

## Albula Line – Thusis to St. Moritz



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## I Route Information

### I.1 History

Dating back to the early 1900s, the unique railway that operates between Thusis and St. Moritz via the Albula Valley truly is a spectacular wonder to behold. Home to incredible scenery, innovative engineering and the 'slowest express service in the world'.

Following the formation of the Rhaetian Railway (RhB) in 1890, plans were put into effect which would increase the somewhat lacking number of railway lines in south-east Switzerland. Multiple proposals were put forward for the new line's route with the eventual result settling on a pass through the Albula Valley to connect Thusis and St. Moritz.

Thanks to the undulating nature of the Albula Valley, the line needed to ascend over 1 km in the distance between the two towns; as a result the railway featured multiple hairpin loops, spiraling tunnels and numerous viaducts to achieve the climb at a rate of 3.5%, without the need for a rack-and-pinion railway. Construction of the new line was completed in as little as 5 years and services began to operate regularly almost immediately. Despite this however, the opening of St. Moritz was delayed by about a year as there was an ongoing dispute on the stations' location.

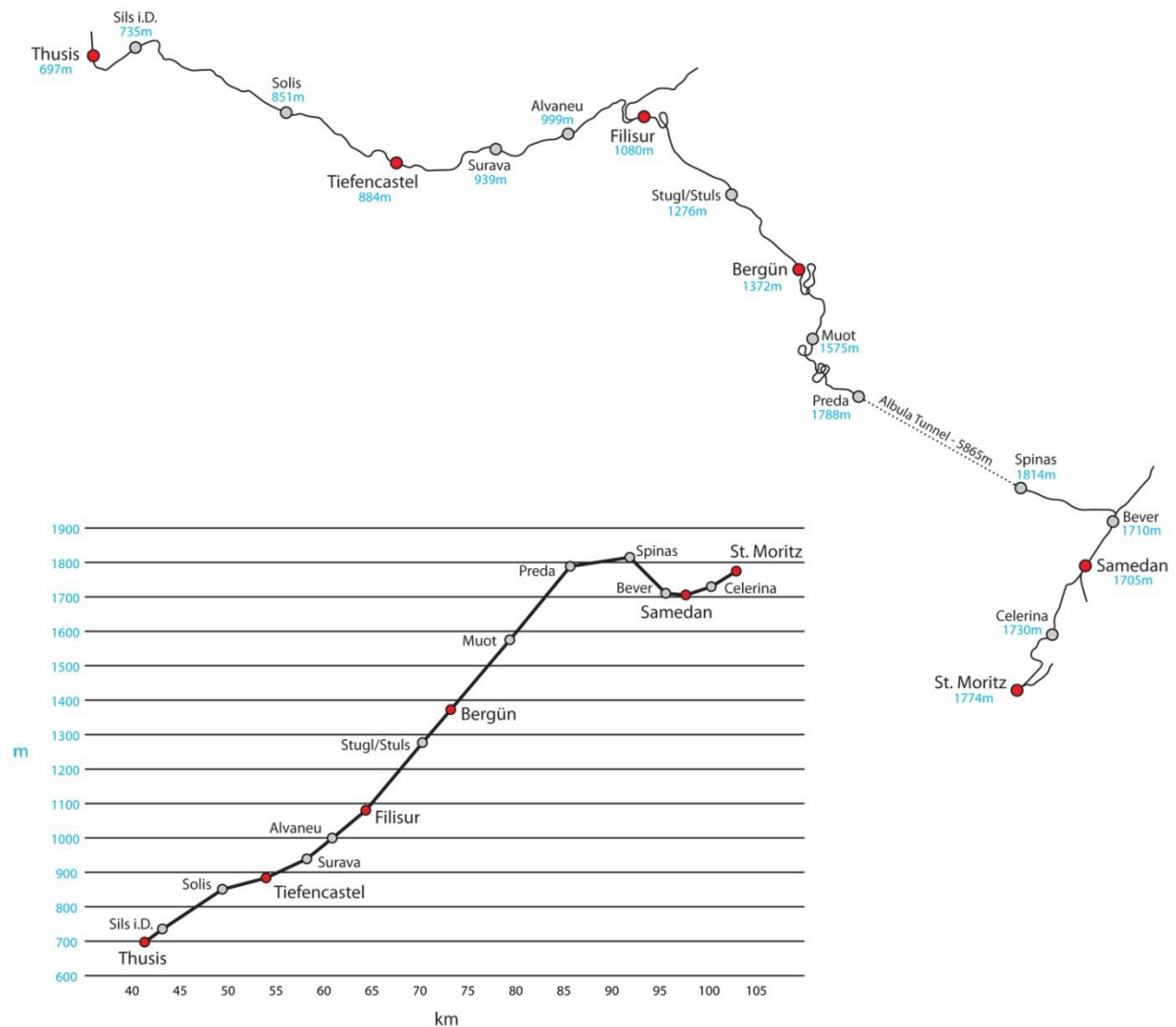
The line was initially built as a single track, metre gauge, steam railway with passing loops at each of the stations along the route. In more modern times, the number of passing loops and the length of them also has been increased to ensure smoother running throughout. The line remained without wires until 1919 when a shortage of coal following World War I prompted the start of electrification.



Aside from the stunning scenery offered by the surrounding mountains at every turn, the centrepiece of the line is considered to be the Albula Tunnel. Stretching over 5.8 km under the Rhine and Danube watershed, the Albula Tunnel is the second highest tunnel in Switzerland at 1820m above sea level and passes under almost 1 km of towering mountains above. It was one of the most difficult aspects of the line to construct, with leaky tunnel walls and near-freezing conditions bringing progress to a stand for quite some time.

Today, the Albula Line is known worldwide as one of the most picturesque routes there is. Its tracks see regular passage of the famed Glacier Express, complete with modern, panoramic coaches to give passengers a full frontal view into the Albula Valley. With such sharp turns and steep gradients, the Glacier Express traverses the line at an average of 39 km/h, making it amongst the slowest, yet most beautiful in the world. The unbeatable nature and technological marvel of the Albula Railway has earned it ever-lasting railfan fame and UNESCO World Heritage status.

## 1.2 Route Map



## 1.3 Route Features

- All new metre gauge track system with 3D sleepers, animated junction levers and illuminated indicators covering the 65km line.
- Completely new RhB signalling system with custom designed signal models and features including:
  - Animated Brake Test and “Abfahrbefehl” (departure indicators)
  - Operating “Besetztes Gleis” indicators for entering occupied platforms
  - Three state ground signals that function correctly between main signals
  - ZSI-90 Safety System track magnets and in-cabin equipment
- Over 100 overhead line equipment and catenary models designed specifically for this route.





- The first ever operating pantographs in Train Simulator. Player locomotives have pantographs that dynamically follow the height of the overhead wires and lower through tunnels.
- Over 130 custom bridge and tunnel portal models designed to accurately represent the stunning engineering of the route.
- 16 Highly detailed station models designed from our survey of the route in early 2016 along with many other feature models along the line.
- New animated ski lift models in Bergün and Celerina.
- New detailed rock face models to capture the breath-taking scenery of the Albula Valley.
- All new Ge 4/4 III Electric Locomotive in branded RhB livery with correct body side crests for all twelve locomotive numbers (641 – 652). Dynamic pantographs with sparking feature, animated wing mirrors and exterior driver character that automatically moves to the driving end of the loco. Cabin design based on later models with control wheel including speed control function and a host of other in cabin features.
- Glacier Express panoramic coaches in four variants (Ap, Api, Bp and WRp). The Ap first class coach includes a highly detailed passenger view with 3 camera positions and all coaches are fitted with close coupled corridor connections. They also feature configurable destination and coach number displays.
- Lb-v container flat wagons. An unloaded version and two container liveries are included.
- Route fully configured for Quick Drive scenarios with visibly loaded container wagons.
- 3 x Railfan Mode Scenarios.
- 1 x New Passenger Mode scenario where you can sit back and relax to take in the views.
- 7 x Career Scenarios including a guided tutorial for the Ge 4/4 III locomotive.

## 2 The Ge 4/4 III Locomotive

### 2.1 Locomotive History

After the opening of the Vereina Tunnel there was an increase in traffic on the RhB network. In order to deal with this increase, the Rhaetian Railway ordered new electric locomotives based upon AC technology with GTO Thyristors. The Ge 4/4 III is the third class of Swiss locomotive and railcar classification type Ge 4/4 to be acquired by the Rhaetian Railway. Ge 4/4 indicates a narrow gauge electric adhesion locomotive with four driven axles. Their control technology corresponds almost completely with that of the SBB-CFF-FFS Re 460 class of locomotive.

The first locomotive was delivered in December 1993. A further eleven locomotives were delivered between 1994 and 1999.

### 2.2 Design & Specification

<b>Number Range</b>	<b>641 - 652</b>
<b>Wheel Arrangement</b>	Bo-Bo
<b>Weight</b>	62 tonnes
<b>Length</b>	16m
<b>Width</b>	2.8m
<b>Power at Rail</b>	3,200hp (2,400kW) at 80km/h
<b>Max Speed</b>	100km/h

### 2.3 Cabin Controls - Refer to the illustrations on page 7

<b>1</b>	Train Vacuum Brake	<b>14</b>	Train Braking Force Indicator
<b>2</b>	Parking Brake	<b>15</b>	Shunting Mode Indicator Lamp
<b>3</b>	Driving Control Wheel	<b>16</b>	Differential Traction Force Indicator
<b>4</b>	Driving Mode Switch	<b>17</b>	Catenary Voltage Indicator
<b>5</b>	ZSI Safety System Lamps	<b>18</b>	Wiper Switch and Left Wiper Enable Button
<b>6</b>	Emergency Brake	<b>19</b>	Reverser
<b>7</b>	Warning Horn	<b>20</b>	ZSI Acknowledge Button
<b>8</b>	Sander Button	<b>21</b>	Pantograph Raise / Lower Switch
<b>9</b>	Main Reservoir Pressure Needle	<b>22</b>	Parking Brake Indicator Lamp
<b>10</b>	Brake Cylinder Pressure Needle	<b>23</b>	Headlight Mode Selector Switch
<b>11</b>	Brake Pipe Pressure Needle	<b>24</b>	Cabin Lights Switch
<b>12</b>	Vacuum Brake Pressure Needle	<b>25</b>	Instrument Lights Dimmer Control
<b>13</b>	Speedometer KPH	<b>26</b>	Opening Cabin Windows

### 2.4 Additional Keyboard Controls

<b>L</b> – Toggle Cab Light On / Off	<b>V</b> – Toggle Wipers On / Off
<b>I</b> – Increase Instrument Lights	<b>SHIFT+V</b> – Enable Left Wiper
<b>SHIFT+I</b> – Decrease Instrument Lights	<b>E</b> – Increase Driving Mode
<b>Q</b> – ZSI Acknowledge	<b>SHIFT+E</b> – Decrease Driving Mode



**Note: controls that are not identified above have no function even if they are animated.**

## 2.5 Driving Mode Switch

This locomotive is equipped with automatic speed / regulator control. The Driving Control Wheel can operate in three different modes for regulator control:

- 1) Shunting (Rangier)
- 2) Speed Control (Strecke)
- 3) Speed Control Half Power (Leistung 1/2)

When the operation mode is set to Shunting the "Betriebsart Rangier" desk indicator (15) illuminates as shown on page 7. This mode should be used for all shunting and coupling operations to enable slower speed control as it provides linear regulator control from the Driving Control Wheel.

When Speed Control is selected it converts the Driving Control Wheel to a speed select mode. In this mode the power is automatically controlled to accelerate the locomotive up to, and maintain the selected speed. This system is not connected to the brakes and cannot slow the train down, you must manually control the brakes.

Half Power mode operates the same as standard speed control but applies only fifty percent of the power. This mode should be used when travelling without wagons or coaches. It can also be useful while travelling downhill.

## 2.6 Driving Control Wheel

The wheel is divided into two zones - Bremsen and Fahren. The Bremsen zone controls the locomotive only brake in all operation modes. The Fahren zone operates differently depending on the current position of the Driving Mode Switch as explained above. Power and locomotive brakes are both off while the wheel is in the centre position.

## 2.7 ZSI-90 Safety System

You are alerted by the ZSI safety system when you pass a distant signal (Vorsignal) that is displaying a warning. The ZSI Acknowledge Button and ZSI Warnung Lamp will start to flash accompanied by an audio beep. You must press the ZSI Acknowledge Button immediately otherwise the emergency brakes will be applied automatically. Once pressed there will be five further lamp and audio alerts to remind you that you are driving under a distant signal caution. **A ZSI alert will also be activated when you pass a main signal displaying Aspect 6 (Short Journey – Expect Obstruction).**

## 2.8 Running Numbers

When creating scenarios running numbers for the locomotives are generated randomly including a letter that controls the display of the correct crest on the side of the loco corresponding to the generated number. The twelve valid running numbers are as follows:

641a	Maienfeld	647g	Grüsch
642b	Breil/Brigels	648h	Susch
643c	Vals	649i	Lavin
644d	Savognin	650j	Seewis im Prättigau
645e	Tujetsch	651k	Fideris
646f	Sta. Maria Val Müstair	652l	Vaz/Obervaz Lenzerheide-Valbella



## 3 Glacier Express Panoramic Coaches

### 3.1 Destination and Coach Number Displays



If you wish to make use of the coaches in your own scenarios, it is possible to customise the Destination Display and Coach Number during the creation of a scenario.

In order to display a specific destination and coach number, the correct value must be entered into the vehicle properties window. This number consists of a 7 digit value containing both numbers and a letter. This is possible with all coach variants except the WRp catering vehicle as it does not feature LED screens.

The 7 digit value is arranged like so: **VVVVCCD**

**VVVV** = the Vehicle number (the white number displayed on the side of the coach)  
**CC** = the Coach number (the two digit coach number displayed on the LED screens)  
**D** = the Destination (the destination text displayed on the LED screens)

Example shown above: 243251S (where "S" is for St. Moritz) – see valid destinations below:

<b>A</b>	<b>Samedan</b>
<b>B</b>	<b>Bergün/Bravuogn</b>
<b>C</b>	<b>Chur</b>
<b>D</b>	<b>Davos</b>
<b>F</b>	<b>Filisur</b>
<b>G</b>	<b>Brig</b>
<b>S</b>	<b>St. Moritz</b>
<b>T</b>	<b>Thusis</b>
<b>W</b>	<b>Welcome</b>
<b>X</b>	<b>Reserved</b>
<b>Z</b>	<b>Zermatt</b>

## 4 Signals

### 4.1 Signal Heads and Permissible Speeds

Swiss railways use two main families of signalling - the “L” system and the “N” system. The RhB (Rhaetian Railway) network is signalled with the “L” system with alterations to the speeds that relate to the signal aspects compared to those that apply to standard gauge signal aspects on SBB routes for example. In Switzerland signals are normally positioned on the left hand side of the track unlike Germany and Austria. Where there is reduced visibility or multiple tracks they can be also positioned on the right hand side of the track.

RhB signals use separate main and distant heads as shown below and these can be mounted either individually to form a main signal (Hauptsignal) or a distant signal (Vorsignal) or both heads mounted on the same signal post (Combined Signal).

Distant signals provide advanced warning of a speed reduction commencing from the next main signal and usually provide ZSI Safety System protection as described on page 8. Main signal aspects indicate either that the line is blocked or the line is clear at the current line speed or display a reduced speed that must be achieved by the driver before passing the main signal.

There are also some additional signal indicators and the following examples illustrate the most common combinations along with an explanation of their use.



This is a main signal (Hauptsignal) that is currently showing Aspect 3 to alert the driver that 45 km/h is the maximum permissible speed allowed beyond this point.

**Head 1** is the Main Signal Head

**Head 3** is a co-acting Ground Shunt Signal  
(these are explained on page 14)

**Head 4** is a Brake Test / Departure Indicator

If vehicles are uncoupled or coupled to a train then it is essential that the driver carries out a brake test before departure. During the brake test the ground staff communicate with the driver using this indicator as follows:



Apply Brakes

Release Brakes

Brake Test Successful

Ready for Departure (Abfahrbefehl)

These indicators are animated in this simulation for effect but do not need to be obeyed while driving a scenario.

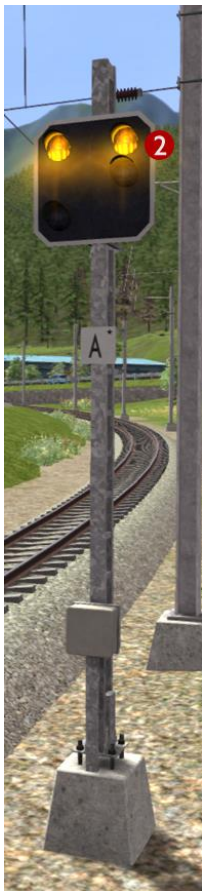


This is a combined signal that is currently showing Aspect 3 on the Main Signal Head to alert the driver that 45 km/h is the maximum permissible speed allowed beyond this point. The Distant Signal Head is showing that the next signal ahead is displaying Aspect 0 (Stop).

**Head 1** is the Main Signal Head

**Head 2** is the Distant Signal Head

*Distant signals usually provide ZSI protection as described on page 8.*



This is a Distant Signal that is currently showing that the next signal ahead is displaying Aspect 0 (Stop).

**Head 2** is the Distant Signal Head

*Distant signals usually provide ZSI protection as described on page 8.*



This is a Distant Repeater Signal that is currently showing that the next signal ahead is displaying Aspect 0 (Stop).

A Repeater Signal can be identified by having a smaller Distant Head. These signals are located between a Main Signal and its preceding Distant Signal at locations where visibility is restricted such as on tight curves or where bridges obstruct the view.

**Head 5** is the Distant Repeater Signal Head

*Repeater signals **DO NOT** provide ZSI protection.*



This combined signal on approach to a station has an additional Occupied Track Indicator.

If you need to proceed past a signal showing a Stop aspect in to an occupied track then you will need to press TAB during the scenario to ask the signaller for permission. If permission is granted then the signaller will set the Main Signal Head to the aspect shown here. The Main Signal Head will display Aspect 2 to limit your speed to 30 km/h and the Occupied Track Indicator (Besetztes Gleis) will illuminate with four horizontal lights. The Distant Signal Head will go dark.











**Head 6** is the Occupied Track Head (Besetztes Gleis)

If the Main Signal Head does not have the lights necessary to display Aspect 2 then Aspect 0 (Stop) will continue to be displayed and the Occupied Track Indicator will illuminate with four diagonal lights instead meaning you have consent to overrun the signal.



This table illustrates the signal aspects and associated permissible speeds that are used on the RhB network.

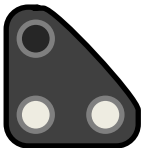
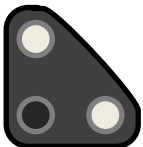
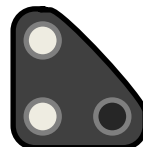
*Note: All Shunting operations should take place at a maximum of 30 km/h in station areas.*

Aspect	Meaning	Distant Signal (Vorsignal)	Main Signal (Hauptsignal)
Aspect 0	<b>Stop</b>		
Aspect 1	<b>Clear</b> – Maximum speed is as shown on relevant speed signs		
Aspect 2	<b>30 km/h</b> Maximum Speed		
Aspect 3	<b>45 km/h</b> Maximum Speed		
Aspect 6	<b>30 km/h</b> Maximum Shunting Speed (Short Journey – Expect Obstruction)  You are alerted by the ZSI safety system when you pass the distant signal <u>and</u> the main signal that is displaying Aspect 6.		

## 4.2 Ground Shunt Signals

These signals are normally mounted on short ground posts, however at stations they are sometimes mounted below the platform canopy.

When they are located alongside a Main Signal they co-act and display the appropriate aspect according to the aspect the Main Signal is set to.

Aspect	Meaning	Ground Shunt Signal
Stop	Stop at this signal	
Warning	The next Main Signal or Shunt Signal is at Stop or you are entering a siding / end of line	
Clear	The next signal is displaying a proceed aspect	

## 4.3 Clear Track Signals



At St. Moritz there is only one main departure signal that applies to all platforms departing for the North. If the main departure signal applies to a specific platform then the associated Clear Track Signal displays four vertical white lights. If the main departure signal does not apply to a platform then the associated Clear Track Signal displays four horizontal white lights and the driver must not pass the indicator.

#### 4.4 Group Signal Stopping Points

At locations where one departure signal is shared between multiple tracks, a Group Signal Stopping Point is used on each track with a sign showing a downwards pointing arrow. This arrow sign tells the driver where to stop if the shared main departure signal does not currently apply to his/her track. There are different types of Group Signal configurations, some with additional indicators mounted on the main departure signal; however these other types are not used on this route.

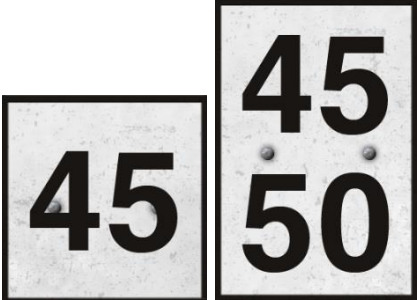


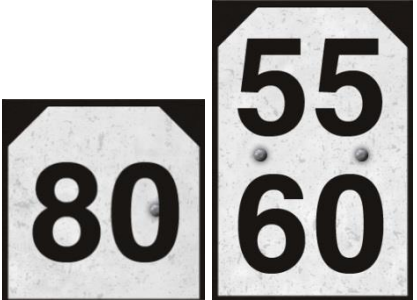
On the Albula Line a new type of Group Signal Stopping Point has been installed at Filisur station as shown below. These stopping points have indicators that illuminate with a white arrow to indicate that the departure signal currently applies to this track and that the driver has permission to proceed up to the departure signal. If it is not illuminated then the driver must stop at the arrow sign.



## 5 Trackside Signs


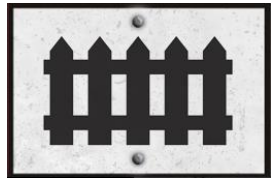
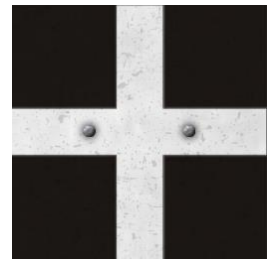

### 5.1 Speed Signs

The line speed on RhB routes is advised using track speed signs. For a reduction in speed the driver first sees a Reduce Speed sign that indicates the target speed. The driver must then reduce his speed before passing a commencement sign situated ahead of the first sign. Main Signals always override any speed indicated by a trackside sign.

	Meaning	Signs
Reduce Speed	<p>Reduce your speed to that shown on this sign before you reach the next speed restriction commencement sign.</p> <p><i>If the sign shows two speeds the higher speed applies to passenger trains and the lower speed to freight trains.</i></p>	
Speed Restriction Commencement Sign	Your train must have reduced speed to that advised at the previous Reduce Speed Sign before passing this sign.	
End of Speed Restriction Sign	If the speed restriction is on a short section of the line then this sign indicates that the driver can return to the speed prior to the speed restriction once the rear wagon or coach has passed this sign.	
Increase Speed	<p>This sign indicates that the driver can increase the train speed once the rear wagon or coach has passed this sign to the speed shown.</p> <p><i>If the sign shows two speeds the higher speed applies to passenger trains and the lower speed to freight trains.</i></p>	



## 5.2 Other Signs

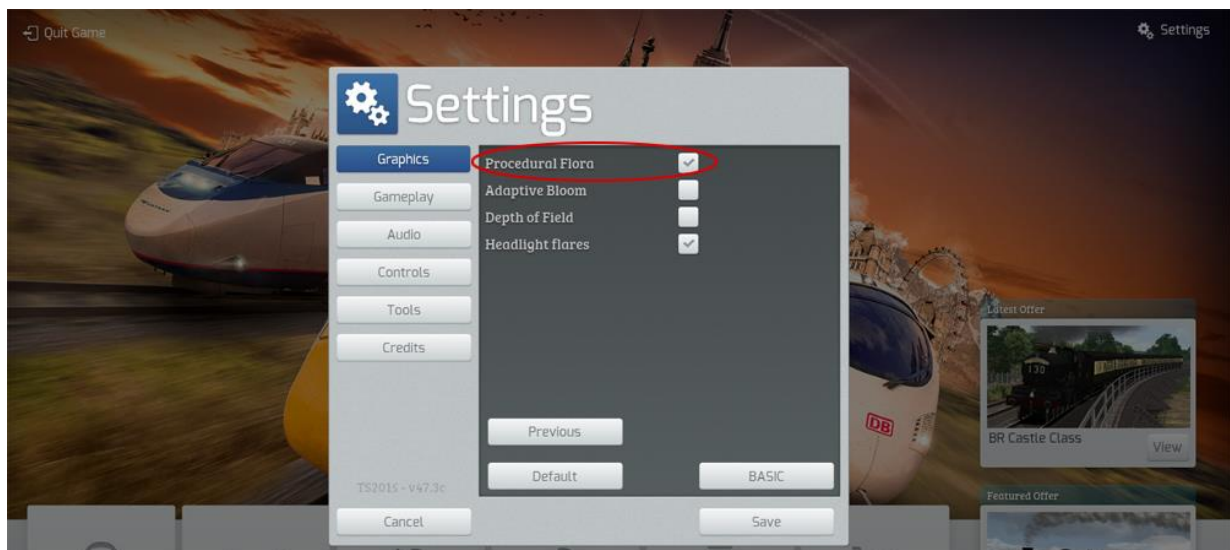
	Meaning	Signs
Whistle Sign	The driver should sound his whistle or warning horn at this sign.	
Level Crossing Sign	This sign is mounted on signal posts prior to a level crossing.	
Limit of Shunting Sign	Outside station areas these signs indicate the limit of shunting operations. During scenarios you do not need to obey these signs as they are only positioned for visual completeness.	
End of Electrification Sign	<p>Where the overhead catenary wires end, these signs are used to alert the drivers of electric trains to proceed no further than the sign.</p> <p>They are suspended from the catenary wires or mounted on the junction indicators where only one route ahead is not electrified as shown below.</p>	



## 6 Procedural Flora



This route has been designed making full use of the simulator's procedural flora functionality. We have designed all new ground textures that feature shrubs and grasses. To make these visible and get the best visual experience of the route we advise that you turn this feature on in the main settings menu as shown below. If you are running a less powerful computer you may get an increase in performance if you turn this setting off.



## 7 Content Creators - Terms and Conditions

### 7.1 End User License Agreement (EULA)

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- Route Enhancement Patches
- Audio Enhancement Packs

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We encourage the non-commercial creation of scenarios for our routes. We prefer these to be distributed through the Steam Workshop so that they are easily available to all players. However non-commercial (Freeware) scenarios may be distributed via other channels as long as there is no commercial charge or gain for the author.

## 8 Acknowledgements

We would like to thank the Rhaetian Railway for their assistance in developing this route and for permission to use their branding on models included with this product.

We also wish to thank the Dovetail Games third party partner team and beta testers for their help and support.

- end -