13:15					14:15				16:15		15:45
Inverness									10:47										12:54			
Perth	10:57	11:14	11:37			11:59	12:14		13:01	13:16				13:58	14:16			15:01	15:16			
Edinburgh Waverley	12:17				12:25	13:19			13:27	14:20				14:27	15:20			15:27	16:22			
Gleneagles			11:52																			0
Blackford			11:57																			16:10
Dunblane			12:06	12:13				13:13					14:13			15:13						16:21
Bridge of Allan				12:16				13:16					14:16			15:16						
Stirling		11:43	12:14	12:21			12:43	13:21			13:44	14:14	14:21		14:44	15:21				15:44	15:55	16:30
Glasgow Queen St		12:15	12:45	13:02			13:15	14:02			14:15		15:02		15:15	16:02				16:15		

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Aberdeen		14:07			14:39	14:49				15:33			16:01				16:37				17:10
Arbroath		15:00		15:07	15:31	15:45		16:07		16:25	16:38	16:44	16:55				17:29		17:09	17:53	18:03
Carnoustie				15:14	15:38			16:14			16:46	16:52	17:02						17:16	18:00	
Monifieth																					
Broughty Ferry																					
Dundee		15:16			15:53	16:02		16:31		16:43	17:12	17:12	17:17				17:49		17:34	18:15	18:18
Dundee		15:17		15:30	15:54	16:03		16:54		16:45			17:17				17:51		18:03		18:19
Dundee West												0									
Barnhill				15:51	16:11			17:18		17:07	17:34	17:44							18:25		
Perth					16:15			17:25		17:10							18:11				
Inverness							14:51														
Perth			15:59	15:54	16:16		16:55		17:00	17:11	17:37				17:48	18:00	18:12	18:24	18:28		
Edinburgh Waverley		16:27	17:20			17:27			18:25				18:32			19:21					19:34
Gleneagles							17:10	0		17:26	0								0		
Blackford				16:17				17:58			18:08				18:08			18:46	19:01		
Dunblane	16:13						17:22	18:06		17:36	18:18		18:11		18:18		18:35				
Bridge of Allan	16:16												18:14								
Stirling	16:21			16:30	16:44		17:29	18:11		17:44	18:28		18:19	18:24	18:28		18:42	19:01	19:15		
Glasgow Queen St	17:02				17:15		18:09			18:15			19:01				19:14				



Aberdeen				17:36				18:16		18:35		19:10			19:46		20:05			20:42		21:05
Arbroath		18:10		18:31		18:55		19:12		19:24	19:48	20:05			20:37		20:57		21:10	21:34		21:57
Carnoustie		18:17		18:38		19:02				19:31	19:56						21:04		21:17			
Monifieth																						
Broughty Ferry																						
Dundee				18:52				19:29		19:46		20:20			20:56		21:15			21:52		22:14
Dundee		18:33		18:52		19:18		19:30		19:46	20:15	20:21			20:56		21:16		21:33	21:52		22:15
Dundee West						0					0											
Barnhill		18:54				19:44					20:46								21:54			
Perth				19:14						20:07					21:17					22:14		
Inverness			16:56										18:43									20:15
Perth		18:57	19:09	19:14		19:47		19:57	20:11	20:52			21:02		21:17				21:57	22:14	22:30	
Edinburgh Waverley			20:29					20:50	21:19			21:32	22:19				22:50				00:19	23:52
Gleneagles									20:25													22:47
Blackford		19:20				20:12					21:16								22:20			
Dunblane	19:13			20:13									21:13				22:13				22:58	
Bridge of Allan	19:16			20:16									21:16				22:16					
Stirling	19:21	19:33		19:43	20:21	20:25	20:33			20:40	21:34			21:21	21:45	22:25		22:21	22:33	22:43	23:03	
Glasgow Queen St	20:01			20:15	21:01					21:14				22:01	22:19			23:01		23:15	23:38	



Package 0: Glasgow Queen St – Aberdeen

Glasgow Queen St				05:55		07:06		06:48	07:41				07:48			08:11	08:41				08:48	09:11	
Stirling				06:24		07:32		07:38	08:07		08:15		08:30	08:36	08:43	08:42	09:07				09:19	09:30	09:42
Bridge of Allan								07:43					08:35										09:35
Dunblane				06:31		07:39		07:51	08:14		08:28		08:43		08:51	08:51					09:26	09:43	09:51
Blackford									08:21		08:39				09:10	09:00	09:21				09:38		10:00
Gleneagles				06:43											09:03	09:03							10:03
Edinburgh Waverley			05:30	06:29		07:30			07:35			08:29						08:33	09:30				
Perth				06:59	07:47	08:03			08:40	08:52	08:56				09:47	09:19	09:37	09:50			10:00		10:19
Inverness				10:xx	10:29													11:54					
Perth	06:00			07:00					08:41						09:49		09:38						
Barnhill	06:03			07:03					08:44	08:59					09:53		09:41					10:07	
Dundee West	06:17																						
Dundee	06:24		06:45	07:21	08:13		08:44		09:03	09:24		09:36			10:23		09:59			10:32	10:37		
Dundee		06:40	06:52	07:23			08:45		09:04			09:37			10:38		10:00			10:33	10:38		
Broughty Ferry																							
Monifieth																							
Carnoustie	06:41	06:56	07:04						09:16	09:37					10:55							10:55	
Arbroath	06:57	07:11	07:11	07:39			09:02		09:23	09:43		09:53			11:03		10:17			10:50	11:03		
Aberdeen	07:44	07:53	08:14	08:39			09:57		10:16	10:xx		10:53			12:xx		11:17			11:xx	12:xx		

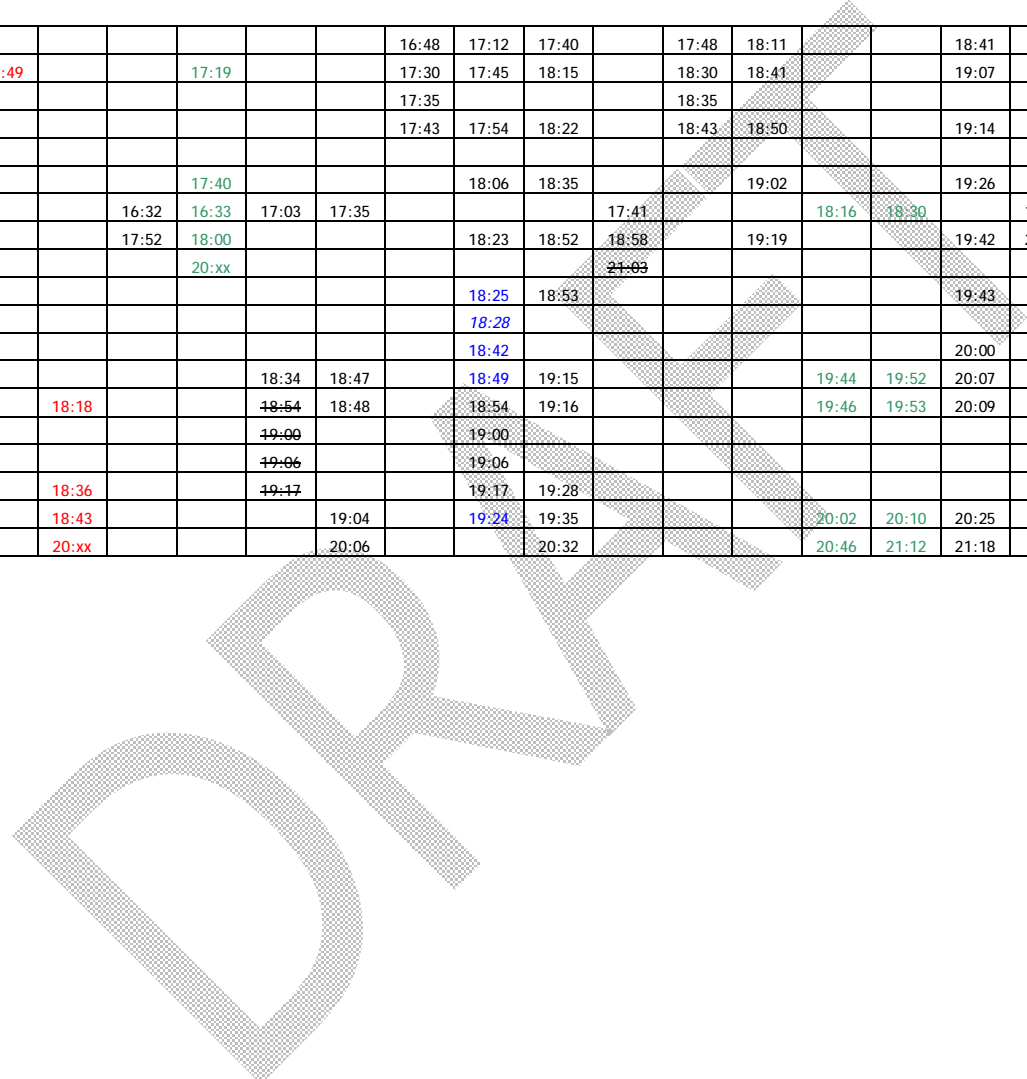
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Stirling	09:41	10:07		10:15		10:30	10:42	10:49	11:07			11:30	11:42	12:07		12:19		12:30	12:42	12:49	13:07	
Bridge of Allan						10:35						11:35						12:35				
Dunblane	09:50			10:28		10:43	10:51					11:43	11:51			12:26		12:43	12:51			
Blackford		10:21		10:39			11:00		11:21				12:00	12:21		12:38			13:00		13:21	
Gleneagles							11:03						12:03						13:03			
Edinburgh Waverley			09:35		10:27					10:34	11:30				11:35		12:30					12:35
Perth	10:17	10:37	10:52	10:56			11:19		11:37	11:53			12:19	12:37	12:53	13:00			13:19		13:37	13:53
Inverness															15:06							
Perth	10:17	10:38							11:38					12:38								13:38
Barnhill	10:21	10:41		10:59					11:41					12:41		13:07						13:41
Dundee West																						
Dundee	10:48	10:57		11:24	11:43				11:59		12:36			12:59		13:31	13:36					13:59
Dundee	11:27	11:00		11:27	11:45				12:01		12:37			13:00			13:37					14:01
Broughty Ferry																						
Monifieth																						
Carnoustie		11:11												13:12		13:49						
Arbroath	11:48	11:18		11:48	12:01				12:17		12:53			13:19		13:56	13:53					14:17
Aberdeen	12:xx	12:14		12:xx	13:05				13:14		13:46			14:14			14:46					15:14

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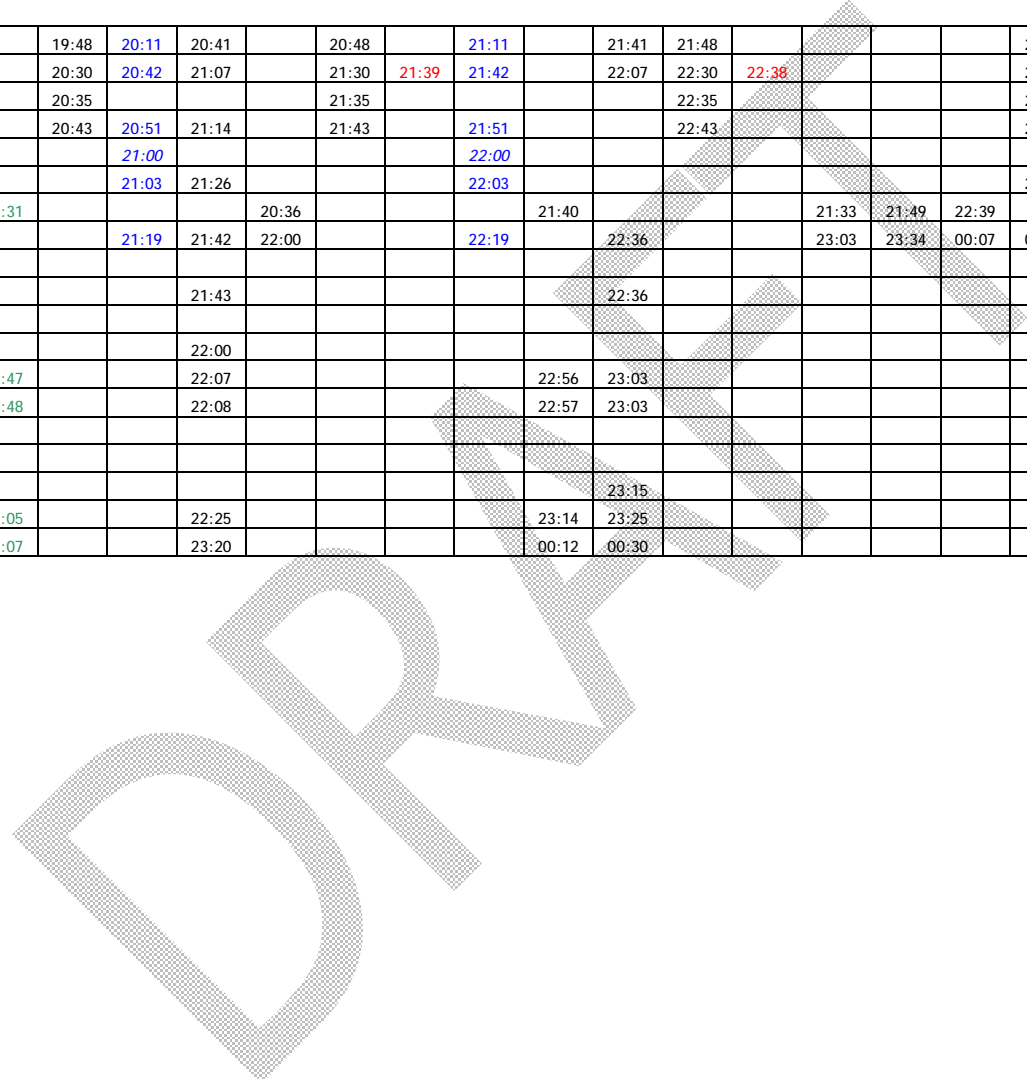
Glasgow Queen St			12:48	13:11	13:41			13:48	14:11		14:41				14:48	15:11		15:41				15:48
Stirling		13:18	13:30	13:42	14:07			14:30	14:42	14:49	15:07				15:30	15:42	15:43	16:07			16:19	16:30
Bridge of Allan			13:35					14:35							15:35							16:35
Dunblane		13:27	13:43	13:51				14:43	14:51						15:43	15:51	15:50				16:26	16:43
Blackford		13:38		14:00	14:21				15:00		15:21					16:00	16:03	16:21			16:38	
Gleneagles				14:03					15:03							16:03						
Edinburgh Waverley	13:30					13:35	14:30					14:35	15:00	15:30				15:35	16:29			
Perth		13:57		14:19	14:37	14:53			15:19		15:37	15:53				16:19		16:37	16:53		17:00	
Inverness						17:05																
Perth		13:57			14:38						15:38						17:44	16:38				
Barnhill		14:00			14:41						15:41						17:52	16:41			17:07	
Dundee West		()																				
Dundee	14:36	14:42			14:59	15:36				15:59		16:18	16:36			18:18	16:59		17:38	17:31		
Dundee	14:37				15:00	15:37				16:01		16:18	16:37				17:01		17:39			
Broughty Ferry																			17:47			
Monifieth																						
Carnoustie		14:55			15:12												18:33	17:13		17:55		
Arbroath	14:53	15:01			15:19	15:53				16:17		16:36	16:53			18:40	17:20		18:02			
Aberdeen	15:46	16:xx			16:19	16:46				17:14		17:37	17:46			20:xx	18:15		19:00			

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Glasgow Queen St	16:11	16:41							16:48	17:12	17:40		17:48	18:11					18:41				18:48	19:11
Stirling	16:42		16:49			17:19			17:30	17:45	18:15		18:30	18:41					19:07			19:20	19:30	19:42
Bridge of Allan									17:35				18:35										19:35	
Dunblane	16:51								17:43	17:54	18:22		18:43	18:50					19:14				19:43	19:51
Blackford	17:00	17:21																						20:00
Gleneagles	17:03					17:40				18:06	18:35			19:02					19:26					20:03
Edinburgh Waverley					16:32	16:33	17:03	17:35				17:41			18:16	18:30			18:40	19:30				
Perth	17:19	17:37			17:52	18:00				18:23	18:52	18:58		19:19					19:42	20:02				20:19
Inverness	19:xx					20:xx						21:03												
Perth		17:38								18:25	18:53								19:43					
Barnhill		17:41								18:28														
Dundee West										18:42									20:00					
Dundee		17:59					18:34	18:47		18:49	19:15			19:44	19:52			20:07				20:40		
Dundee		18:01		18:18			18:54	18:48		18:54	19:16			19:46	19:53			20:09				20:41		
Broughty Ferry							19:00			19:00														
Monifieth							19:06			19:06														
Carnoustie		18:13		18:36			19:17			19:17	19:28													
Arbroath		18:20		18:43			19:04			19:24	19:35				20:02	20:10		20:25				20:58		
Aberdeen		19:13		20:xx			20:06				20:32				20:46	21:12		21:18				21:53		



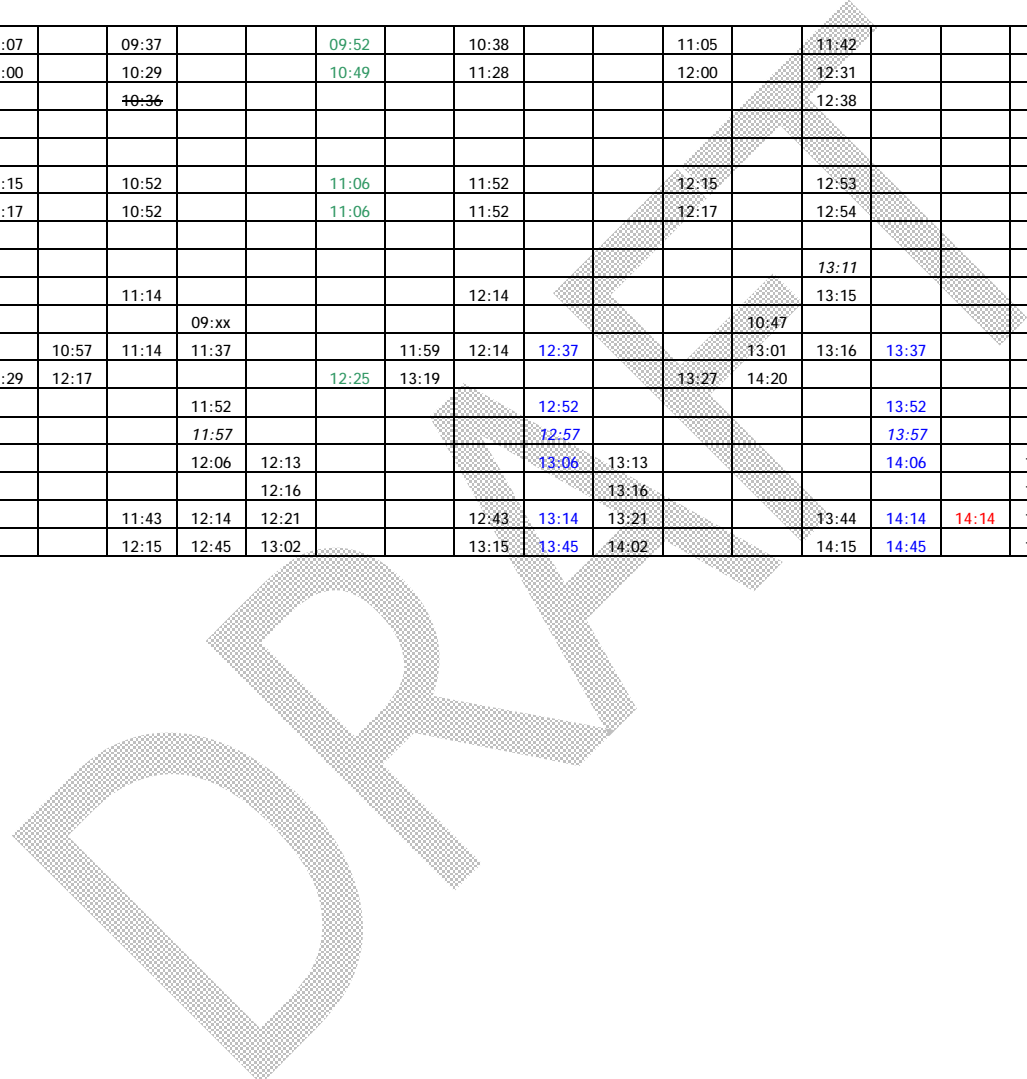
Glasgow Queen St	19:41			19:48	20:11	20:41		20:48		21:11		21:41	21:48					22:48				
Stirling	20:07			20:30	20:42	21:07		21:30	21:39	21:42		22:07	22:30	22:38				23:33				
Bridge of Allan				20:35				21:35					22:35					23:38				
Dunblane				20:43	20:51	21:14		21:43		21:51			22:43					23:42				
<i>Blackford</i>					21:00					22:00												
Gleneagles					21:03	21:26				22:03								23:56				
Edinburgh Waverley		19:35	20:31				20:36			21:40				21:33	21:49	22:39						
Perth	20:36	20:53			21:19	21:42	22:00			22:19		22:36		23:03	23:34	00:07	00:15					
Inverness		23:43																				
Perth	20:36					21:43						22:36										
<i>Barnhill</i>																						
Dundee West						22:00																
Dundee	20:59		21:47			22:07						22:56	23:03									
Dundee	21:00		21:48			22:08						22:57	23:03									
Broughty Ferry																						
Monifieth																						
Carnoustie												23:15										
Arbroath	21:17		22:05			22:25					23:14	23:25										
Aberdeen	22:13		23:07			23:20					00:12	00:30										



Package 0: Aberdeen – Glasgow Queen St

Aberdeen				05:33	05:58			06:34				07:13			07:40			07:52	08:20			08:42
Arbroath				06:31	06:50			07:28				08:08			08:32			08:48	09:15			09:32
Carnoustie		06:14			06:57			07:35				08:15			08:39							09:39
Monifieth		06:23																				
Broughty Ferry		06:29																				
Dundee		06:36		06:51	07:08			07:50				08:26			08:53			09:05	09:31			09:52
Dundee				06:52	07:09			07:51				08:27			08:53			09:06	09:33			09:52
Dundee West										08:22												
<i>Barnhill</i>																						
Perth				07:14				08:12		08:40					09:15							10:14
Inverness														06:xx						07:55		
Perth	06:09		07:03	07:15		07:59		08:12		08:41			08:47	09:15	09:37				09:55	09:51	10:14	
Edinburgh Waverley					08:26	09:25						09:40		10:01				10:27	11:01	11:14	11:26	
Gleneagles	06:26		07:18	07:31				08:26		08:56					09:52				10:12			
<i>Blackford</i>															09:57							
Dunblane	06:40		07:29	07:44			08:12		08:28	09:06	09:13				10:06		10:13					
Bridge of Allan	06:43		07:32	07:48			08:16		08:31		09:16						10:16					
Stirling	06:52		07:36	07:53			08:21	08:43	08:36	09:13	09:21				10:14	10:21			10:30		10:43	
Glasgow Queen St	07:34		08:20	08:34			09:03	09:16	09:32	09:45	10:02				10:15	10:45	11:02				11:15	

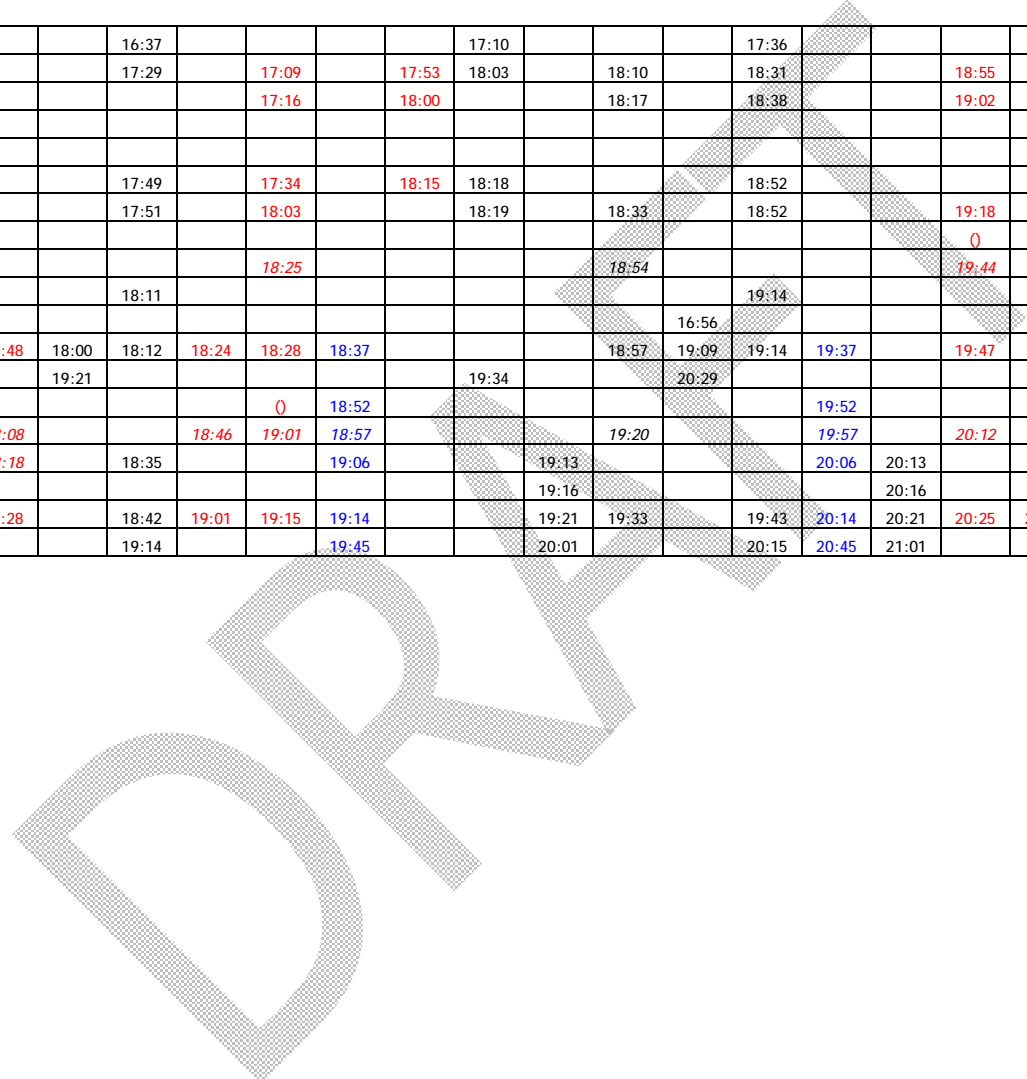
Aberdeen			09:07		09:37			09:52		10:38			11:05		11:42				12:05		12:38	
Arbroath			10:00		10:29			10:49		11:28			12:00		12:31				13:00		13:35	
Carnoustie					10:36										12:38							
Monifieth																						
Broughty Ferry																						
Dundee			10:15		10:52			11:06		11:52			12:15		12:53				13:15		13:53	
Dundee			10:17		10:52			11:06		11:52			12:17		12:54				13:17		13:54	
Dundee West																						
Barnhill															13:11						14:11	
Perth					11:14					12:14					13:15						14:15	
Inverness						09:xx								10:47								
Perth	10:37			10:57	11:14	11:37			11:59	12:14	12:37			13:01	13:16	13:37				13:58	14:16	14:37
Edinburgh Waverley			11:29	12:17				12:25	13:19				13:27	14:20					14:27	15:20		
Gleneagles	10:52					11:52					12:52					13:52						14:52
Blackford	10:57					11:57					12:57					13:57						14:57
Dunblane	11:06	11:13				12:06	12:13				13:06	13:13				14:06			14:13			15:06
Bridge of Allan		11:16					12:16					13:16							14:16			
Stirling	11:14	11:21			11:43	12:14	12:21		12:43	13:14	13:21			13:44	14:14	14:14		14:21			14:44	15:14
Glasgow Queen St	11:45	12:02			12:15	12:45	13:02		13:15	13:45	14:02			14:15	14:45			15:02			15:15	15:45



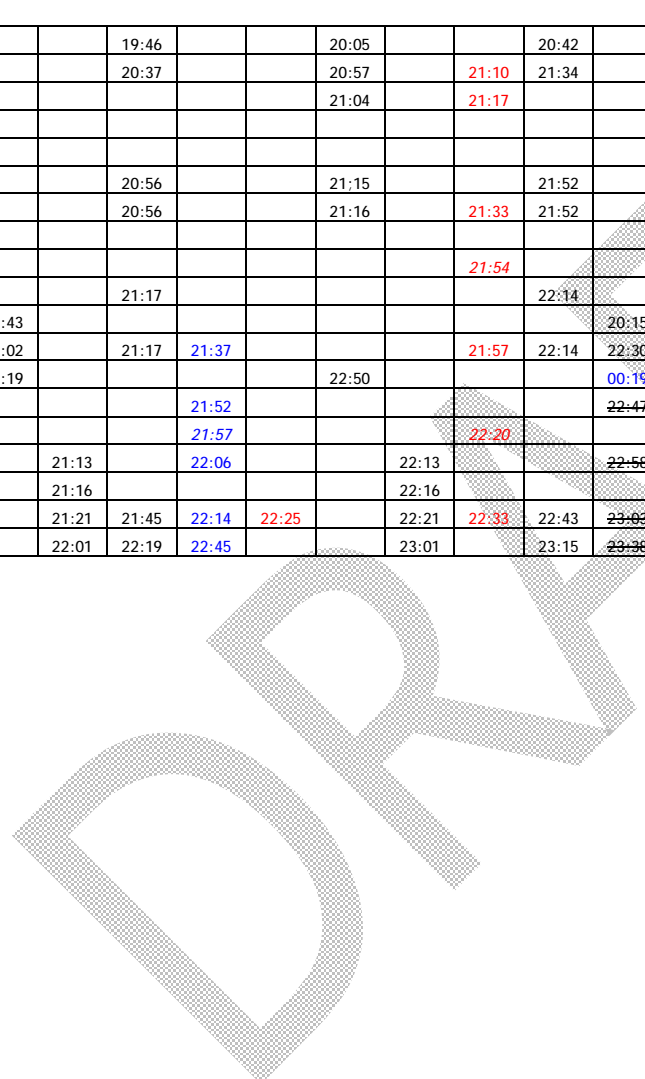
Aberdeen		13:05		13:42			13:xx		14:07		13:xx	14:39	14:49					15:33				16:01
Arbroath		14:00		14:31			14:49		15:00		15:07	15:31	15:45		16:07			16:25	16:38		16:44	16:55
Carnoustie				14:38			14:56				15:14	15:38			16:14				16:46		16:52	17:02
Monifieth																						
Broughty Ferry																						
Dundee		14:15		14:53					15:16			15:53	16:02		16:31			16:43	17:12		17:12	17:17
Dundee		14:17		14:54			15:10		15:17		15:30	15:54	16:03		16:54			16:45				17:17
Dundee West							0															0
Barnhill				15:11			15:42				15:51	16:11			17:18			17:07	17:34		17:44	
Perth				16:15			15:45					16:15			17:25			17:10				
Inverness			12:54											14:54								
Perth			15:01	15:16		15:37				15:59	15:54	16:16		16:55			17:00	17:11	17:37		17:37	
Edinburgh Waverley		15:27	16:22						16:27	17:20			17:27				18:25					18:32
Gleneagles						15:52	0						17:10	0			17:26	0		17:52		
Blackford						15:57	16:10				16:17				17:58				18:08		17:57	
Dunblane	15:13					16:06	16:21	16:13						17:22	18:06			17:36	18:18		18:06	
Bridge of Allan	15:16							16:16														
Stirling	15:21			15:44	15:55	16:14	16:30	16:21			16:30	16:44		17:29	18:11			17:44	18:28		18:14	
Glasgow Queen St	16:02			16:15		16:45		17:02				17:15		18:09				18:15			18:45	

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Aberdeen					16:37					17:10				17:36				18:16		18:35			
Arbroath					17:29		17:09		17:53	18:03		18:10		18:31			18:55		19:12		19:24		
Carnoustie							17:16		18:00			18:17		18:38			19:02				19:31		
Monifieth																							
Broughty Ferry																							
Dundee					17:49		17:34		18:15	18:18				18:52					19:29		19:46		
Dundee					17:51		18:03			18:19		18:33		18:52			19:18		19:30		19:46		
Dundee West																0							
Barnhill							18:25					18:54				19:44							
Perth					18:11									19:14								20:07	
Inverness													16:56										
Perth			17:48	18:00	18:12	18:24	18:28	18:37				18:57	19:09	19:14	19:37		19:47			19:57	20:11	20:37	
Edinburgh Waverley				19:21						19:34			20:29						20:50	21:19			
Gleneagles							0	18:52						19:52							20:25	20:52	
Blackford			18:08			18:46	19:01	18:57			19:20			19:57		20:12						20:57	
Dunblane	18:11		18:18		18:35			19:06			19:13			20:06	20:13							21:06	
Bridge of Allan	18:14										19:16				20:16								
Stirling	18:19	18:24	18:28		18:42	19:01	19:15	19:14			19:21	19:33		19:43	20:14	20:21	20:25	20:33			20:40	21:14	
Glasgow Queen St	19:01				19:14			19:45			20:01			20:15	20:45	21:01						21:14	21:45



Aberdeen		19:10			19:46			20:05			20:42			21:05		21:32		22:30				
Arbroath	19:48	20:05			20:37			20:57	21:10	21:34			21:57		22:26		23:28					
Carnoustie	19:56							21:04	21:17								23:35					
Monifieth																	23:41					
Broughty Ferry																	23:45					
Dundee		20:20			20:56			21:15		21:52			22:14		22:43		23:52					
Dundee	20:15	20:21			20:56			21:16	21:33	21:52			22:15		22:43		23:53					
Dundee West	0																23:59					
Barnhill	20:46								21:54								00:14					
Perth					21:17					22:14							00:19					
Inverness			18:43								20:15											
Perth	20:52		21:02		21:17	21:37			21:57	22:14	22:30	22:37		22:45		22:38	-					
Edinburgh Waverley		21:32	22:19					22:50			00:19		23:52		00:08	00:19	-					
Gleneagles						21:52					22:47	22:52										
Blackford	21:16					21:57			22:20			22:57		23:06								
Dunblane				21:13		22:06			22:13		22:58	23:06										
Bridge of Allan				21:16					22:16													
Stirling	21:34			21:21	21:45	22:14	22:25		22:21	22:33	22:43	23:03	23:14		23:19							
Glasgow Queen St				22:01	22:19	22:45			23:01		23:15	23:38	23:45									



Package 1: Glasgow Queen St – Aberdeen

Glasgow Queen St					05:55		07:06		06:48	07:41				07:48			08:11	08:41					08:48
Stirling					06:24		07:32		07:38	08:07		08:15		08:30	08:36	08:43	08:42	09:07				09:19	09:30
Bridge of Allan									07:43					08:35									09:35
Dunblane					06:31		07:39		07:51	08:14		08:28		08:43		08:51	08:51					09:26	09:43
Blackford										08:21		08:39				09:10	09:00	09:21				09:38	
Gleneagles					06:43											()	09:03						
Edinburgh Waverley			05:30		06:29		07:30			07:35			08:29						08:33	09:30			
Perth					06:59	07:47	08:03			08:40	08:52	08:56				09:47	09:19	09:37	09:50			10:00	
Inverness					10:xx	10:29										11:xx		11:54					
Perth	06:00			06:45	07:00		08:05			08:41						09:49		09:38					
Barnhill	06:03			06:48	07:03		08:08			08:44	08:59					09:53		09:41				10:07	
Dundee West	06:17			07:02			08:22																
Dundee	06:24		06:45	07:09	07:21	08:13	08:29	08:44		09:03		09:24	09:36			10:23		09:59		10:32	10:37		
Dundee		06:40	06:52	07:10	07:23		08:30	08:45		09:04			09:37			10:38		10:00		10:33	10:38		
Broughty Ferry				07:16			08:36																
Monifieth				07:20			08:40																
Carnoustie	06:41	06:56	07:04	07:26			08:46			09:16	09:37					10:55						10:55	
Arbroath	06:57	07:11	07:11	07:33	07:39		08:53	09:02		09:23	09:43	09:53				11:03		10:17		10:50	11:03		
Aberdeen	07:44	07:53	08:14		08:39			09:57		10:16		10:xx	10:53			12:xx		11:17		11:xx	12:xx		

Glasgow Queen St	09:11		09:41				09:48	10:11		10:41			10:48	11:11	11:41				11:48	12:11		12:41
Stirling	09:42	09:41	10:07		10:15		10:30	10:42	10:49	11:07			11:30	11:42	12:07		12:19		12:30	12:42	12:49	13:07
Bridge of Allan							10:35						11:35						12:35			
Dunblane	09:51	09:50			10:28		10:43	10:51					11:43	11:51			12:26		12:43	12:51		
Blackford	10:00		10:21		10:39			11:00		11:21				12:00	12:21		12:38			13:00		13:21
Gleneagles	10:03							11:03						12:03						13:03		
Edinburgh Waverley			09:35		10:27					10:34	11:30				11:35		12:30					
Perth	10:19	10:17	10:37	10:52	10:56			11:19		11:37	11:53			12:19	12:37	12:53	13:00			13:19		13:37
Inverness								13:xx			14:xx					15:06				15:xx		
Perth	10:20	10:17	10:38							11:38				12:20	12:38							13:38
Barnhill	10:23	10:21	10:41		10:59					11:41				12:23	12:41		13:07					13:41
Dundee West	10:37													12:37								
Dundee	10:44	10:48	10:57		11:24	11:43				11:59		12:36		12:44	12:59		13:31	13:36				13:59
Dundee	10:45	11:27	11:00		11:27	11:45				12:01		12:37		12:45	13:00			13:37				14:01
Broughty Ferry	10:51													12:51								
Monifieth	10:55													12:55								
Carnoustie	11:01		11:11											13:01	13:12		13:49					
Arbroath	11:08	11:48	11:18		11:48	12:01				12:17		12:53		13:08	13:19		13:56	13:53				14:17
Aberdeen		12:xx	12:14		12:xx	13:05				13:14		13:46			14:14			14:46				15:14

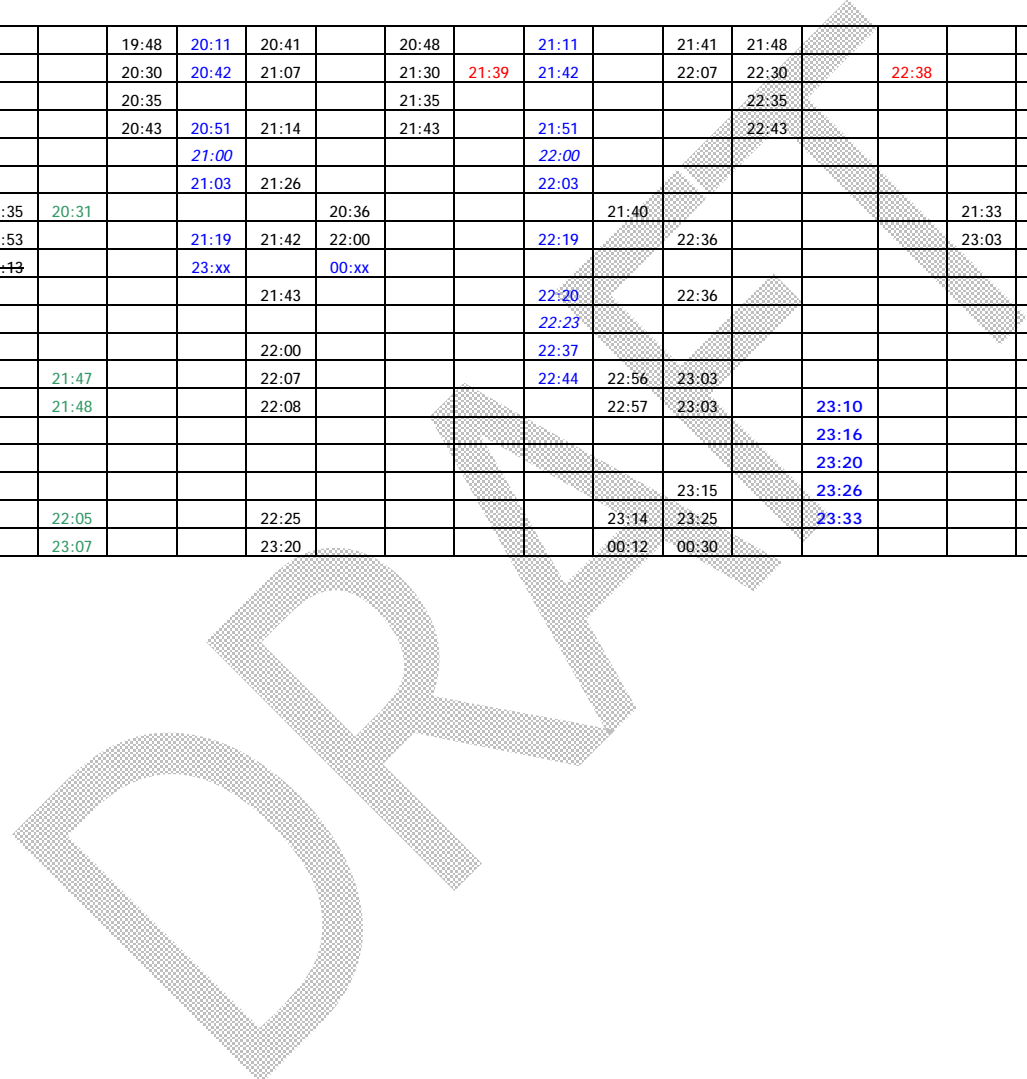
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Glasgow Queen St				12:48	13:11	13:41				13:48	14:11		14:41			14:48	15:11		15:41			
Stirling			13:18	13:30	13:42	14:07				14:30	14:42	14:49	15:07			15:30	15:42	15:43	16:07			16:19
Bridge of Allan				13:35						14:35						15:35						
Dunblane			13:27	13:43	13:51					14:43	14:51					15:43	15:51	15:50				16:26
Blackford			13:38		14:00	14:21					15:00		15:21				16:00	16:03	16:21			16:38
Gleneagles					14:03						15:03						16:03					
Edinburgh Waverley	12:35	13:30					13:35	14:30					14:35	15:00	15:30					15:35	16:29	
Perth	13:53		13:57		14:19	14:37	14:53				15:19		15:37	15:53				16:19		16:37	16:53	17:00
Inverness	16:xx						17:05				17:xx			18:xx								
Perth			13:57		14:20	14:38							15:38				16:20	17:44	16:38			
Barnhill			14:00		14:23	14:41							15:41				16:23	17:52	16:41			17:07
Dundee West			0		14:37												16:37					
Dundee		14:36	14:42		14:44	14:59		15:36					15:59		16:18	16:36		16:44	18:18	16:59		17:38
Dundee		14:37			14:45	15:00		15:37					16:01		16:18	16:37		16:45		17:01		17:39
Broughty Ferry					14:51													16:51				17:47
Monifieth					14:55													16:55				
Carnoustie			14:55		15:01	15:12												17:01	18:33	17:13		17:55
Arbroath		14:53	15:01		15:08	15:19		15:53					16:17		16:36	16:53		17:08	18:40	17:20		18:02
Aberdeen		15:46	16:xx			16:19		16:46					17:14		17:37	17:46			20:xx	18:15		19:00

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Glasgow Queen St	15:48	16:11	16:41							16:48	17:12	17:40		17:48	18:11			18:41				18:48
Stirling	16:30	16:42		16:49			17:19			17:30	17:45	18:15		18:30	18:41			19:07			19:20	19:30
Bridge of Allan	16:35									17:35				18:35								19:35
Dunblane	16:43	16:51								17:43	17:54	18:22		18:43	18:50			19:14				19:43
Blackford		17:00	17:21																			
Gleneagles		17:03					17:40				18:06	18:35			19:02			19:26				
Edinburgh Waverley						16:32	16:33	17:03	17:35				17:41		18:16	18:30		18:40	19:30			
Perth		17:19	17:37			17:52	18:00				18:23	18:52	18:58		19:19		19:42	20:02				
Inverness		19:xx					20:xx						21:09		21:xx			22:xx				
Perth			17:38								18:25	18:53					19:43					
Barnhill			17:41								18:28											
Dundee West											18:42						20:00					
Dundee			17:59				18:34	18:47			18:49	19:15			19:44	19:52	20:07		20:40			
Dundee			18:01		18:18		18:54	18:48			18:54	19:16			19:46	19:53	20:09		20:41			
Broughty Ferry							19:00				19:00											
Monifieth							19:06				19:06											
Carnoustie			18:13		18:36		19:17				19:17	19:28										
Arbroath			18:20		18:43			19:04			19:24	19:35			20:02	20:10	20:25		20:58			
Aberdeen			19:13		20:xx			20:06				20:32			20:46	21:12	21:18		21:53			

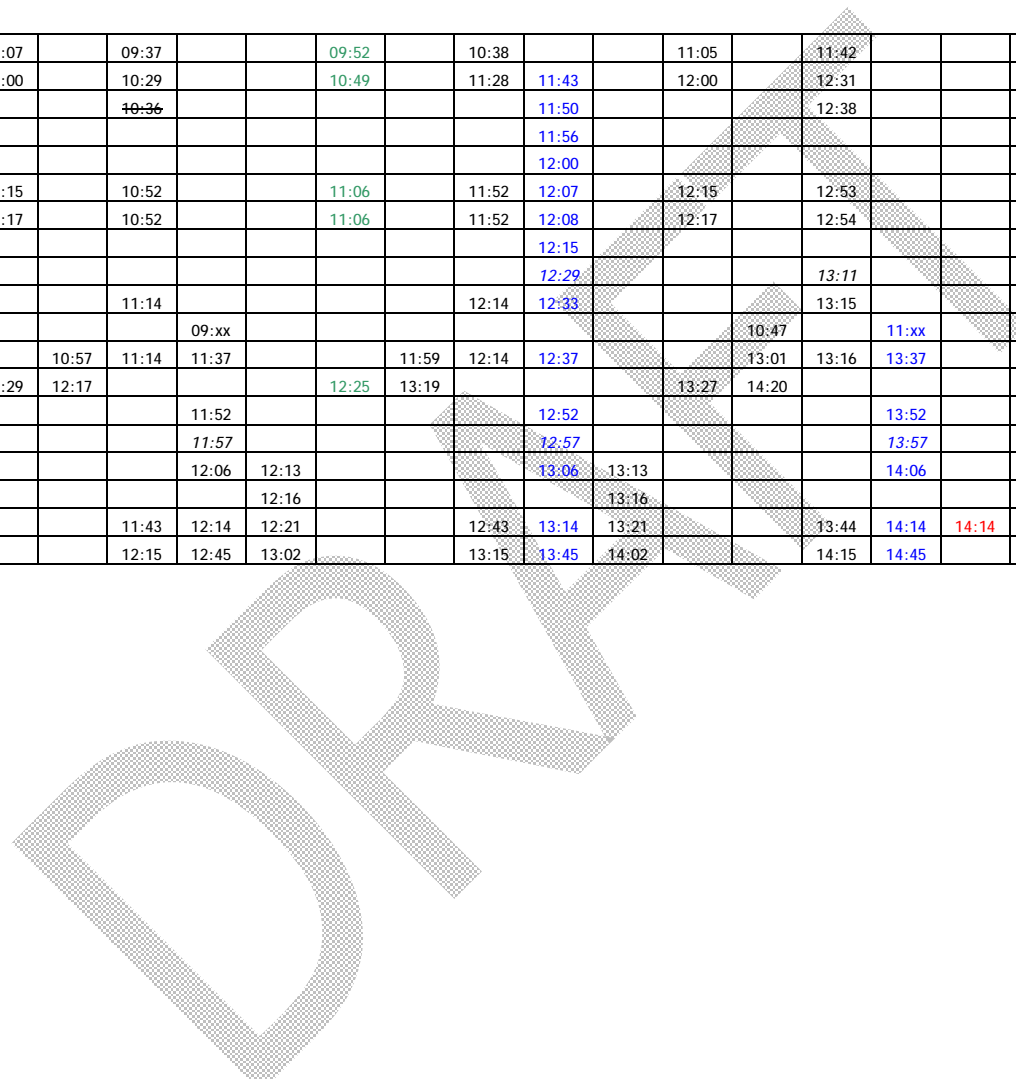
Glasgow Queen St	19:11	19:41			19:48	20:11	20:41		20:48		21:11		21:41	21:48						22:48			
Stirling	19:42	20:07			20:30	20:42	21:07		21:30	21:39	21:42		22:07	22:30		22:38					23:33		
Bridge of Allan					20:35				21:35					22:35								23:38	
Dunblane	19:51				20:43	20:51	21:14		21:43		21:51			22:43								23:42	
Blackford	20:00					21:00					22:00												
Gleneagles	20:03					21:03	21:26				22:03											23:56	
Edinburgh Waverley			19:35	20:31				20:36				21:40					21:33	21:49	22:39				
Perth	20:19	20:36	20:53			21:19	21:42	22:00			22:19		22:36				23:03	23:34	00:07	00:15			
Inverness			23:13			23:xx		00:xx															
Perth	20:20	20:36					21:43				22:20		22:36										
Barnhill	20:23										22:23												
Dundee West	20:37						22:00				22:37												
Dundee	20:44	20:59		21:47			22:07				22:44	22:56	23:03										
Dundee	20:48	21:00		21:48			22:08				22:57	23:03									23:10		
Broughty Ferry	20:54																					23:16	
Monifieth	20:58																					23:20	
Carnoustie	21:04												23:15									23:26	
Arbroath	21:11	21:17		22:05			22:25					23:14	23:25									23:33	
Aberdeen		22:13		23:07			23:20					00:12	00:30										



Package 1: Aberdeen – Glasgow Queen St

Aberdeen				05:33	05:58			06:34				07:13			07:40			07:52	08:20			08:42
Arbroath				06:31	06:50			07:28		07:45		08:08			08:32			08:48	09:15			09:32
Carnoustie		06:14			06:57			07:35		07:52		08:15			08:39							09:39
Monifieth		06:23								08:01												
Broughty Ferry		06:29								08:07												
Dundee		06:36		06:51	07:08			07:50		08:14		08:26			08:53			09:05	09:31			09:52
Dundee				06:52	07:09			07:51		08:15		08:27			08:53			09:06	09:33			09:52
Dundee West										08:22												
<i>Barnhill</i>																						
Perth				07:14				08:12		08:40					09:15							10:14
Inverness														06:xx		07:xx				07:55		
Perth	06:09		07:03	07:15		07:59		08:12		08:41			08:47	09:15	09:37				09:55	09:51	10:14	
Edinburgh Waverley					08:26	09:25						09:40		10:01				10:27	11:01	11:14	11:26	
Gleneagles	06:26		07:18	07:31				08:26		08:56					09:52					10:12		
<i>Blackford</i>															09:57							
Dunblane	06:40		07:29	07:44			08:12		08:28	09:06	09:13				10:06		10:13					
Bridge of Allan	06:43		07:32	07:48			08:16		08:31		09:16						10:16					
Stirling	06:52		07:36	07:53			08:21	08:43	08:36	09:13	09:21				10:14	10:21				10:30		10:43
Glasgow Queen St	07:34		08:20	08:34			09:03	09:16	09:32	09:45	10:02				10:15	10:45	11:02					11:15

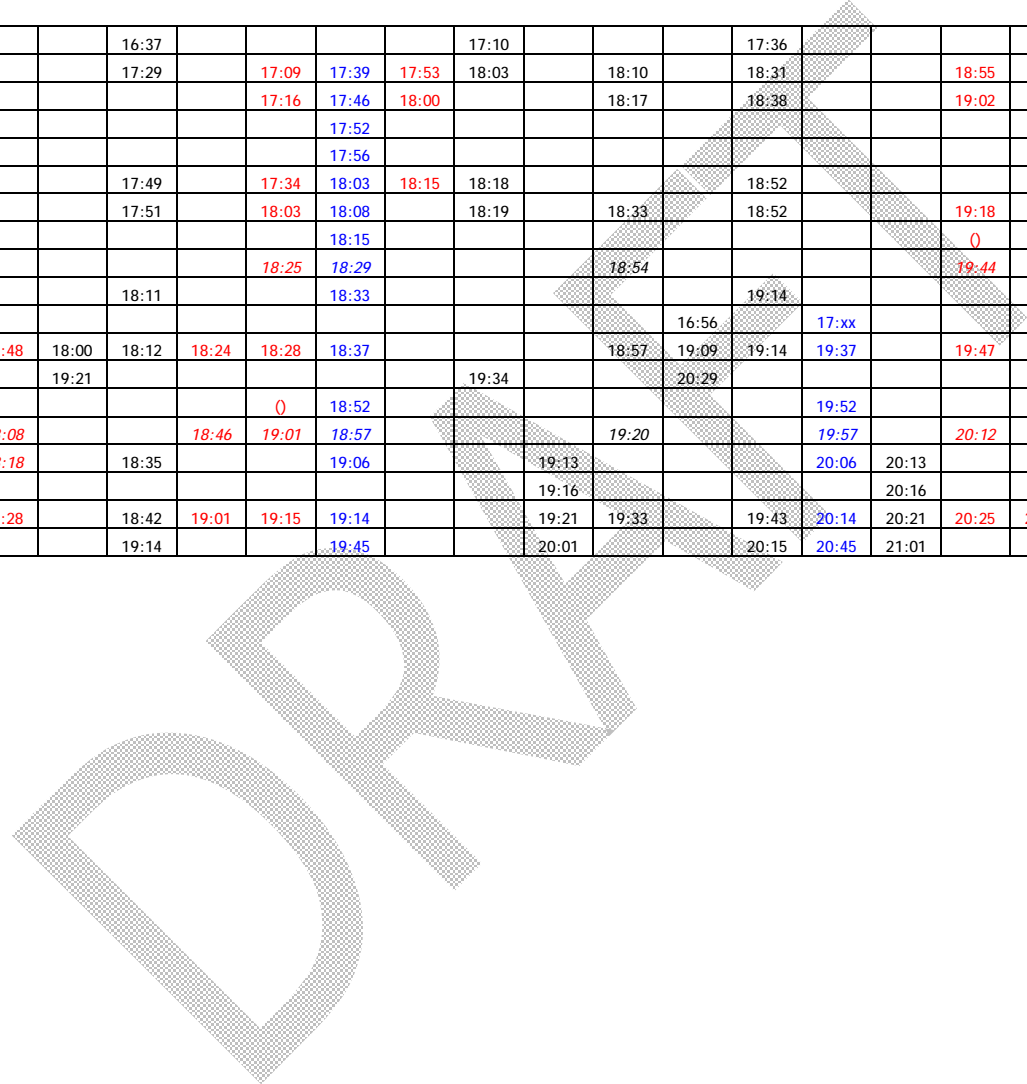
Aberdeen			09:07		09:37			09:52		10:38			11:05		11:42				12:05		12:38	
Arbroath	09:43		10:00		10:29			10:49		11:28	11:43		12:00		12:31				13:00		13:35	13:43
Carnoustie	09:50				10:36						11:50				12:38							13:50
Monifieth	09:56										11:56											13:56
Broughty Ferry	10:00										12:00											14:00
Dundee	10:07		10:15		10:52			11:06		11:52	12:07		12:15		12:53				13:15		13:53	14:07
Dundee	10:08		10:17		10:52			11:06		11:52	12:08		12:17		12:54				13:17		13:54	14:08
Dundee West	10:15										12:15											14:15
Barnhill	10:29										12:29				13:11						14:11	14:29
Perth	10:33				11:14					12:14	12:33				13:15						14:15	14:33
Inverness						09:xx								10:47		11:xx						
Perth	10:37			10:57	11:14	11:37			11:59	12:14	12:37			13:01	13:16	13:37				13:58	14:16	14:37
Edinburgh Waverley			11:29	12:17				12:25	13:19				13:27	14:20					14:27	15:20		
Gleneagles	10:52					11:52					12:52					13:52						14:52
Blackford	10:57					11:57					12:57					13:57						14:57
Dunblane	11:06	11:13				12:06	12:13				13:06	13:13				14:06			14:13			15:06
Bridge of Allan		11:16					12:16					13:16							14:16			
Stirling	11:14	11:21			11:43	12:14	12:21		12:43	13:14	13:21			13:44	14:14	14:14		14:21			14:44	15:14
Glasgow Queen St	11:45	12:02			12:15	12:45	13:02		13:15	13:45	14:02			14:15	14:45			15:02			15:15	15:45



Aberdeen		13:05		13:42			13:xx		14:07		13:xx	14:39	14:49				15:33				16:01
Arbroath		14:00		14:31			14:49		15:00		15:07	15:31	15:45	15:54	16:07		16:25	16:38		16:44	16:55
Carnoustie				14:38			14:56				15:14	15:38		16:00	16:14			16:46		16:52	17:02
Monifieth														16:06							
Broughty Ferry														16:10							
Dundee		14:15		14:53					15:16			15:53	16:02	16:17	16:31		16:43	17:12		17:12	17:17
Dundee		14:17		14:54			15:10		15:17		15:30	15:54	16:03	16:18	16:54		16:45				17:17
Dundee West							0							16:25						0	
Barnhill				15:11			15:42				15:51	16:11		16:39	17:18		17:07	17:34		17:44	
Perth				16:15			15:45					16:15		16:43	17:25		17:10				
Inverness			12:54				13:xx							14:54		14:xx				15:xx	
Perth			15:01	15:16			15:37			15:59	15:54	16:16		16:55		17:00	17:11	17:37		17:37	
Edinburgh Waverley		15:27	16:22						16:27	17:20			17:27			18:25					18:32
Gleneagles							15:52	0						17:10	0		17:26	0		17:52	
Blackford							15:57	16:10			16:17				17:58			18:08		17:57	
Dunblane	15:13						16:06	16:21	16:13					17:22	18:06		17:36	18:18		18:06	
Bridge of Allan	15:16								16:16												
Stirling	15:21			15:44	15:55	16:14	16:30	16:21			16:30	16:44		17:29	18:11		17:44	18:28		18:14	
Glasgow Queen St	16:02			16:15			16:45	17:02				17:15		18:09			18:15			18:45	

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Aberdeen					16:37					17:10				17:36				18:16		18:35				
Arbroath					17:29		17:09	17:39	17:53	18:03		18:10		18:31			18:55		19:12		19:24	19:39		
Carnoustie							17:16	17:46	18:00			18:17		18:38			19:02				19:31	19:46		
Monifieth								17:52														19:52		
Broughty Ferry								17:56														19:56		
Dundee					17:49		17:34	18:03	18:15	18:18				18:52					19:29		19:46	20:03		
Dundee					17:51		18:03	18:08		18:19		18:33		18:52			19:18		19:30		19:46	20:08		
Dundee West								18:15									0					20:15		
Barnhill							18:25	18:29				18:54					19:44					20:29		
Perth					18:11			18:33						19:14								20:07	20:33	
Inverness													16:56		17:xx									
Perth			17:48	18:00	18:12	18:24	18:28	18:37				18:57	19:09	19:14	19:37		19:47				19:57	20:11	20:37	
Edinburgh Waverley				19:21						19:34			20:29						20:50		21:19			
Gleneagles							0	18:52							19:52							20:25	20:52	
Blackford			18:08			18:46	19:01	18:57				19:20			19:57		20:12						20:57	
Dunblane	18:11		18:18		18:35			19:06			19:13				20:06	20:13							21:06	
Bridge of Allan	18:14										19:16					20:16								
Stirling	18:19	18:24	18:28		18:42	19:01	19:15	19:14			19:21	19:33		19:43	20:14	20:21	20:25	20:33				20:40	21:14	
Glasgow Queen St	19:01				19:14			19:45			20:01				20:15	20:45	21:01						21:14	21:45



Aberdeen		19:10			19:46			20:05			20:42			21:05		21:32		22:30				
Arbroath	19:48	20:05			20:37			20:57	21:10	21:34		21:39	21:57		22:26		23:28	23+43				
Carnoustie	19:56							21:04	21:17			21:46					23:35					
Monifieth												21:52					23:41					
Broughty Ferry												21:56					23:45					
Dundee		20:20			20:56			21:15		21:52		22:03	22:14		22:43		23:52	00+07				
Dundee	20:15	20:21			20:56			21:16	21:33	21:52		22:08	22:15		22:43		23:53					
Dundee West	0											22:15					23:59					
Barnhill	20:46								21:54			22:29					00:14					
Perth					21:17					22:14		22:33					00:19	00+29				
Inverness			18:43		19:xx						20:15											
Perth	20:52		21:02		21:17	21:37			21:57	22:14	22:30	22:37		22:45		22:38	-					
Edinburgh Waverley		21:32	22:19					22:50			00:19		23:52		00:08	00:19	-					
Gleneagles						21:52					22:47	22:52										
Blackford	21:16					21:57			22:20			22:57		23:06								
Dunblane				21:13		22:06			22:13			22:58	23:06									
Bridge of Allan				21:16					22:16													
Stirling	21:34			21:21	21:45	22:14	22:25		22:21	22:33	22:43	23:03	23:14		23:19							
Glasgow Queen St				22:01	22:19	22:45			23:01		23:15	23:38	23:45									

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Package 2: Glasgow Queen St – Aberdeen

Glasgow Queen St					05:55			07:06		06:48		07:41			07:48			08:11		08:41		
Stirling					06:24			07:32		07:38		08:07		08:15		08:30	08:36	08:43	08:42		09:07	
Bridge of Allan										07:43					08:35							
Dunblane					06:31			07:39		07:51		08:14		08:28		08:43		08:51	08:51			
Blackford												08:21		08:39				09:10	09:00		09:21	
Gleneagles					06:43													09:03				
Edinburgh Waverley			05:30				06:29		07:30				07:35		08:29							08:33
Perth					06:59		07:47	08:03				08:40	08:52	08:56				09:47	09:19		09:37	09:50
Inverness							10:xx	10:20											11:xx			11:54
Perth	06:00			06:45	07:00	07:35					08:25	08:41						09:49		09:25	09:38	
Barnhill	06:03			06:48	07:03	07:38					08:28	08:44		08:59				09:53		09:28	09:41	
Dundee West	06:17			07:00		07:50					08:40									09:40		
Dundee	06:24		06:45	07:06	07:21	07:56	08:13		08:44		08:46	09:03		09:24	09:36			10:23		09:46	09:59	
Dundee		06:40	06:52	07:07	07:23	07:57			08:45		08:47	09:04			09:37			10:38		09:47	10:00	
Broughty Ferry				07:13		08:03					08:58									09:53		
Monifieth				07:17		08:07					09:02										09:57	
Carnoustie	06:41	06:56	07:04	07:23		08:13					09:08	09:16		09:37				10:55		10:03		
Arbroath	06:57	07:11	07:11	07:30	07:39	08:20			09:02		09:15	09:23		09:43	09:53			11:03		10:10	10:17	
Aberdeen	07:44	07:53	08:14		08:39				09:57			10:16		10:xx	10:53			12:xx				11:17

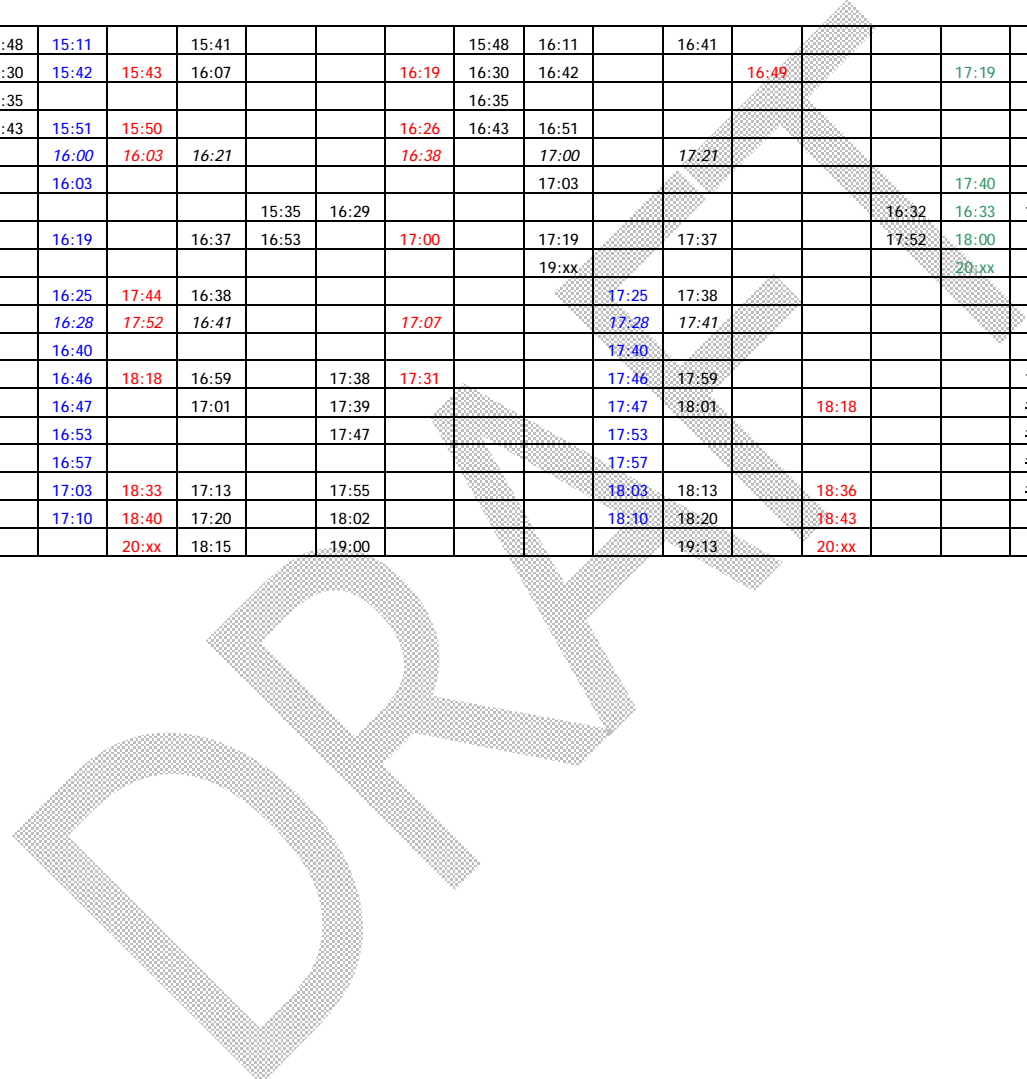
Glasgow Queen St			08:48	09:11			09:41				09:48	10:11			10:41			10:48	11:11		11:41	
Stirling		09:19	09:30	09:42	09:41		10:07		10:15		10:30	10:42		10:49	11:07			11:30	11:42		12:07	
Bridge of Allan			09:35								10:35							11:35				
Dunblane		09:26	09:43	09:51	09:50				10:28		10:43	10:51						11:43	11:51			
Blackford		09:38		10:00			10:21		10:39			11:00			11:21				12:00		12:21	
Gleneagles				10:03								11:03							12:03			
Edinburgh Waverley	09:30						09:35		10:27						10:34	11:30						11:35
Perth		10:00		10:19	10:17		10:37	10:52	10:56			11:19			11:37	11:53			12:19		12:37	12:53
Inverness												13:xx				14:xx						15:06
Perth				10:17	10:25	10:38						11:25			11:38				12:25		12:38	
Barnhill		10:07		10:21	10:28	10:41		10:59				11:28			11:41				12:28		12:41	
Dundee West					10:40							11:40							12:40			
Dundee	10:32	10:37		10:48	10:46	10:57		11:24	11:43			11:46			11:59	12:36			12:46		12:59	
Dundee	10:33	10:38		11:27	10:47	11:00		11:27	11:45			11:47			12:01	12:37			12:47		13:00	
Broughty Ferry					10:53							11:53							12:53			
Monifieth					10:57							11:57							12:57			
Carnoustie		10:55			11:03	11:11						12:03							13:03		13:12	
Arbroath	10:50	11:03		11:48	11:10	11:18		11:48	12:01			12:10			12:17	12:53			13:10		13:19	
Aberdeen	11:xx	12:xx		12:xx		12:14		12:xx	13:05						13:14	13:46					14:14	

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Glasgow Queen St			11:48	12:11			12:41				12:48	13:11		13:41			13:48	14:11			14:41		
Stirling	12:19		12:30	12:42		12:49	13:07			13:18	13:30	13:42		14:07			14:30	14:42		14:49	15:07		
Bridge of Allan			12:35								13:35						14:35						
Dunblane	12:26		12:43	12:51						13:27	13:43	13:51					14:43	14:51					
Blackford	12:38			13:00			13:21			13:38		14:00		14:21				15:00				15:21	
Gleneagles				13:03								14:03						15:03					
Edinburgh Waverley		12:30					12:35	13:30								13:35	14:30					14:35	
Perth	13:00			13:19			13:37	13:53		13:57		14:19		14:37	14:53			15:19				15:37	15:53
Inverness				15:xx				16:xx							17:05			17:xx					18:xx
Perth				13:25			13:38			13:57		14:25	14:38					15:25				15:38	
Barnhill	13:07			13:28			13:41			14:00		14:28	14:41					15:28				15:41	
Dundee West				13:40						0		14:40						15:40					
Dundee	13:31	13:36		13:46			13:59	14:36		14:42		14:46	14:59		15:36			15:46				15:59	
Dundee		13:37		13:47			14:01	14:37				14:47	15:00		15:37			15:47				16:01	
Broughty Ferry				13:53								14:53						15:53					
Monifieth				13:57								14:57						15:57					
Carnoustie	13:49			14:03						14:55		15:03	15:12					16:03					
Arbroath	13:56	13:53		14:10			14:17	14:53		15:01		15:10	15:19		15:53			16:10				16:17	
Aberdeen		14:46					15:14	15:46		16:xx			16:19		16:46							17:14	

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Glasgow Queen St			14:48	15:11		15:41				15:48	16:11		16:41								14:48
Stirling			15:30	15:42	15:43	16:07			16:19	16:30	16:42		16:49		17:19						15:30
Bridge of Allan			15:35							16:35											15:35
Dunblane			15:43	15:51	15:50				16:26	16:43	16:51										15:43
Blackford				16:00	16:03	16:21			16:38		17:00		17:21								
Gleneagles				16:03							17:03				17:40						
Edinburgh Waverley	15:00	15:30				15:35	16:29							16:32	16:33	17:03	17:35	15:00	15:30		
Perth				16:19		16:37	16:53		17:00		17:19		17:37		17:52	18:00					
Inverness											19:xx				20:xx						
Perth				16:25	17:44	16:38					17:25	17:38									
Barnhill				16:28	17:52	16:41			17:07		17:28	17:41									
Dundee West				16:40							17:40										
Dundee	16:18	16:36		16:46	18:18	16:59		17:38	17:31		17:46	17:59				18:34	18:47	16:18	16:36		
Dundee	16:18	16:37		16:47		17:01		17:39			17:47	18:01		18:18		18:54	18:48	16:18	16:37		
Broughty Ferry				16:53				17:47			17:53					19:00					
Monifieth				16:57							17:57					19:06					
Carnoustie				17:03	18:33	17:13		17:55			18:03	18:13		18:36		19:17					
Arbroath	16:36	16:53		17:10	18:40	17:20		18:02			18:10	18:20		18:43			19:04	16:36	16:53		
Aberdeen	17:37	17:46			20:xx	18:15		19:00				19:13		20:xx			20:06	17:37	17:46		



Glasgow Queen St	16:48	17:12	17:40		17:48	18:11			18:41				18:48	19:11	19:41			19:48	20:11	20:41		20:48	
Stirling	17:30	17:45	18:15		18:30	18:41			19:07			19:20	19:30	19:42	20:07			19:48	20:11	20:41		20:48	
Bridge of Allan	17:35				18:35								19:35					20:30	20:42	21:07		21:30	
Dunblane	17:43	17:54	18:22		18:43	18:50			19:14				19:43	19:51				20:35				21:35	
<i>Blackford</i>														20:00				20:43	20:51	21:14		21:43	
Gleneagles		18:06	18:35			19:02			19:26					20:03					21:00				
Edinburgh Waverley				17:41			18:16	18:30		18:40	19:30					19:35			21:03	21:26			
Perth		18:23	18:52	18:58		19:19			19:42	20:02				20:19	20:36	20:53	20:31					20:36	
Inverness				21:09		21:xx				22:xx						23:19			21:19	21:42	22:00		
Perth		18:25	18:53						19:43					20:25	20:36				23:xx			00:xx	
<i>Barnhill</i>		18:28												20:28							21:43		
Dundee West		18:42							20:00					20:40									
Dundee		18:52	19:15				19:44	19:52	20:07		20:40			20:46	20:59							22:00	
Dundee		18:54	19:16				19:46	19:53	20:09		20:41			20:47	21:00		21:47					22:07	
Broughty Ferry		19:00												20:53			21:48					22:08	
Monifieth		19:06												20:57									
Carnoustie		19:17	19:28											21:03									
Arbroath		19:24	19:35				20:02	20:10	20:25		20:58			21:10	21:17								
Aberdeen			20:32				20:46	21:12	21:18		21:53				22:13		22:05				22:25		

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Aberdeen				05:33	05:58			06:34				07:13		07:40				07:52	08:20			08:42
Arbroath				06:31	06:50			07:28		07:45		08:08		08:32	08:37			08:48	09:15			09:32
Carnoustie		06:14			06:57			07:35		07:52		08:15		08:39	08:44							09:39
Monifieth		06:23								08:01					08:50							
Broughty Ferry		06:29								08:07					08:54							
Dundee		06:36		06:51	07:08			07:50		08:14		08:26		08:53	09:00			09:05	09:31			09:52
Dundee				06:52	07:09			07:51		08:15		08:27		08:53	09:02			09:06	09:33			09:52
Dundee West										08:22					09:09							
<i>Barnhill</i>															09:23							
Perth				07:14				08:12		08:40				09:15	09:27							10:14
Inverness												06:xx								07:55		
Perth	06:09		07:03	07:15		07:59		08:12		08:41		08:47	09:15		09:37					09:55	09:51	10:14
Edinburgh Waverley					08:26	09:25						09:40	10:01					10:27	11:01	11:14	11:26	
Gleneagles	06:26		07:18	07:31				08:26		08:56					09:52					10:12		
<i>Blackford</i>															09:57							
Dunblane	06:40		07:29	07:44			08:12		08:28	09:06	09:13				10:06	10:13						
Bridge of Allan	06:43		07:32	07:48			08:16		08:31	09:16						10:16						
Stirling	06:52		07:36	07:53			08:21	08:43	08:36	09:13	09:21				10:14	10:21				10:30		10:43
Glasgow Queen St	07:34		08:20	08:34			09:03	09:16	09:32	09:45	10:02			10:15	10:45	11:02						11:15

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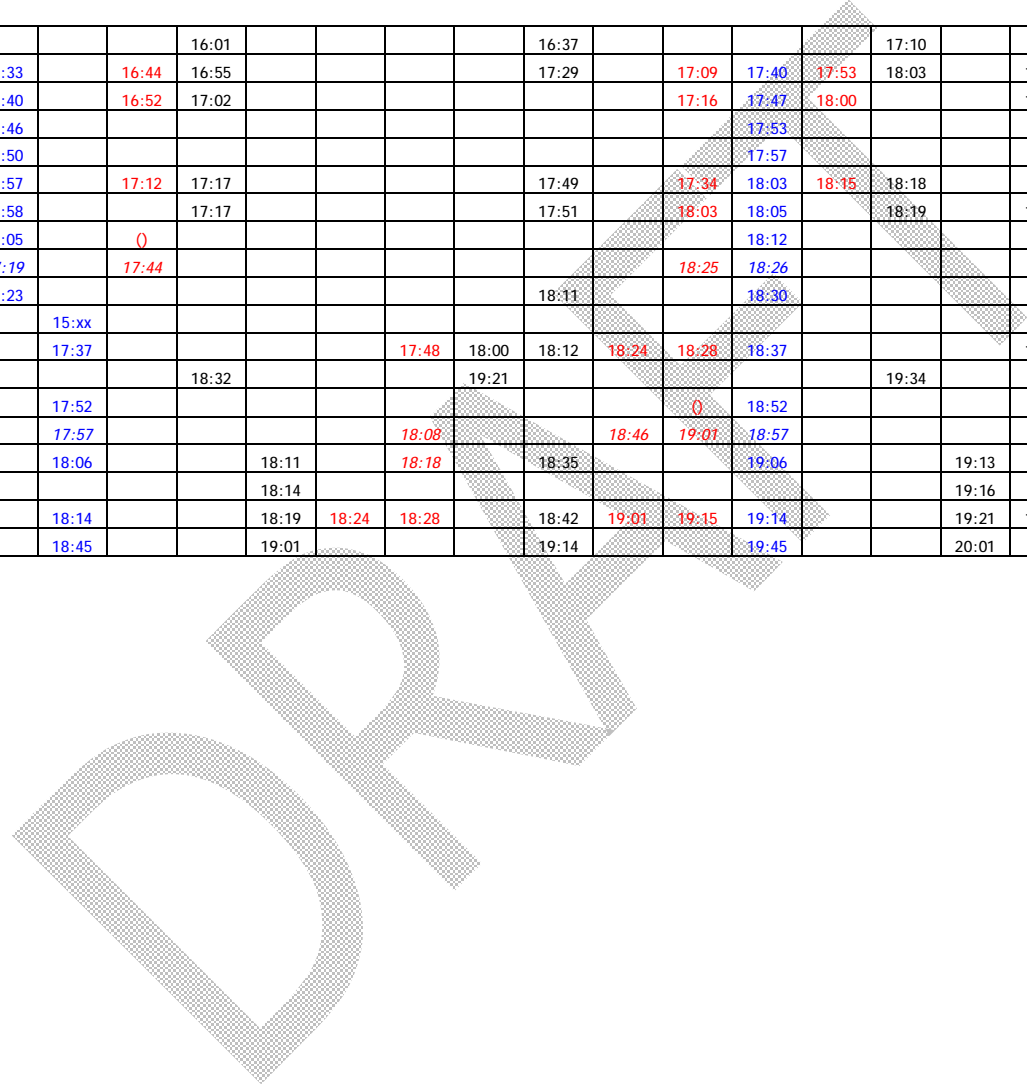
Aberdeen				09:07		09:37				09:52		10:38				11:05		11:42					
Arbroath	09:40			10:00		10:29	10:37			10:49		11:28	11:40			12:00		12:31	12:40				
Carnoustie	09:47					10:36	10:44						11:47					12:38	12:47				
Monifieth	09:53						10:50						11:53						12:53				
Broughty Ferry	09:57						10:54						11:57						12:57				
Dundee	10:03			10:15		10:52	11:00			11:06		11:52	12:03			12:15		12:53	13:03				
Dundee	10:05			10:17		10:52	11:02			11:06		11:52	12:05			12:17		12:54	13:05				
Dundee West	10:12						11:09						12:12						13:12				
Barnhill	10:26						11:23						12:26					13:11	13:26				
Perth	10:30					11:14	11:27					12:14	12:30					13:15	13:30				
Inverness							09:xx									10:47			11:xx				
Perth		10:37			10:57	11:14		11:37			11:59	12:14		12:37			13:01	13:16		13:37			
Edinburgh Waverley				11:29	12:17					12:25	13:19					13:27	14:20						
Gleneagles		10:52						11:52						12:52						13:52			
Blackford		10:57						11:57						12:57						13:57			
Dunblane		11:06	11:13					12:06	12:13					13:06	13:13					14:06			14:13
Bridge of Allan			11:16						12:16						13:16								14:16
Stirling		11:14	11:21			11:43		12:14	12:21			12:43		13:14	13:21			13:44		14:14	14:14	14:21	14:21
Glasgow Queen St		11:45	12:02			12:15		12:45	13:02			13:15		13:45	14:02			14:15		14:45			15:02

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Aberdeen	12:05		12:38				13:05		13:42				13:xx		14:07		13:xx	14:39	14:49			
Arbroath	13:00		13:35	13:40			14:00		14:31		14:40		14:49		15:00		15:07	15:31	15:45	15:53	16:07	
Carnoustie				13:47					14:38		14:47		14:56				15:14	15:38		16:00	16:14	
Monifieth				13:53							14:53									16:06		
Broughty Ferry				13:57							14:57									16:10		
Dundee	13:15		13:53	14:03			14:15		14:53		15:03				15:16			15:53	16:02	16:17	16:31	
Dundee	13:17		13:54	14:05			14:17		14:54		15:05		15:10		15:17		15:30	15:54	16:03	16:18	16:54	
Dundee West				14:12							15:12		0							16:25		
Barnhill			14:11	14:26					15:11		15:26		15:42				15:51	16:11		16:39	17:18	
Perth			14:15	14:30					16:15		15:30		15:45					16:15		16:43	17:25	
Inverness							12:54				13:xx									14:51		14:xx
Perth		13:58	14:16		14:37			15:01	15:16		15:37				15:59	15:54	16:16		16:55		17:00	
Edinburgh Waverley	14:27	15:20					15:27	16:22							16:27	17:20		17:27			18:25	
Gleneagles					14:52						15:52	0								17:10	0	
Blackford					14:57						15:57	16:10				16:17					17:58	
Dunblane					15:06	15:13					16:06	16:21	16:13							17:22	18:06	
Bridge of Allan						15:16								16:16								
Stirling			14:44		15:14	15:21			15:44	15:55	16:14	16:30	16:21			16:30	16:44		17:29	18:11		
Glasgow Queen St			15:15		15:45	16:02			16:15		16:45		17:02				17:15		18:09			

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Aberdeen	15:33					16:01					16:37					17:10				17:36		
Arbroath	16:25	16:38	16:33		16:44	16:55					17:29		17:09	17:40	17:53	18:03		18:10		18:31	18:40	
Carnoustie		16:46	16:40		16:52	17:02							17:16	17:47	18:00			18:17		18:38	18:47	
Monifieth			16:46											17:53							18:53	
Broughty Ferry			16:50											17:57							18:57	
Dundee	16:43	17:12	16:57		17:12	17:17					17:49		17:34	18:03	18:15	18:18				18:52	19:03	
Dundee	16:45		16:58			17:17					17:51		18:03	18:05		18:19		18:33		18:52	19:05	
Dundee West			17:05		()									18:12							19:12	
Barnhill	17:07	17:34	17:19		17:44								18:25	18:26			18:54				19:26	
Perth	17:10		17:23								18:11			18:30							19:14	19:30
Inverness				15:xx																16:56		17:xx
Perth	17:11	17:37		17:37			17:48	18:00	18:12	18:24	18:28	18:37					18:57	19:09	19:14		19:37	
Edinburgh Waverley						18:32			19:21							19:34			20:29			
Gleneagles	17:26	()		17:52									()	18:52								19:52
Blackford		18:08		17:57			18:08			18:46	19:01	18:57					19:20					19:57
Dunblane	17:36	18:18		18:06		18:11	18:18		18:35			19:06				19:13						20:06
Bridge of Allan						18:14										19:16						
Stirling	17:44	18:28		18:14		18:19	18:24	18:28	18:42	19:01	19:15	19:14				19:21	19:33		19:43		20:14	
Glasgow Queen St	18:15			18:45		19:01			19:14			19:45				20:01			20:15			20:45



Aberdeen				18:16			18:35			19:10			19:46			20:05			20:42			21:05	
Arbroath		18:55		19:12			19:24	19:40	19:48	20:05			20:37			20:57	21:10		21:34		21:40	21:57	
Carnoustie		19:02					19:31	19:47	19:56							21:04	21:17				21:47		
Monifieth								19:53														21:53	
Broughty Ferry								19:57														21:57	
Dundee				19:29			19:46	20:03		20:20			20:56			21:15			21:52		22:03	22:14	
Dundee		19:18		19:30			19:46	20:05	20:15	20:21			20:56			21:16	21:33		21:52		22:05	22:15	
Dundee West		0						20:12	0													22:12	
Barnhill		19:44						20:26	20:46									21:54				22:26	
Perth							20:07	20:30					21:17						22:14			22:30	
Inverness										18:43			19:xx						20:15				
Perth		19:47		19:57			20:11	20:37	20:52	21:02		21:17	21:37				21:57	22:14	22:30	22:37			
Edinburgh Waverley				20:50	21:19					21:32	22:19					22:50					23:50		23:52
Gleneagles							20:25	20:52					21:52								22:47	22:52	
Blackford		20:12						20:57	21:16				21:57				22:20					22:57	
Dunblane	20:13							21:06				21:13	22:06			22:13					22:50	23:06	
Bridge of Allan	20:16											21:16				22:16							
Stirling	20:21	20:25	20:33				20:40	21:14	21:34			21:21	21:45	22:14	22:25	22:21	22:33	22:43	23:03	23:14			
Glasgow Queen St	21:01						21:14	21:45				22:01	22:19	22:45		23:01		23:15	23:30	23:45			

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Appendix E – Route plans

Model supplied by Network Rail PCAT department under the national infrastructure sharing agreement. The absolute block signalling has been updated to the following documents provided by SDG:

Network Rail Scotland [Issued: April 2008]
Route SC119
Greenhill Upper Junction and Dundee

Network Rail Scotland [Issued: April 2008]
Route SC171
Edinburgh Waverley and Dundee via Kirkcaldy

Network Rail Scotland [Issued: April 2008]
Route SC181
Ladybank Junction and Hilton Junction

Network Rail Scotland [Issued: April 2008]
Route SC191
Dundee and Aberdeen

Network Rail Scotland [Issued: April 2008]
Route SC195
Aberdeen and Inverness

Appendix F – Glossary

The following is a list of common acronyms and terms:

AML	Average minutes late
CIF	Common interface file. A text based file containing timetable data
CUI	Capacity Utilisation Index
ECS	Empty coaching stock
FOC	Freight operating company
LTP	Long term planned freight services
NR	Network Rail
P CAT	Performance & Capacity Analysis Team (formally Strategic Access Planning Department)
PPM	Public Performance Measure. Measures the performance of individual trains against their planned timetable and reports the percentage of trains 'on time' compared to the total number of trains planned
PSS	Performance Systems Strategy
ROTP	Rules of the Plan
STP	Short term planned freight services
TIPLOC	Timing point location
TOC	Train operating company
TRUST	Train Running System TOPS, the industry tool for storing train running data
TSR	Temporary speed restriction
VSTP	Very short term planned freight services
WTT	Working Timetable