



Glasgow Airport **Rail Link**

RailWorks Simulator Route Manual

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1 - Glasgow Airport Rail Link (GARL)

1.1 Project Background

The original project that was given the go ahead in 2006 was to provide a regular and fast rail service between Glasgow International Airport and Glasgow Central Station. Trains would call at Paisley Gilmour Street allowing passengers to connect to Ayrshire and Inverclyde services then travel non-stop to Glasgow.

A new 1.9km airport spur was to be constructed starting from Paisley St James. This would extend from the existing rail line on an elevated viaduct crossing the M8 motorway and terminating at a new terminal station located next to the existing airport car park. The 9km of existing track between Shields Junction and Paisley Gilmour Street station was to be upgraded by adding a third bi-directional relief line increasing overall route capacity. Two new platforms would also be built in Central Station accessed through the existing arch by extending platform 11a. The new rail link would provide a dedicated train service with a journey time of approx. 15 minutes.

On the 17th September 2009 GARL was cancelled by the Scottish Government due to budget cuts. However the line upgrade between Shields Junction and Paisley Gilmour Street station was still to go ahead along with the two new platforms in Glasgow Central. This RailWorks simulation is based in the year 2012 as if the project had gone ahead as originally planned.

1.2 The Route

The journey begins at Glasgow Central Station where we have modelled the terminus in great detail including the two new platforms 12 and 13 that are accessible through the arch. The complex track work has been carefully reproduced along with catenary spans and signal gantry placement.

The line leaves Central Station to the West past Shields Electric Traction Depot. This is where the new Class 380 trains will be stabled and serviced. The line between Shields Depot and Paisley Gilmour Street handles passenger services to Ayrshire (Ayr, Largs & Ardrossan) and Inverclyde (Gourock & Wemyss Bay) and has been constructed with the capacity increased for the additional Glasgow Airport service. To achieve this additional capacity a bi-directional relief line has been added between the existing Up and Down lines from Shields Junction through to the re-modelled Arklestone Junction, East of Paisley. The existing Up and Down lines have also been signalled for bi-directional working.

At Paisley Gilmour Street the line splits for Ayrshire services and continues Northwest for Inverclyde and Glasgow Airport traffic, the proposed Airport Junction is located shortly afterwards just prior to Paisley St James Station. This Airport Spur is of double track design and is elevated on a new 1.9km viaduct that extends over St James playing fields and the M8 motorway terminating at the futuristic Glasgow International Airport Station. The Airport Link journey from Glasgow should take approx. 15 minutes with one stop at Paisley Gilmour Street.

A detailed route map is provided at the end of this document in a 5 page printable format. We recommend you print this for reference prior to driving the included scenarios.

2 - Getting Started

2.1 Recommended Minimum Hardware Specification

As our GARL route is highly detailed and feature rich, we do recommend a slightly higher PC specification than that of RailWorks to gain the best simulation experience.

- OS Windows XP with latest service pack installed / Windows Vista / Windows 7
- CPU Intel Pentium 4 / AMD Athlon 3.0 GHz or equivalent
- RAM 2.0GB
- GFX 512MB DirectX 9.0c compliant video card, supporting Pixel Shader 3.0
- SFX Sound Blaster® X-Fi™ series from Creative Labs
- HDD 4.5 GB of space is required to install the game

2.2 Graphics Settings

There are many ways to configure your video card and RailWorks and this manual does not intend to cover all of these options. However, if you need to increase performance then the following options may be of assistance. **REMEMBER!** You should only adjust settings if you are confident that you know what you are doing. Totalize Media Limited cannot take any responsibility for damage caused or loss of data due to altering computer settings as outlined below.

RailWorks Display Setting	Start with 1024 x 768 then gradually increase resolution until you find the best setting for your PC
RailWorks Procedural Flora	Turn this off for better performance
RailWorks High Detail Shadows	Turn this off for better performance
RailWorks Object Texture	Lower the detail for better performance as this decreases the photographic terrain resolution
RailWorks Scenery Detail Slider	On a lower specification PC this can be set lower to remove scenery assets and detail. Try reducing to a setting between 5 and 9. Settings lower than 5 will remove detail such as catenary brackets and may detract significantly from the simulation experience.
GFX Anti-Aliasing	The higher this is set the bigger the impact on your graphics card. Try 4X and gradually increase until you find the best setting for your PC
GFX Anti-Aliasing Transparency	This setting can have one of the highest impacts on system performance. Supersampling looks great but has the highest impact. Multisampling is a good compromise and best performance can be achieved with this effect turned off.

3 - Class 380 Electric Multiple Unit



3.1 Overview

Initially, the trains will be used for ScotRail services in Ayrshire and the Inverclyde region of Scotland and had also been intended for the cancelled Glasgow Airport Rail Link.

A total of 38 sets were ordered, comprising 22 three-car and 16 four-car units. Stations along the Ayrshire Coast Line and Inverclyde Line will undergo platform extension to allow the use of the longer trains. The trains were specified to have full access for the disabled and to have streamlined end corridor connections. The fleet will be based at Shields Electric Traction Depot.

On the unveiling of the first completed vehicle, it was announced that the fleet would be divided into two sub-groups, with the 3-car units classified as Class 380/0 and the 4-car units as Class 380/1.

Our 380 model features animated gangway corridor connections and these automatically close up on coupling sets together.

3.2 Design & Specification

TOPS Number	Class 380
Formation	3-car 380/0:DMSO+PTOSLW+DMSO 4-car 380/1:DMSO+PTOSLW+TOSL+DMSO
Weight	180 tonnes (4-car)
Per Car Length	66ft (20.4m)
Width	9ft (2.796m)
Body Construction	Aluminium
Articulation	Inter-unit and inter-vehicle flexible diaphragm
Power per DMSO	775kW
Design Speed	100 M.P.H. (160km/h)
Brake Types	Regenerative, Rheostatic, Air
Voltage	25 kV AC Overhead

3.3 Driver Cabin



	Control Name	Description
1	Throttle Brake Controller	Push forward for Brake in 4 steps, Centre for off and pull back for throttle <i>Maximum design speed is 100 M.P.H. Maximum Line Speed for GARL is 75 M.P.H.</i>
2	Reverser	Forward, Neutral and Reverse
3	AWS Acknowledge Button	<i>(See safety systems section of this manual)</i>
4	Horn	Warning Horn
5	Wiper Switch	Windscreen Wipers On/Off
6	Pantograph Switch	Raise and Lower Pantograph
7	Headlight Switch	Off / Headlights / Taillights
8	Air Brake Pipe Gauge	Current Brake Pipe Pressure
9	Speedometer	Current Speed
10	AWS Sunflower Indicator	<i>(See safety systems section of this manual)</i>
11	Doors Locked Indicator Lamps	Illuminated in blue when train doors locked
12	Sander Button	Apply sand to track for added traction
13	LCD Throttle Brake Position Indicator	Displays current position of Throttle Brake
14	LCD Headlight Setting Indicator	Displays current Headlights or Taillights
Key B	On Train Communication Bell	Keyboard “B” sounds the Bell tone

4 - Signals

4.1 Main Signal Head Aspects



Colour light signals are used for controlling running movements. They display aspects by means of red, yellow and green coloured lights.

Signal Aspect	Description	Instruction to Driver
Red light	Danger	Stop.
Single yellow light	Caution	Proceed: be prepared to stop at the next signal.
Double yellow lights	Preliminary caution	Proceed: be prepared to find the next signal displaying one yellow light.
One flashing yellow light	Preliminary caution for a diverging route	Proceed: Be prepared to find the next signal displaying one yellow light with feather junction indicator for diverging route(s).
Double flashing yellow lights	Indication of diverging route ahead of the next but one signal	Proceed: Be prepared to find the next signal displaying one flashing yellow light.
Green light	Clear	Proceed: The next signal is displaying a proceed aspect.

4.2 Theatre Type Signals



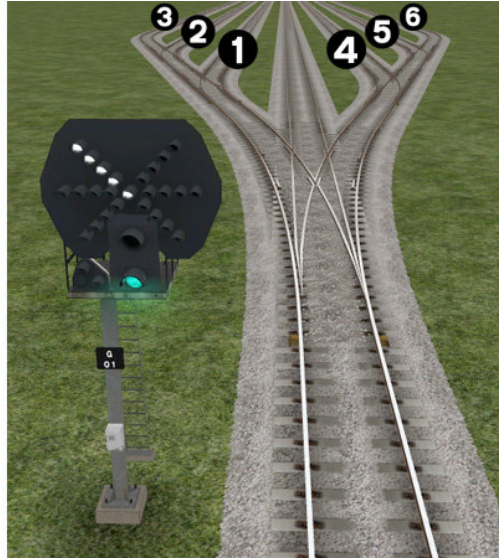
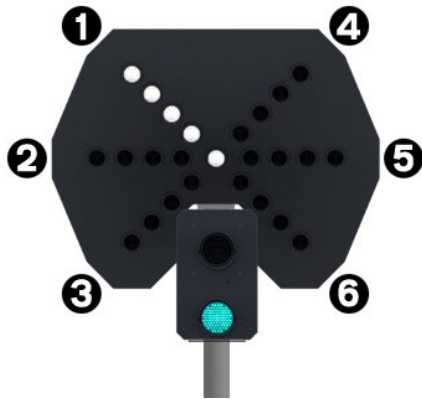
A Theatre alphanumeric route indicator indicates the route to be taken using numbers or letters (or a combination of numbers and letters).

The examples shown opposite indicate routing on to the “Down Ayr Line” and routing on to “Glasgow Central Line 4”.

Full details of all Theatre indications for the GARL route are shown on the route map provided at the end of this document.

4.3 Feather Type Signals

A Feather junction indicator indicates a diverging route to be taken by the angle at which a line of five white lights is displayed. (Position 1 shown)



Feather Indication	Instruction to Driver
No Feather Indication	Obey main aspect, straight-ahead route is set
Position 1 indication	Obey main aspect, expect divergence to left
Position 2 indication	Obey main aspect, expect divergence to left more extreme than that for position 1
Position 3 indication	Obey main aspect, expect divergence to left more extreme than that for position 2
Position 4 indication	Obey main aspect, expect divergence to right
Position 5 indication	Obey main aspect, expect divergence to right more extreme than that for position 4
Position 6 indication	Obey main aspect, expect divergence to right more extreme than that for position 5

4.4 Ground Signals and Position Light Signals



Ground Signals and Position Light Signals (PLS) display their aspects by means of the position and colour of lights. Ground Signals are always illuminated and can have miniature theatre indicators attached whereas PLS only illuminate to allow a train to pass in to an occupied section of line and are mounted as an addition to a main signal head.

Signal Aspect	Description	Instruction to Driver
Two red lights	Danger	Stop.
No aspect (where associated with a main aspect)		Obey main aspect.
Two white lights	Caution	The line ahead may be occupied. Proceed cautiously towards the next stop signal, stop board or buffer stops. Be prepared to stop short of any obstruction. The associated main aspect (where provided) may be passed at danger

4.5 Repeater Signals



A banner repeater signal indicates whether the signal ahead is displaying a proceed aspect or is at danger. Modern fibre optic banner repeating signals, as shown opposite, consist of a rectangular unlit black background displaying a white circle with a black bar.

Signal Display	Instruction to Driver
Horizontal arm	Be prepared to find the related signal at danger
Arm at an upper quadrant angle of 45°	Related signal is exhibiting a proceed aspect

Repeater signals are intended to provide a driver with advance information of a signal that may be obscured on approach. A train does not need to stop at a repeater signal, only at the related signal if it is at danger.

Splitting banner signals provide two banner signal heads combined to form a splitting banner repeating signal. These are used to indicate the aspect of a signal with a feather junction indicator. If the related junction signal is displaying an illuminated feather then the lower banner head displays an arm at an upper quadrant angle of 45°. Alternatively, if the related junction signal is not displaying an illuminated feather and is indicating a straight ahead route then the higher “main” banner head displays an arm at an upper quadrant angle of 45°.

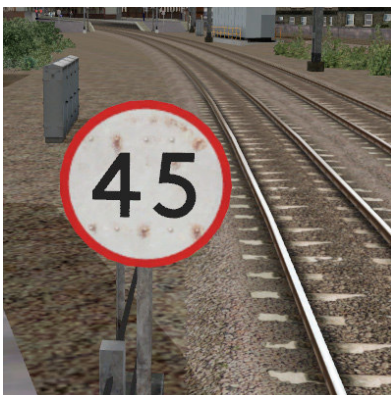


Another type of repeater is an “OFF” platform indicator.

Signal OFF indicators are provided to assist train dispatch staff. An OFF indicator displays the illuminated word ‘OFF’ only when the signal(s) to which it applies is displaying a proceed aspect. No indication is shown when the signal is at danger.

5 - Speed Signs

5.1 Permissible Speed Indicators



These signs display the permissible speed in M.P.H. applicable to the section of line beyond the sign up to the commencement of any subsequent permissible speed section.

Remember to wait for the complete length of your train to pass these signs before accelerating if the permissible line speed is increasing. If the permissible line speed is decreasing then you must reduce your speed before passing these signs.

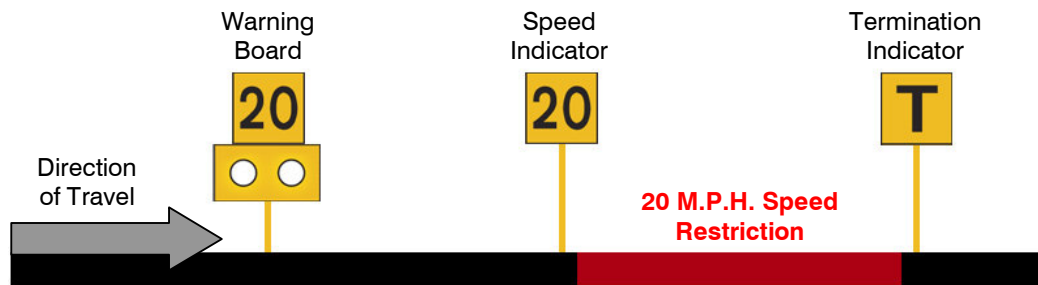
5.2 Permissible Speed Warning Indicators



These signs provide advance warning of a reduction in permissible speed ahead. Permanent AWS Ramps (Automatic Warning System) are often installed in conjunction with these signs. In these cases the driver must cancel the AWS warning when triggered on approach to these signs.




(See safety systems section of this manual)





5.3 Temporary Speed Restrictions



Temporary speed restrictions are normally put in place when engineering works and track maintenance is taking place. These temporary speed restrictions are advised in the drivers' weekly operating notice and in this simulation are advised in your scenario briefing. The normal sequence of trackside signage is shown above.

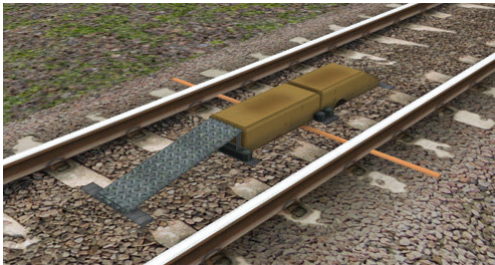
However, when line speeds need to be reduced at short notice they are referred to as an "Emergency Speed Restriction" and are additionally protected by providing an "Emergency Indicator" prior to the temporary speed restriction warning board. The emergency indicator has two synchronous flashing white lights.

Temporary Sign	Description	Instruction to Driver
	Emergency Indicator	This sign warns that there is a warning board ahead for an emergency speed restriction that has not been previously advised.
	Warning Board	This sign provides warning of a restriction speed indicator ahead.
	Repeater Warning Board	This sign provides a reminder of a restriction speed indicator ahead. It is normally used where a driver has set off from a platform after passing a warning board

	Restriction Directional Arrow	This sign is always associated with either a warning board, a speed indicator or a spate indicator.
	Restriction Speed Indicator	This sign indicates the start of a temporary speed restriction with the value shown in M.P.H. You must reduce your speed before passing these signs.
	Restriction Termination Indicator	This sign identifies the end of a temporary speed restriction. Remember to wait for the complete length of your train to pass this sign before accelerating back to normal line speed.
	Restriction Spate Indicator	This sign identifies that the temporary speed restriction, at that location as previously advised, is now not in force.

6 - Safety Systems

6.1 AWS (Automatic Warning System)



AWS is provided to give train drivers in-cab warnings of the approach to signals, reductions in permissible speed and temporary/emergency speed restrictions, and to apply the brakes in the event that a driver does not acknowledge cautionary warnings given by the system.

As a train approaches a signal, it passes over AWS track equipment (magnets) which are fixed to the sleepers between the running rails. The magnets are sensed by a receiver mounted under the leading end of the train.

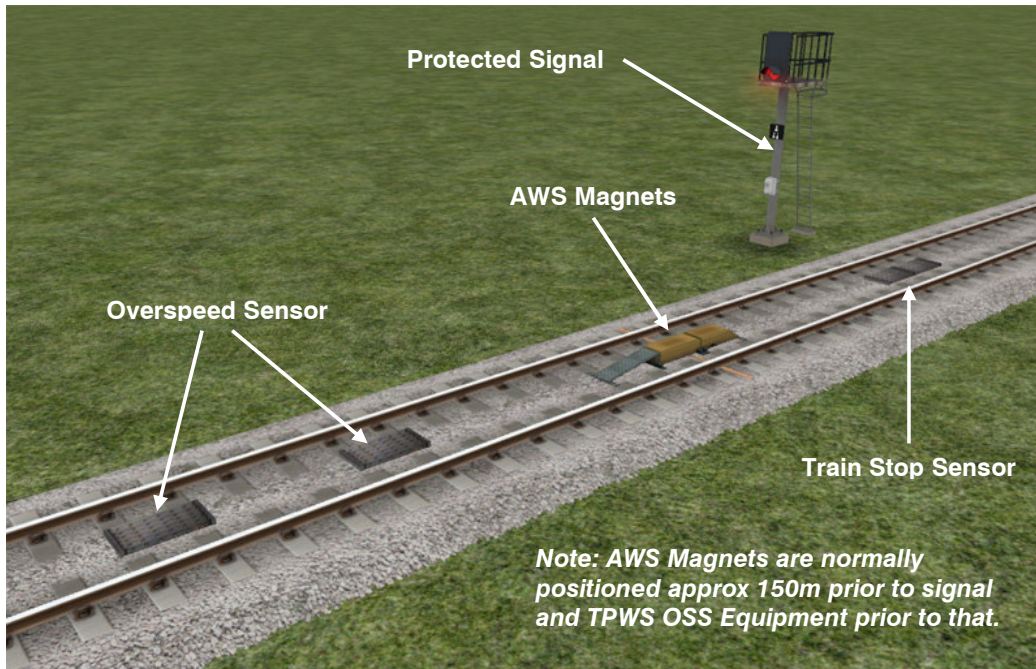
If the signal ahead is displaying a clear aspect (green), a bell (or an electronic ping) sounds in the driver's cab, and the AWS Sunflower indicator displays "all black". No action in respect of the AWS is required of the driver.

If the signal is displaying a caution or danger aspect (yellow, double yellow or red), a horn sounds in the driver's cab and the display shows "all black". The driver has to acknowledge the warning by pressing the "AWS Acknowledgement" push button. When the driver operates the push button, the horn is silenced and the AWS Sunflower changes to a segmented yellow and black circular display. If the driver fails to acknowledge the warning horn within a set time period, the brakes are applied automatically.

Where AWS equipment is provided on the approach to reductions in permissible speed and temporary/emergency speed restrictions, the cab equipment always operates in a manner equivalent to the approach to a signal displaying a caution or stop aspect. The driver receives a warning and has to respond to it accordingly; otherwise the brakes are applied automatically.

6.2 TPWS (Train Protection and Warning System)

The primary purpose of TPWS is to minimise the consequence of a train passing a TPWS fitted signal at danger and a train overspeeding on approach to a TPWS fitted signal at danger. TPWS track equipment is only active when the signal that they are protecting is displaying a danger aspect (red).



There are two pairs of grids mounted between the running rails. Both pairs consist of an 'arming' and a 'trigger' grid. The first pair, the Overspeed Sensor (OSS), are positioned on approach to the protected signal. The other pair of grids are mounted back to back at the signal location, and these form the Train Stop Sensor (TSS).

The emergency train brakes are automatically applied if a train passes over an active Overspeed Sensor faster than a predetermined speed (in the GARL simulation this preset speed is between 20 and 25 M.P.H. dependent on line speed and location). The brakes are also automatically applied if a train passes over an active Train Stop Sensor at any speed, as the signal it is protecting must be at danger.

After passing a signal displaying a caution aspect (single yellow) it is advisable to reduce your train speed to anticipate the approach to the next signal. It may be at danger and therefore the TPWS Overspeed Sensor will be active and will trip an emergency stop if your train speed is greater than the preset approach speed when you pass over it.

TPWS "Mini OSS" grids are also installed at terminus stations (Glasgow Central and Glasgow International Airport). These grids are positioned approx 50m prior to the buffer stops and are preset to 12 M.P.H. Your train must be traveling at less than 12 M.P.H. when passing over these grids when arriving in to these platforms.

7 Entering an occupied section of track

During a scenario your train may be scheduled to enter a platform or section of track that is already occupied by another train or rolling stock. In this situation you should stop at the red signal protecting this section of track as normal. Once your train has stopped press the TAB key on your keyboard to request permission from the signalling centre to enter the occupied section of track. When your train movement is approved the signal will illuminate the two white lights on the position light signal if it has one.

8 Coupling Class 380 sets together

We recommend that “Automatic Coupling” is set to “On” in RailWorks options before running any scenarios. (Home > Options > Gameplay)

When coupling up to another Class 380 set you should stop just short of the other train then move forward slowly at about 2 M.P.H. until coupling commences and the gangways between the sets extend. As soon as coupling commences remember to apply the train brake. You can then navigate to another driver cabin on the new train formation by pressing CTRL and + together on your keyboard.

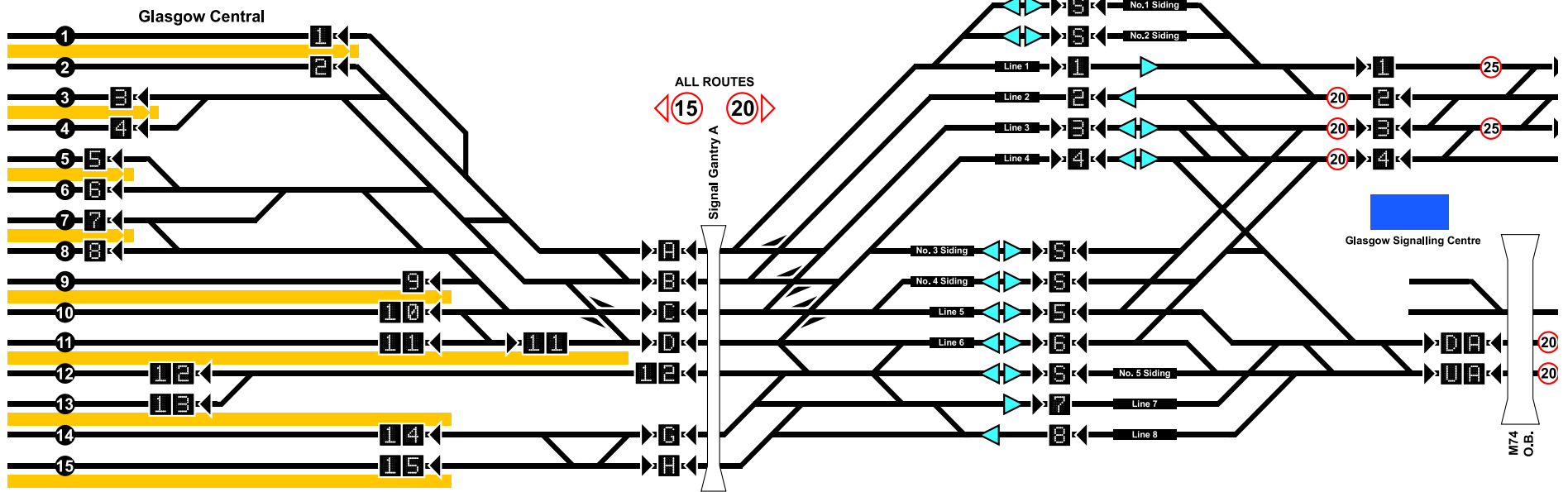
9 Credits

Lead Developer	Alan Thomson
Totalize Media Team	Alan Cunningham
	John Edgar

GARL has been a complex undertaking and we would like to thank everyone who helped in its development including the Railsimulator.com team.



Terrain height data for the GARL project was converted with a commercial licensed copy of ReDem from Zugware.com



KEY	
Rail Line	Line Theatre Indicator
Line Name	Platform Number
Single Directional Line	Station Platform
Bi-Directional Line	O.B. Over Bridge
Bi-Directional Line (Double Arrow for Normal Direction)	U.B. Under Bridge
Line Speed Restriction	

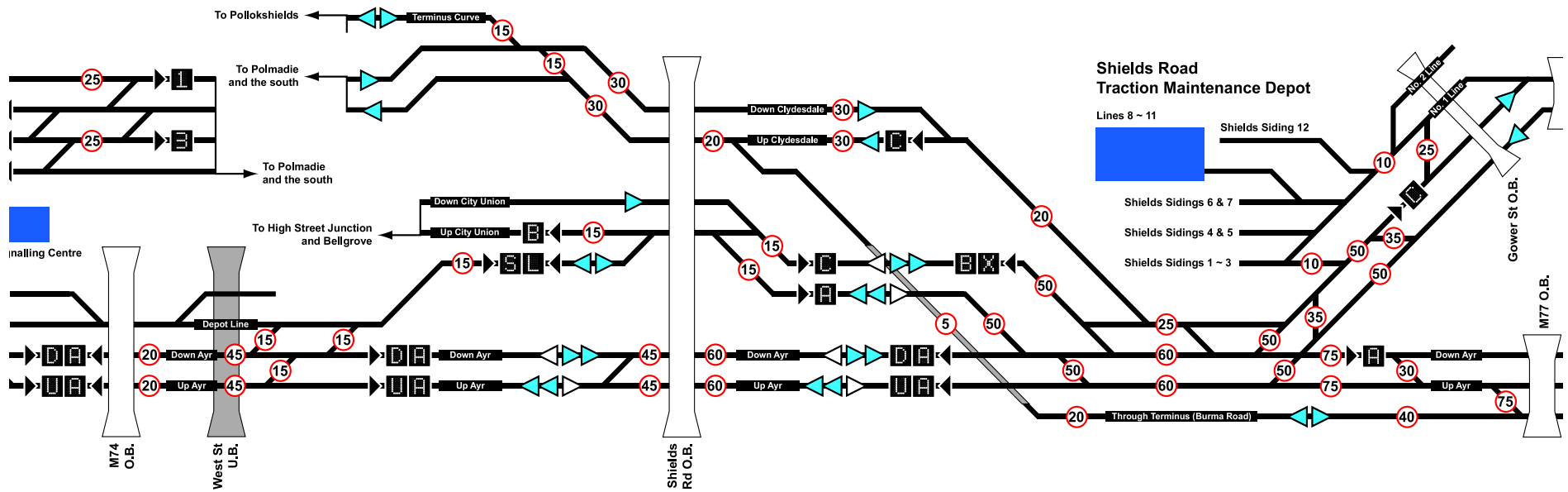
Glasgow Airport Rail Link Route Map

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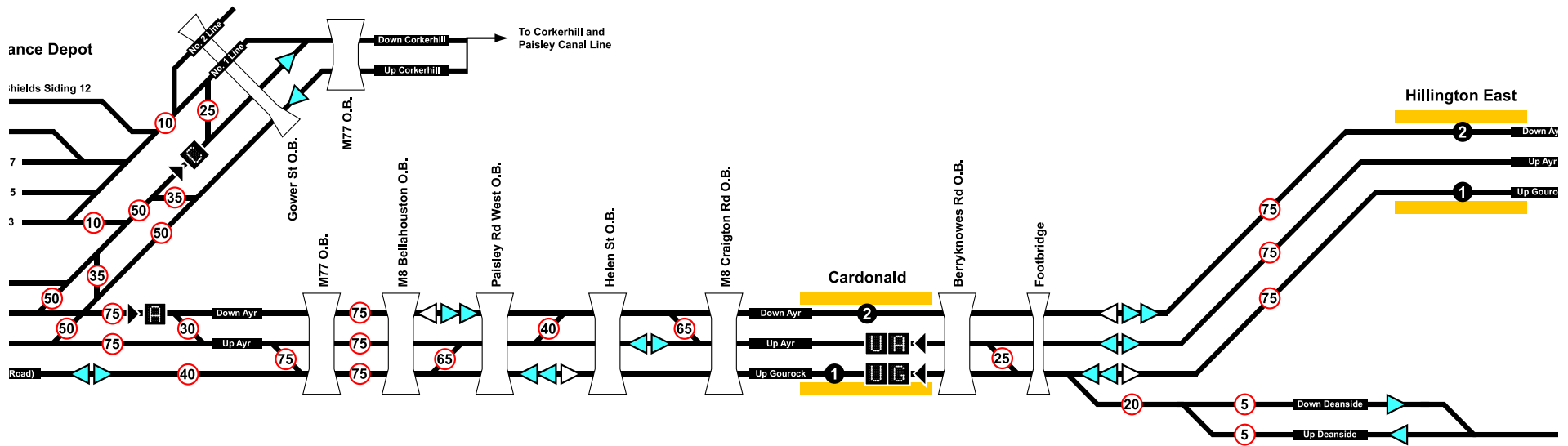
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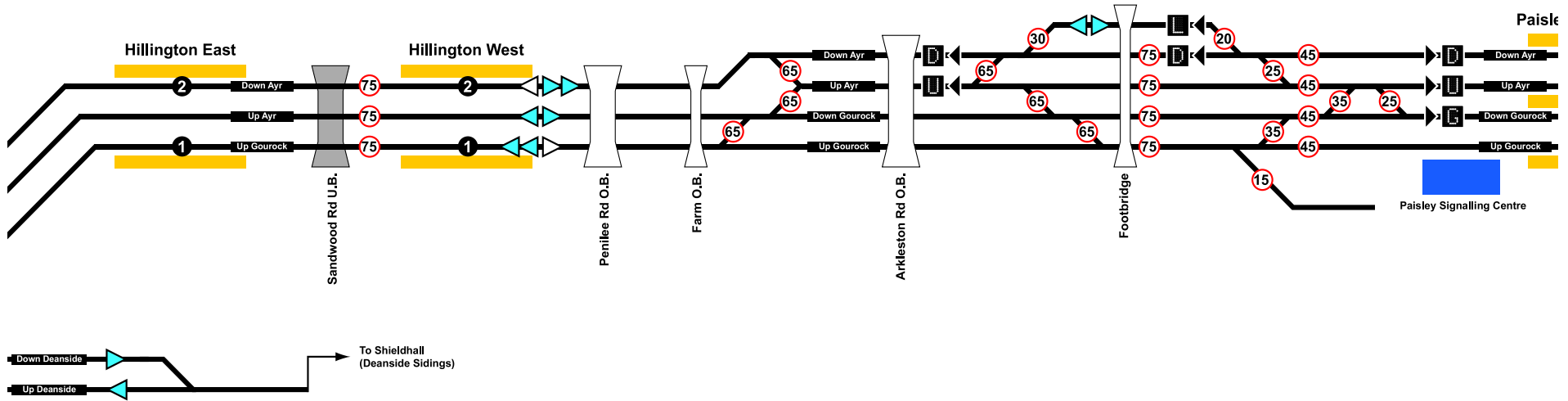
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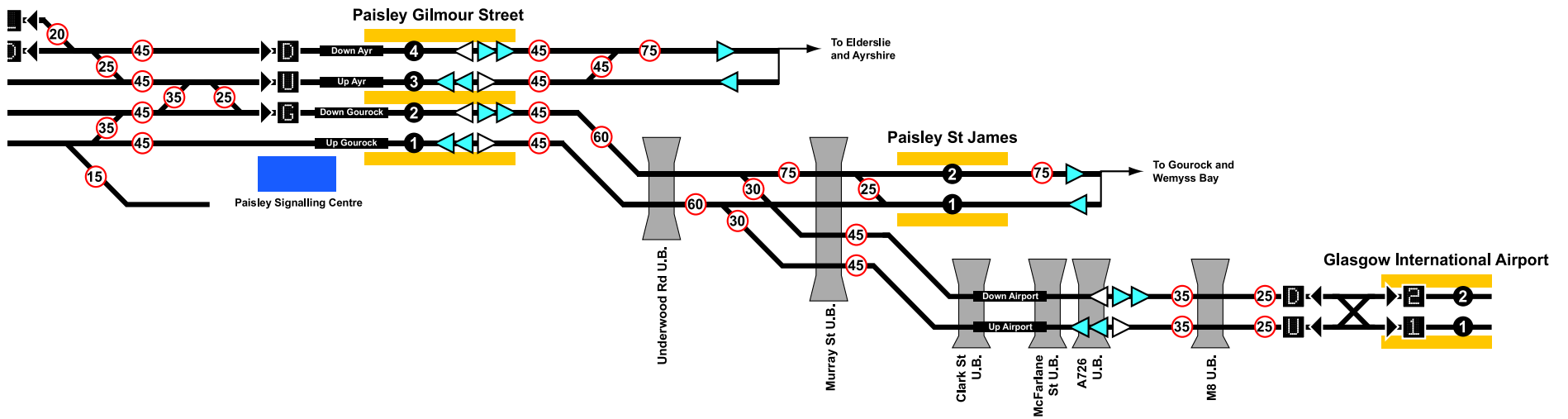
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