History

The Great Northern Railway completed its link to the Puget Sound port of Seattle in 1893. Originally, the track alignment required trains to negotiate a treacherous series of switchbacks to make the crossing over Washington’s Cascade Mountains. A few years later, in 1900, the first Cascade Tunnel opened and the switchbacks were eliminated. The tunnel, at 2.6 miles (4.2 km) in length, made the journey less subject to severe winter weather. Due to fume problems from the coal-burning steam locomotives used in those days, the railroad decided to electrify the stretch between the towns of Wellington and Cascade at the opposite ends of the tunnel, and the electrification project was completed in 1909. Steam trains arriving at the tunnel would have their fires banked off or dumped, and electric locomotives would haul the train to the other end of the tunnel where steam power could be restored. Electricity was supplied at 6,600 Volts by a new 5 MW hydroelectric plant located next to the original right-of-way, alongside the Wenatchee River in narrow, winding Tumwater Canyon, just west of Leavenworth. The power supply was three-phase AC, an early design that required two overhead contact wires.

Unfortunately, the tunnel area continued to be plagued by snow slides. In 1910, an avalanche at Wellington (renamed "Tye" after the incident) killed an estimated 100 people. It was the deadliest avalanche disaster in US history, and it prompted the construction of a new, longer tunnel at a lower elevation. Upon completion of the new, 7.8-mile-long (12.6 km) Cascade Tunnel in 1929, portions of the railroad between Leavenworth and Scenic were realigned to the present-day right of way. That year also saw the extension of the electric catenary system along the 73-miles (117km) of trackage between Skykomish and Appleyard in Wenatchee—this time with a more modern 11,000 Volt, single-phase AC system.

A mechanical ventilation system was installed at the east end of Cascade Tunnel in 1956, thereby allowing the tunnel to be used by diesel locomotives. This eliminated the need for the electric helper locomotives, and electrification was removed that same year.

In 1970 the Great Northern Railway became part of what today is the BNSF Railway.
About the Route

The Cascadian route for Train Simulator is a backdated version of the popular Stevens Pass route, which was originally released in 2013. Both the Cascadian and Stevens Pass were developed by the same team of railroad simulation enthusiasts. While the Stevens Pass route depicts present-day operations on BNSF’s Scenic Subdivision, the target era of the Cascadian route ranges from 1928 to 1956, so there’s a lot more operational flexibility. You can operate steam, electric or diesel locomotives on the route, as would be appropriate for the date specified in the scenario you’re running. If you opt for the earlier end of the target era, you will probably want to take the original route through Tumwater Canyon and cross the Cascades via the original, shorter 1900 tunnel. In the later years it’s more likely you will follow the shorter, modern-day route through Chumstick Canyon and the newer 1929 tunnel. Just remember, neither tunnel at the time had been equipped with a ventilation system, ruling out the passage of diesel- or steam-only trains. It’s perfectly all right to use the powerful Y-1 electrics to haul such trains along either route – and through the tunnels – because that’s exactly what the Great Northern did!

There are also plenty of opportunities to operate “short line” scenarios, running smaller freight and passenger trains between the numerous local industries and flag stops.

For best results, the following two DLC packages, available on Steam, should be installed on your system: European Loco & Asset Pack and US Loco & Asset Pack. If you purchased RailWorks DLC for TS2012 or earlier, chances are you already own these packs. To make sure, look in your RailWorks folder under subfolders Assets\Kuju. If a folder named RailSimulator is present you have the European pack, and if a folder named RailsimulatorUS is present you have the US pack.

Some scenarios included in the Cascadian pack require the GN 4-8-4 Northern steam locomotive to be installed on your system. The locomotive is available as a free download at Railworks America.
The Y-1 was an AAR 1-C+C-1 electric locomotive, of which eight were built for the Great Northern Railway between 1927 and 1930 and numbered 5010-5017. The locomotives were assembled at Schenectady, New York, with car bodies manufactured by American Locomotive Company and electrical components by General Electric. They used motor-generator sets to rectify the 11,000 Volt alternating current line voltage to 750 Volt direct current for the traction motors. The locomotives saw service on the electrified portion of the Great Northern from Wenatchee to Skykomish, including the Cascade Tunnel, in Washington State.

In the mid-1930s, GN modified the locomotives by adding an overhead 11,000 Volt bus bar to electrically connect locomotives operating in multiples. This was done as a safety measure to avoid the need for work crews to handle any high-voltage MU connectors. In order to accommodate this
change, the headlights were moved to the front of the cabs and the bells were moved beneath the cab-entry platforms. Later, in the 1940s, the locomotives were given their iconic Empire Builder paint scheme.

In 1956, the GN dieselized its operations, including through the Cascade Tunnel. The overhead electrical system was decommissioned, and the Y-1 locomotives were sold to the Pennsylvania Railroad, which classified them as FF2.

**Y-1 Cab**
### Y-1 Controls

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### Y-1 Instrument Group

- **a** Compound brake gauge
  - Red – Main reservoir
  - Black – Equalizing reservoir
- **b** Compound brake gauge
  - Red – Brake cylinder
  - Black – Brake pipe
- **c** Volt meter (DC volts to traction motors)
- **d** Ampere meter
- **e** Speedometer
- **f** Toggle switch group (left to right)
  - Cab interior light$^2$
  - Gauge lights$^3$
  - Forward marker lights$^4$
  - Rear marker lights$^5$
- **g** Indicator light group (left to right)
  - Wheel slip
  - Forward pantograph$^6$
  - Rear pantograph$^6$
  - Traction motor ventilation fans (total four)$^7$
- **h** Pantograph auto-manual selector$^6$
Notes:

1. A regenerative brake behaves similarly to the way a diesel-electric dynamic brake behaves. However, whereas a dynamic brake dissipates energy generated by the traction motors as heat in a grid of resistors, a regenerative brake feeds that energy back into the overhead power supply.

2. Shortcut key L. You can also click on the lights to turn them on.

3. Shortcut key K.

4. Shortcut key Shift+J. Repeated pressing this key combination, or clicking on the switch, cycles the forward marker light through its various aspects.

5. Shortcut key Ctrl+J. Repeated pressing this key combination, or clicking on the switch, cycles the rear marker light through its various aspects.

6. When the Expert gameplay setting is chosen, control of the pantographs can be Manual or Automatic, depending on the setting of selector switch h. The default setting is Automatic. In cab view, click on the selector switch to change settings.

   In Automatic mode, the front or rear pantograph will be automatically raised depending on the position of the Reverser control (2). When the Reverser is in its neutral position, both pantographs are lowered and the engine is shut off. In Automatic mode, the pantograph control levers (13) are operable but they have no effect.

   In Manual mode you can raise or lower either or both pantographs using the pantograph control levers (13) or their shortcut keys (I and O). GN engineers sometimes operated with both pantographs raised as a safety measure where redundancy might be desirable, or during winter icing conditions.

   When the Simple Controls gameplay setting is chosen, the pantographs behave similarly to Automatic mode as described above, except neither the selector switch (h) nor the pantograph control levers (13) are operable.

7. The vent fan indicator lights are illuminated when at least one pantograph is raised, thereby connecting the engine to the overhead power supply.
Freight Cars

Boxcars, Steel

Pullman-Standard 40 ft PS-1, in six GN lettering styles.

Boxcars, Wood

USRA 40 ft double-sheathed, in seven GN lettering styles; four USRA DS in various colors, unlettered; five USRA outside-braced in various colors, unlettered.
Caboose

GN-X200, wood and steel, 2 lettering styles each.

Flatcars

50 ft Class FM, GN lettered, 10 different loads and empty, optional stanchions and bulkheads; 30 ft truss rod, optional stanchions and bulkheads.
Gondolas

43 ft steel, GN lettered, 7 different loads and empty.

Hoppers

55-ton GN lettered, coal; 70-ton GN lettered (2 styles), coal; USRA unlettered, coal, gravel, limestone, ore loads.
Reefers

Steel and wood, GN lettered and unlettered, hatches open or closed.

Stock Cars

USRA outside-braced, GN lettered, with or without cattle loads.
Tank Cars

USRA “OTLX” 10,000 gallon and 8,000 gallon.

Specialty Cars
Crane car, pickle car, skeleton car

The whole set at once. No two alike!
Passenger Cars

Coaches

Pullman green and Empire Builder.
Baggage

Pullman green and Empire Builder.
Trackside Signs

The Great Northern used a number of unique trackside signs of which the following can be seen along the Cascadian route.

Left to Right: Milepost, distance in miles from St. Paul, Minnesota; Speed limit sign in miles per hour for passenger (P) and freight (F) trains, placed either one mile ahead of a reduced speed zone or at the beginning of a zone with increased permitted speed; Restricting sign ("Tiger sign"), placed one mile after the speed limit sign at the start of a reduced speed zone to indicate where the speed reduction actually begins; Grade crossing whistle post; Siding clearance in number of car lengths to the previous siding turnout, each car assumed to average 50 feet in length; Siding capacity in number of 50-ft cars; Flanger sign, placed on both sides of any track obstruction, e.g. bridges, turnouts and crossings, that could damage a snow flanger if not raised.

Left to Right: One mile to Junction; One mile to Station; The text on the remaining four signs on the right is self-explanatory.
Automatic Block and Interlocking Signals

Rule 501 A / 601 A

**Stop Signal**

Indication: Stop.

Rule 501 AA

**Stop and Proceed Signal**

Indication: Stop, then proceed at restricted speed.

Rule 501 AAA

**Permissive Signal**

Indication: Proceed at restricted speed without stopping.

Rule 501 B / 601 B

**Approach Signal**

Indication: Proceed on main route prepared to stop at next signal. Train exceeding medium speed must at once reduce to that speed.

Rule 501 C / 601 C

**Clear Signal**

Indication: Proceed on main route.

Rule 501 D / 601 D

**Secondary Route Signal**

Indication: Proceed on secondary route.
Rule 601 E

**Restricting Signal**

Indication: Proceed at restricted speed.

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**Train Order Signals**

Rule 200 A

**Stop Signal**

Indication: Stop for orders.

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Rule 200 B

**19 Order Signal**

Indication: Proceed under clearance or train order and clearance.

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Rule 200 C

**Clear Signal**

Indication: Proceed.
Train order signals are installed at various stations and depots along the route. Unlike the automatic block and interlocking signals, the train order signals do not actually interact with the player or AI services. Nevertheless, their signal state can still be set by the scenario author.

Open the 2D map (9 key) and look for a set of switches buried underground near the train order signal. Setting these switches changes the state of the train order signal.

A straight path on these buried switches indicates a CLEAR train order signal.

There are no train orders. Proceed without slowing or stopping.

Setting the **second** switch from the center at a train order signal makes it show ORDERS.

Proceed slowly (15 mph or less) and pick up orders from the agent while on the move.

Setting the **first** switch from the center at a train order signal makes it show STOP.

Stop the train, go into the depot and pick up orders from the agent.
**Scenarios**

The Cascadian route package includes a selection of Standard, Quick Drive and Free Roam scenarios. A growing collection of Standard scenarios may also be downloaded for free from the file library at the Railworks America web site (http://railworksamerica.com/index.php/download-library). Some of the Standard scenarios require locomotives that are not included in the Cascadian package, but which are available as freeware from the RWA site. No Career scenarios are provided.

**Standard Scenarios**

**Cattle Drive (3 Parts)**

It's the fall of 1938 and today our assignment is to transport a shipment of cattle headed west. Too bad it's not a happier ending to their journey, but let's maintain smooth running and keep our "passengers," including their drovers (livestock handlers), as comfortable as possible. We begin our journey in Part 1 at 9:00 am just outside of Leavenworth with a set of empty stock cars which we'll exchange for loaded cars at Chumstick. In Part 2 we pick up additional loads at Winton, then proceed up to the yard at Cascade Tunnel where the cattle can be fed and watered. In Part 3 we'll be under way again, heading downhill to end our day at Skykomish. Total Duration: 3:10 hours.

**The Oriental Limited (3 Parts—requires GN 4-8-4 Northern)**

The Oriental Limited runs from Chicago to Seattle starting on the CB&Q, and continuing on the GN beginning at St. Paul. This being early 1928, the new track alignment is not complete and the electrification extension to Appleyard has yet to be energized. Your locomotive is a 4-8-4 Northern and your job is to take the train as far as the Cascade Tunnel yard where the locomotive's fire will be banked prior to its running through the tunnel. In Part 1 you'll make a brief stop in Leavenworth. Then in Part 2 you'll continue through Tumwater Canyon and up to the tunnel. In Part 3 you'll board a Y-1 electric, couple it to the Limited, and guide the train down to Skykomish. At that point a different crew will re-fire the 4-8-4 and take it to Seattle. Your timetable is identical to the Great Northern Railway's July 1928 timetable. It's now 11:20 am, time for you to depart Appleyard on this clear summer day. Total duration: 3:22 hours.

**Heavy Electric (3 Parts)**

Your assignment it to haul a heavy freight train over the Cascades, a task that will require three Y-1 electrics at the point. It's 9:30 am on a crisp spring day in 1946. In Part 1 we're cleared to depart Appleyard. We need to be aware that there's other traffic on the road and at Monitor we'll be making a stop to pick up additional orders; we'll do so again at Berne. In Part 2 we depart Berne, make the run through the new tunnel, then stop again at Scenic. In this part and the following part we'll need to make full use of the regenerative braking system. In Part 3 we make the long downhill run to our final destination in Skykomish. Total duration: 2:40 hours.
Train 38 (3 Parts—requires GN 4-8-4 Northern)

Train 38 is the eastbound leg of a passenger daily running between Wenatchee and Skykomish. The train makes a morning run westbound and is then turned at Skykomish for the afternoon return. The train is a local so expect to make many stops. Here’s the original timetable for Train 38; read upward in the right-hand column for eastbound trains.

In Part 1 we depart Sky at 3:05 pm on a winter day, and make our way to Cascade Tunnel yard. In Part 2 we would normally make a crew change at Merritt, but word is our replacement has gone missing. Unfortunately that means we’ll have to continue to Winton and, in Part 3, take the train all the way into Wenatchee. Total Duration: 3:45 hours.

Quick Drive Scenarios

The Quick Drive scenarios will allow you to run trains eastbound and westbound over either the original pre-1929 alignment or the post-1929 revised alignment. See the route map above for more information.

Acknowledgements

Principal Authors: Jim Friedland, Rick Grout, Michael Stephan.

Additional Contributors: Wayne Campbell, Rich Chargin.
Known Issues

The Cascadian route has many deck-plate girder bridges which were modeled using loft objects. Occasionally, the game engine will not draw the end portions of these lofts, for example bridge abutments and piers, either as they approach the edge of your screen or simply not at all.

Trains entering a tunnel pass through a "tunnel hole decal," a feature that's designed to prevent the terrain layer from being shown inside the tunnel portal. Occasionally the game engine will ignore the decal, causing the terrain to falsely appear to be blocking the tunnel entrance. Fortunately, this will not affect your train or cause a collision.

Road segments having traffic managers ("car spawners") have a limited length, so in places you will see cars popping in and out of view. Also, traffic managers do not always spawn cars, and sometimes all the spawned cars are seen to vanish at once.

Grade crossings sometimes behave improperly. Problems may include gates not closing, premature gate opening, road traffic not stopping, or lack of audio.

Tunnels over 500 m in length will have unintentionally lit areas at each 500 m joint.

In addition to the behavior described above, some scenery assets or audio elements may at times appear to be missing or partially missing. Users may experience frame-rate stalling in areas of high-density scenery. These issues may be due to system limitations or memory issues. For best results the Cascadian route should be run immediately following a fresh operating-system boot and in full-screen mode. You can also improve performance by reducing the game's Graphics Settings, but be aware that improved performance comes at the cost of lower visual quality.
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